Sumak Kawsay. Author: Luis Lozano (2016)

ACTIVE TRANSFORMATIVE PATHWAYS FOR LOCAL AGRI-FOOD SYSTEMS

Drawing and applying an integrated framework to assess agri-food systems vulnerability under the political paradigm of food sovereignty in Ecuadorian Andes

Ph.D. Dissertation

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Virginia

ABSTRACT

Taking into account the limitations of official approaches for addressing agri-food research, as well as their associated policies to tackle the problems of hunger and vulnerability of agri-food systems to global change, it becomes necessary to consider new frameworks and alternative policies for research and management of agri-food systems. With this thesis we contribute to the advances of agri-food research by rethinking the way of conceptualizing the agri-food system and by designing and testing analysis tools capable to link the research process with the management dynamics found in the local territory. We focus our attention on those linked to the political paradigm of food sovereignty. To achieve this objective we adopted a deductive and inductive method of research, organized in three phases. During the first phase, and under the wider umbrella of Sociology of Agriculture and Food, we developed a conceptual and theoretical framework which integrates systemic thinking and development studies capable to analyze the political paradigm of food sovereignty. For this purpose, we linked the approach focused in the analysis of socio-ecological systems (SES) with the vulnerability approach focused in the analysis of actors' dynamics. As a result, we have obtained an integrate framework that address the ecological and social dimensions of agri-food systems. During the second phase, we tested the framework developed in an empirical case study of a local agri-food system of the canton of Loja, located at the Southern Ecuadorian Andean region. The case is of particular interest due to the recent consideration of *comunas* and barrios as basic units for citizen participation within decentralized autonomous governments; and, the parallel process of creation of new collective action organizations, such as the recently conformed *Agroecological Network of Loja (RAL)*. Using empirical data obtained from a survey conducted between December 2013 and March 2014 based on questionnaires to households (N = 116) and interviews to key informants (N = 14). We analyzed the role of social and institutional factors on the local agri-food system configuration taking into account the pillars of food sovereignty within the analysis. The results showed the significant, but differentiated, role of institutions (*Agroecological Network of Loja*), social groups (*Saraguro* indigenous culture) and income generation strategies on the agri-food system configuration. During the third phase, we assessed the future vulnerability vs resilience of local agri-food system through a participatory scenario development process. Using data obtained from semi-structured interviews (N = 14 and N = 25) and two workshops we analyzed the future trajectories of transformation for the local agri-food system under multiple ecological, socio-economic and political drivers of change. Four scenarios were envisioned by local actors. This assessment showed how drivers of change can affect different components of the local agri-food system when it is conceptualized as SES; and, how different perspectives contribute to build different future trajectories of active

transformation. Overall, the results of the research process emphasize the role played by actors (understood as an intersectional group where gender takes meaning from its intersection with ethnicity and class) and novel institutional arrangements action to star the active transformation of agri-food systems in the marginal Andes. These findings have implications in agri-food systems policy design at local level, where the local peasant initiatives of social innovation have to be seen as potential mean to achieve the materialization of the political paradigm of food sovereignty within Andean agri-food system.

Keywords

Agri-food systems, Andes, Food sovereignty, Policy analysis, Participatory scenario analysis, Socio-ecological systems, Vulnerability

RESUMEN

Frente a las limitaciones tanto de los enfoques oficiales para la investigación agroalimentaria como de las políticas asociadas para abordar el problema del hambre y la vulnerabilidad de los sistemas agroalimentarios al cambio global, se hace necesario considerar nuevos marcos de análisis y políticas alternativas para el estudio y la gestión de los sistemas agroalimentarios. Con este trabajo de tesis nos proponemos contribuir al avance de la investigación agroalimentaria repensado la forma de conceptualizar el sistema agroalimentario y diseñando herramientas de análisis que vinculen el proceso de investigación con las dinámicas de gestión encontradas en el territorio local, enfocándonos en aquellas vinculadas con la soberanía alimentaria. Para alcanzar este objetivo hemos realizado un proceso (inductivo y deductivo) bajo el paraguas de la sociología de la agricultura y la alimentación, que hemos llevado a cabo en tres fases de investigación. Durante la primera fase, hemos desarrollado un marco teórico y metodológico que integra el pensamiento sistémico y estudios del desarrollo bajo el paradigma político de la soberanía alimentaria. Con este fin hemos vinculado el enfoque centrado en el análisis de los sistemas socio-ecológicos (SES) con el enfoque de vulnerabilidad centrado en el análisis de la dinámica de los actores. Como resultado hemos obtenido un marco integrado que aborda las dimensiones ecológica y social de los sistemas agroalimentarios, tal y como lo requiere el paradigma político de la soberanía alimentaria. Durante la segunda fase, hemos aplicado empíricamente el marco desarrollado en el sistema agroalimentario del cantón Loja, ubicado en los Andes del sur de Ecuador. Este caso de estudio es de particular interés debido a la reciente consideración de las comunas y barrios como unidades básicas para la participación ciudadana dentro de los gobiernos autónomos descentralizados; y, paralelamente, a la creación de nuevos procesos de acción colectiva, como la Red Agroecológica Loja (RAL). Usando datos empíricos obtenidos de cuestionarios a hogares campesino (N = 116) y entrevistas en profundidad a informantes clave (N = 14), realizada entre diciembre de 2013 y marzo de 2014, analizamos el rol de los factores sociales e institucionales sobre la configuración del sistema agroalimentario integrando dentro del análisis los pilares de la soberanía alimentaria. Este análisis mostró el rol significativo, pero diferenciado, de las instituciones (Red Agroecológica Loja), grupos sociales (cultura indígena Saraguro) y las estrategias de generación de ingresos para dar lugar a la configuración del sistema agroalimentario local. Durante la tercera fase, evaluamos la vulnerabilidad vs resiliencia del sistema agroalimentario local mediante un proceso de análisis de escenarios participativos. Hemos analizado las futuras trayectorias de transformación del sistema agroalimentario local bajo múltiples conductores de cambio (de tipo ecológico, socio-económico y político) mediante el análisis de datos obtenidos a partir de entrevistas semi-estructuradas (N = 14 y N = 25) y dos talleres. Los actores locales visionaron cuatro posibles

futuros escenarios. Nuestra evaluación muestra cómo los conductores de cambio afectan los diferentes componentes del sistema agroalimentario local cuando se lo conceptualiza como SES; y, cómo las diferentes perspectivas de los actores construyen diferentes trayectorias para la transformación activa del sistema. En general, los resultados del proceso de investigación enfatizan el rol que desempeñan los actores (entendido como un grupo interseccional donde el género se concibe a partir de su intersección con la etnicidad y la clase) y los nuevos arreglos de acción institucional para iniciar la transformación activa del sistema agroalimentario en los sectores marginales andinos. Esos hallazgos tienen implicaciones dentro del diseño de políticas para la gestión de los sistemas agroalimentarios a nivel local, donde las iniciativas locales campesinas para la innovación social tienen que ser vistas como un medio potencial para alcanzar la materialización del paradigma político de la soberanía alimentaria.

Palabras clave

Sistemas agroalimentarios, Andes, Soberanía alimentaria, Análisis de políticas, Análisis de escenarios participativos, Sistemas socio-ecológicos, Vulnerabilidad

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Home garden (*huerta*), Saraguro indigenous commune "Ñamarín" (2015). Photo by author.

"La agroecología no es sólo producción,
fortalecemos también el compañerismo, el trueque.
Estamos trabajando como dice una compañerita con el factor 'c',
el factor del cariño, de la comprensión, de la cordialidad (…)
porque todas de alguna manera miramos el mismo objetivo
que es cuidar nuestro territorio, nuestra alimentación, la salud,
y a la final, esto conlleva a cuidar la vida"

(Peasant woman of RAL)

CHAPTER 1: Introduction

1.1 Research motivation

> *We are living in the midst of this rapid and deep transition, so we cannot predict its outcome. But we can help to create the conditions and the intellectual tools whereby the process of change can be managed for the best benefit of the global environment and humanity* (Funtowicz and Ravetz 1993: 754).

Following the argument proposed by Funtowicz & Ravetz (1993), the strategies for solving complex problems in systems characterized by high levels of uncertainty (epistemological and/or ethical) require of assessments using inclusive criteria from wider communities, that it, to go from science *for* people to science *with* people. Within the boundaries of agri-food research and management, and to explore the agri-food issue within the current crisis of development, that means to consider the series of counter-movements which have been generated on the basis of the material and symbolic power of food (McMichael 2000). These counter-movements have built agri-food policy proposals linking nature, human survival, health, culture and local livelihoods to achieve alternative ways to manage the agri-food systems. As Rivera-Ferre (2012) proposes, to understand these links we require to consider how we carry out the agri-food research in order to rethink the study and management of agri-food systems (Rivera-Ferre et al 2013). The core motivation of this research is based on these considerations and on the emphasis given to the dialogue between academia and activism (Friedland 2008; Martinez-Alier et al 2011; Brower 2013).

Regarding my own academic process, I'm a biotechnology engineer and I started investigating the genes to arrive little by little studying the communities. Within this trajectory, I believe that a relevant inflection point was the attendance to a number of seminars about community work realized in 2010-2011 in the National University of Loja by university Cuban professors. My mother, who was subscribed to the master's degree in community development, invited me to participate to those seminars, which were part of the master. Those seminars opened my perspective beyond the natural sciences to put my academic interest in the linkage between natural and social sciences and the exploration of the dialogue between science and activism.

In the meanwhile, my motivation to explore alternative approaches to address the food issue increased in the light of the current political context in my country (Ecuador) since the promulgation of the new Constitution (Asamblea Nacional 2008). Within the new Constitution text, food sovereignty has been specifically proposed as a strategic objective and an obligation

of the State to ensure that individuals, communities, peoples and nations reach food self-sufficiency, permanently, based on healthy and culturally appropriate foods (article 281). This policy proposal is a national strategy to foster the *Sumak Kawsay* (in Quechua) or Good Living within the rural territories (SENPLADES 2009). Therefore, it is a potential tool for the management of agri-food systems based on public policies at national level, but it remains substantially not implemented at local levels and unexplored in terms of how to operationalize.

Lastly, my academic and political motivations were reinforced after knowing a series of initiatives of transformation towards more resilient Andean agri-food system in the canton of Loja, where I live. Indeed, in this territory there are a number of local peasant organizations which, under the paradigm of food sovereignty, are building alternative ways to transform and sustainably manage local Andean agri-food systems. The interest for investigating and supporting the initiatives generated from local communities is a shared motivation within my family. My mother, my brothers and I have worked together in the last few years from our different backgrounds (law, architecture, and engineering), to contribute to the wellbeing of our local communities. Specifically, we have been interested in making visible and recognizing the contribution of rural women within the transformation processes of agri-food systems, aiming to contribute to create the conditions for their political advocacy. Personally, I believe that it is my activist challenge engaged within the research.

1.2 Brief literature review on sociology of agriculture and food

Between the 1940s and the 1960s social sciences were dominated by functionalist perspectives, and adoption/diffusion frameworks dominated the agricultural sciences. Functionalist perspectives were focused on the adoption of new solutions based on modern technological farming, mainly through the diffusion of the Green Revolution. But these functionalist perspectives failed to explain well the existing social conflicts within the society. As a response to these perspectives many academics and activists, mainly from the 1970s, turned towards conflict perspectives to find explanatory frameworks to interpret socioeconomic development (Constance et al 2014). This gave rise to the sociology of agriculture and food (SAF) as a subarea of Rural Sociology and Sociology. The SAF begins in the 1970s, grew stronger in the 1980s and became established in the 1990s (Bonanno 2009). The SAF research constitutes a critical response to the inadequacy of adoption/diffusion models grounded in functionalist perspectives to explain the changes occurring in rural society and agriculture (Buttel 2001; Constance 2008). According to Constance (2008) the discourses on agri-food studies within the SAF have moved from ‘‘The Agrarian Question’’, ‘‘The Environment Question,’’ and ‘‘The Food Question’’ to “The Emancipatory Question” (Table 1.1). These questions address the convergence around the critique of conventional agri-food systems as unsustainable systems.

Through this trajectory, Alternative Agrifood Movements (AAM) can act as emancipatory agents to transform the agri-food system. All questions include social justice dimensions that have been pursued but constrained, mainly in the first three questions, by external factors that the fourth question attempts to address (Constance et al 2014). The issues concerning each question are explained below.

The Agrarian Question asks: "What is the relationship between the structure of agriculture and the quality of life for farmers and rural communities?" The **answer** is that conventional agriculture has a negative impact on the quality of life for most rural peoples. This critical response began in the 1970s, showing that modern technological farming ignores how development is both constrained by the national and international political economy, and it constitutes an ethnocentrist imposition of one culture upon another in the benefit of the elites' interests and at the expense of peasants and poor peoples. In later phases, the globalization of agriculture and Corporate Food Regime created the "Food from Nowhere" global commodity chains (Constance et al 2014). The scientific paradigm of New Rural Sociology or New Sociology of Agriculture (Buttel 2001), addressed this perspective, because the modernist conceptual frameworks that dominated rural sociology and sociology for the previous 30 years could not explain the social conflict (farm/debt crisis, the disappearing middle-sized farms, agribusiness market concentration, and structural adjustment linked to the failures of the development project) of the time. Initially, the new rural sociology was based on neo-Marxist interpretations of social differentiation in agriculture, especially the role of the state and business interest groups in maintaining the political economic system. Then, social constructivist perspectives criticized both functionalist and neo-Marxist interpretations for ignoring the role of social agency. As a result, the interpretations to address agri-food systems were moved from structuralist approaches to more reflexive and interpretive approaches (Constance et al 2014). An **example of alternatives** generated within the Agrarian Question is local food. Local food is an alternative agri-food system based on shorter food supply chains which creates social and economic benefits to farmers and their communities. However, some factors have constrained its transformative potential. For example, the focus on an "unreflexive localism" has led to overlook other sources of local structural inequality such as the sexism, classism or racism (Constance et al 2014).

The Environment Question asks: "What is the relationship between modern agriculture and the quality of the environment?", "What impact does industrial agriculture have on the environment?" The **answer** is that industrial agriculture is based on productivist production principles that privilege short-term profit over long-term sustainability, externalizing the negative ecological, economic, and social costs (Buttel 1996; Constance et al 2014). The

scientific paradigm of new rural sociology also was stimulated by the growing critique to the Green Revolution development strategies. In the last decades, the field of political ecology has focused on addressing issues linked to the environmental question (Galt 2013; Perreault et al 2015). Agroecology as a science also critics modern agriculture because undermines the ecological and social bases of peasant and small-farmer agriculture (Altieri 2002; Altieri and Toledo 2011). An **example of alternatives** generated within the Environmental Question is organic food (Constance et al 2014). Organic food is a model of agriculture regulated by formal legislation and implies a third-party certification. Their focus mainly on inputs instead of processes have led only to input substitution within agribusiness farms. Consequently, it has avoided the costly agro-ecological practices associated with organic production, thereby limiting their transformative potential (Constance et al 2014).

The Food Question asks: "What is the relationship between the conventional agrifood system and the quality of food it produces?" The **answer** is that conventional agri-food system is hazardous to the health of consumers, food workers, farm workers, farmers, food animals, and environment (Constance et al 2014). This critical response began in the 1990s. The Food Question expanded agri-food studies into new areas such as the relationship between food quality and consumer health, i.e., a shift from production to consumption studies (Constance 2008). The Food Question overtly links agriculture and food and brings the role of social movements and culture into the discussion, as consumers demand "Food from Somewhere" (Campbell 2009). Additionally, the Food Question formalizes the discourse on governance of the agri-food system as a mean that can both enable and constrain the development and transformative potential of alternative agri-food movements (Constance et al 2014). An **example of alternatives** generated within the Food Question is fair trade. Fair trade is an AAM based on a "quality label" with an overt social justice agenda to improve the lives of farmers and peasants in the global South. However some factors have constrained their transformative potential. For example, some quality labels have oriented towards a business model with low representation of civil society within their governance structure (Constance et al 2014).

The Emancipatory Question asks: "What is the relationship between the conventional agrifood system and social justice and civil rights?" The **answer** is that the corporate food regime privileges the market over civil society, which marginalizes the civil rights of the majority of the people on the planet (Constance et al 2014). The corporate food regime is a vector of the global development project, based on the "accumulation through dispossession" (McMichael 2005). Thus, the Emancipatory Question turns back toward political economy frameworks which assume that the global agri-food system works for the benefit of the rich countries and rich people over the poor countries and poor people (Constance et al 2014). This

shows a movement from new rural sociology to the political economy and political sociology of global agri-food systems (Buttel 2001). This also shows a change in the level of analysis, from approaches mainly linked to farm level to approaches that embrace the global level. Given that the alternatives proposed within the first three questions (e.g., local foods, organic agriculture, fair trade) have been constrained and coopted by market-based solutions, the Emancipatory Question emphasizes that the collective political action is necessary to counter the hegemony of this system (Constance et al 2014). Thus the SAF has evolved into a strong commitment to improve social relations and contribute to the emancipation of subordinate groups, linking the research with the political action (Constance 2008; Bonanno 2009; Constance et al 2014). An **example of alternatives** generated within the Emancipatory Question based on collective political action is the food sovereignty movement, this AAM embodies a diversity of responses corresponding to the re-spatialization of social and economic relations in the corporate food regime (McMichael 2005).

Moving to the Emancipatory Question implies that current SAF research is linked to the transformation of the conventional agri-food system to a more socially just alternative agri-food system. To do it the SAF research accompanies the analysis of existing social relations with a genuine desire to transform them (Bonanno 2009). Therefore, the frameworks used to analyze the agri-food systems should take into account approaches to analyze the structure of agri-food system and their process of transformation. In this line, our research aims to address with more emphasis the Agrarian and Emancipatory Questions under the constructionist approach of SAF, i.e., taking into account that the characteristics of contemporary farming cannot be correctly understood without considering culture and social agency (Bonanno 2009: 35). Thus, the thesis aims to give advance about the role of human agency for the transformation of agri-food systems.

Table 1.1 Questions that address the critique of conventional agri-food systems as unsustainable systems

Question	Explanation
The Agrarian Question "*What is the relationship between the structure of agriculture and the quality of life for farmers and rural communities?"*	The globalization of agriculture and Corporate Food Regime created the **"Food from Nowhere"** global commodity chains. Here, producers and farm workers often find themselves in precarious positions. Therefore, it produces a negative impact on quality of life for most rural peoples
The Environmental Question "*What is the relationship between modern agriculture and the quality of the environment?" "What impact does industrial agriculture have on the environment?"*	Industrial agriculture is based on productivist production principles and short-term profit. This model externalizes the negative ecological, economic, and social costs, most often through agribusiness manipulation of state policies The metabolic rift linked to the petro-economy threatens food security globally and contributes to

Question	Explanation
	global climate change
The Food Question "*What is the relationship between the conventional agri-food system and the quality of food it produces?"*	The conventional, chemical-intensive, monoculture agriculture and their industrial agri-food products are linked to environmental and socioeconomic externalities such as poor nutrition, obesity, food safety, food deserts, animal welfare, food and farm worker marginalization, and systematic rural depopulation. Therefore, the Food Question overtly links agriculture and food and brings the role of social movements and culture into the discussion, as consumers demand **"Food from Somewhere"**
The Emancipatory Question "*What is the relationship between the conventional agri-food system and social justice and civil rights?*"	The Corporate Food Regime privileges the **market over civil society**, which marginalizes the civil rights of the majority of the people on the planet. People of color and **women** suffer disproportionately in the global agri-food system The discourse on collective rights and entitlements of citizens protected by the state is replaced by neoliberal arguments about individual responsibility and choice in the market

Source: elaboration from Constance et al. (2014)

1.3 Approaches to analyze the responses of systems to changes

Resilience and vulnerability are two related approaches concerned with how systems respond to social, economic, political and environmental changes. However, each approach considers systems in quite different ways (Table 1.2). The concept of resilience is derived from ecology theory, and it is focusing mainly in ecological – biophysical dimensions. Resilience is often defined in terms of the ability of a system to absorb shocks, to avoid crossing a threshold into an alternate and possibly irreversible new state, and to regenerate after disturbance (Resilience Alliance 2009; cited in Miller et al 2010: 3). Resilience research has generally been more strongly influenced by a positivist epistemology, arguing that phenomena can be objectively defined and measured (Lincoln et al 2011). Regarding governance, it is often interpreted in an apolitical sense in resilience research (Miller et al 2010). However, one limitation of the concept of resilience lies in its inability to address the active agency of actors to analyze the responses of systems to changes. Here, the term agency is conceptualized as the capacity of an individual or group to act independently (Berkes and Ross 2013). Addressing the agency is relevant given that only humans anticipate to change and use social, political and cultural means to influence resilience (Berkes and Ross 2013). Therefore, it is necessary the integration of resilience approach with other approaches that allow to address the social dimension of complex systems (Cote and Nightingale 2012). In this sense, the vulnerability approach, conceptualized from a constructivist perspective, mainly linked to social theory, allows addressing the social and political dimensions of systems during its responses to changes. This actor-oriented approach addresses the interest, values, knowledge, and agency of actors allowing examination of social

issues such as power, social change, access, entitlements, conflicts and equity (Miller et al 2010), issues relevant within the SAF to address the role of culture and social agency and to link the research with the political action (Constance 2008; Bonanno 2009; Constance et al 2014). The integration between system-oriented and actor-oriented frameworks allows to consider the transformability as a core property of a resilient agri-food system (Darnhofer 2014). Here the transformability is understood as the capacity to transform the system when ecological, economic, or social structures make the existing system untenable (Folke et al 2010). This transformation is active when the transformation is introduced deliberately by the agency of the actors (Folke et al 2010; Berkes and Ross 2013). It implies to recognize the paradigms and structural constraints that impede the transformation, as well as, the incorporation of new rights claims and changes in political regimes to facilitate and give way to active transformation of the system (Pelling 2011). Linking active transformation with the study and management of agri-food systems implies to place the agri-food study within an alternative frame of research and addressing the management of agri-food systems under an alternative political paradigm (Rivera-Ferre 2012; Rivera-Ferre et al 2013). Bellow, the approaches commonly used for the analysis and management of agri-food systems are explained.

Table 1.2 Analysis of responses of complex systems from resilience and vulnerability approaches

	Resilience	**Vulnerability**
Epistemological distinction	Positivist approach	Constructivist approach
Theory	Ecology theory	Social theory
Major scientific disciplines	Natural sciences	Diverse in terms of disciplinary and cultural contributions
Dimensions	Ecological – biophysical dimensions	Socio – political dimensions
Focus	Systems to changes (system dynamic)	Actors to changes (actor dynamic)
Governance	Apolitical sense	Political sense

Source: elaboration from Miller et al. (2010)

1.4 Agri-food study under different research frames

In agriculture and food policies many complex goals exist, being one of them to achieve food for all. In this context, food should be conceived as a human right (UN 1948; De Schutter 2014), with both material and symbolic power, given it embodies complex links between nature, human survival, health, culture and livelihood (McMichael 2000). To understand these interrelationships is necessary to rethink the way agri-food systems' are studied and managed (Rivera-Ferre 2012; Rivera-Ferre et al 2013). Rivera-Ferre (2012) suggests that agri-food

system studies are mainly determined by both the role granted to agriculture in society and the role of science in society under the current concept of development, resulting in two different research framings: alternative and official (table 1.3).

Table 1.3 Agri-food assessments characteristics under different research framings

			Official	**Alternative**
Vision of science			Instrumental vision of science Positivist approach	Complex vision of science Constructionist approach
Object of study		*Agri-food system*	Simple system or simplification processes	Complex and adaptive socio-ecological system
	Production	*Agricultural systems*	Industrial agriculture	Peasant agriculture
		Seeds/breeds/ cultures	Few species/varieties + monoculture	Multiple species/varieties + polyculture
	Transformation		Uniform international and national standards to food safety	Participatory and context specific regulations
	Distribution		Long distribution–processing–storage (exports)	Short food supply chains
	Consumption		Nutrition improvement	Nutrition improvement linked to healthy and culturally appropriate food
Methodology and research process		*Interdisciplinarity/ Transdisciplinarity*	Null or very little. Fragmentation social–natural sciences	High
		Major scientific disciplines	Natural sciences	Social and political sciences
		Economic science	Classical economy/bioeconomy	Political economy/ecological economy
		Type of knowledge	Formal knowledge	Traditional/ indigenous + formal knowledge (*Diálogo de saberes*)
		Participation	Small, null participation	High
		Production and knowledge transfer	Top-down transfer of knowledge	Co-production of knowledge (science with people)
Results		*Solutions* *Technologies*	Panaceas Non-replicable technologies	Diverse Appropriate technologies
Policy responses			Economic growth, sectorial responses	Address power structures, alternative development path-ways, integrated response

Source: modified from Rivera-Ferre (2012)

1.4.1 Official frame

Within the official frame the **vision of science** is based on positivist and reductionist approaches of modern science. This means that the results of science are conceived as neutral and they are not value driven (Lincoln et al 2011). In this sense, the official frame favors the instrumental function of science. The main **object of study** is industrial agriculture linked to agricultural practices based on monoculture, with long distribution chains, favoring the "Food from

Nowhere" approach (see section 1.2). The **methodology and research process** tends to separate social and natural sciences to study the agri-food system, is more simplistic in analyzing the causes of hunger, of food price crises or other important issues affecting food security. For example, regarding the causes of hunger these assessments seen this problem as a lack of productivity (a technical problem) and thus they tend to separate this problem from other social (e.g., lack of access and control of productive resources), economic (e.g., free trade agreements that favor dumping) and ecological (e.g., climate change) problems. Thus, there is a simplification of research process (a reductionist approach) more based in natural sciences disciplines with null or very little participation of social sciences. The research process and methodology is mainly based in a formal knowledge, that is, a process that only favors the scientific and technical knowledge as tools to agri-food research process. In this type of scientific assessment the **results** usually lead to solutions more technical rather that social and/or political (Rivera-Ferre 2012). These solutions act as panaceas (unique and ubiquitous solutions to solve problems) to a given problem within the agri-food context boundaries; e.g., solutions such as the green revolution (Mann 1997) to address the production of food. Within the official frame the agriculture has as main role the contribution to development through economic growth, which subsequently leads to an increase of the social (e.g., nutrition improvement, income) and ecological (e.g., ecosystems stocks, flows) outcomes. Here these outcomes could be achieved, for example, with increasing the food production and the minimization of ecological impacts through the development of new technologies. From this narrative the **policy responses** are promoted mainly by major governments, the private sector (agribusiness, large farmers) and some multilateral institutions (e.g., World Trade Organization). Thus, the narrative of official frame has an economic focus and promotes market-centered policies. The new green economy proposals for agri-food and food security derive from this narrative (Rivera-Ferre 2012).

1.4.2. Alternative frame

Within the alternative frame the **vision of science** is based on a constructionist approach. This means that the knowledge creation is constructed in social discourses that categorize the word and bring phenomena into view (Talja et al 2005). The constructionist approach perceives reality as locally and specifically constructed (Lincoln et al 2011). In this sense, agri-food assessments depend on researches' world-views, values or paradigms which, in turn, affect the framing of agri-food research (Fjelsted and Kristensen 2002; Thompson and Scoones 2009). The main **object of study** is peasant agriculture and food systems linked to agricultural practices based on agroecological and peasant production models, with short distribution chains, favoring the "Food from Somewhere" approach (see section 1.2). The **methodology and**

research process tends to integrate social and natural sciences, and is more inter/trans-disciplinary in analyzing the issues affecting food security. Assessments have a stronger component of social sciences, and the methodology includes participatory tools in order to achieve a co-production of knowledge (science with people). Thus, this type of assessment tends to conceive agri-food system as complex socio-ecological system[1], defined as an integrated system of ecosystems and human societies with reciprocal feedback and interdependence (Folke et al 2010), to analyze the causes of hunger and other agri-food related problems. This definition emphasizes the humans-in-nature perspective. Agricultural and food systems show complex interactions associated with evolving environmental, agricultural, socio-economic and institutional systems that are heterogeneous in space and time, multidimensional in nature and with high variability, uncertainty and potential surprises (Chen and Kates 1994; Downing and Parry 1994; Ericksen 2008a; Ericksen 2008b; Liverman and Kapadia 2010; Rivera-Ferre et al 2013). According to Ericksen (2008a: 234-235) the agri-food system includes: (a) The interactions between and within biogeophysical and human environments, which determine the food activities. (b) The activities themselves, i.e., the production, process and package, distribution and retail, and consumption. (c) The outcomes of these activities, which can contribute to food security, environmental and social welfare, or in our case to food sovereignty. (d) And other determinants or drivers of these outcomes; stemming in part from the interactions, rather than food system activities directly. These dynamic interactions are vulnerable to short-term shocks (e.g., pricing) and long-term stresses (e.g., climate change) (Ericksen 2008a; Thompson and Scoones 2009). Alternative frame of agri-food research emphasizes that there are some structural reasons (e.g., lack of access and control of productive resources, differences in terms of power among countries) and temporary reasons (e.g., adverse climate conditions) to be addressed to analyze the problem of hunger (Rivera-Ferre 2012). From this perspective, it is proposed that enough food is produce today to feed 12 billion people (Ziegler 2008). Thus, agri-food research should not only focus within a productivist paradigm. Consequently, the **results** usually propose more diverse solutions, contextual to each social, cultural and environmental context (Rivera-Ferre 2012). The **policy responses** are linked to human rights, agroecological and participatory narratives (Thompson and Scoones 2009). These narratives are promoted by some parts of civil society and small peasant' organizations, such as La Vía Campesina (Desmarais and Nicholson 2013) and other multilateral institutions (e.g., United Nations Special Rapporteur on the Right to Food; De Schutter 2014). Here the agriculture has as main role the provision of a healthy and culturally adequate food, through a democratization of the agri-food system, which in parallel leads to an increase of the social and

[1] "Complex systems are characterized by strong (usually non-linear) interactions between the parts, complex feedback loops that make it difficult to distinguish cause from effect, and significant time and space lags, discontinuities, thresholds, and limits" (Constanza et al., 1993: 545).

ecological outcomes of agri-food system. Thus, alternative frame narratives have a right focus and promote people-centered policies. The proposals based on social justice and civil rights for agri-food systems, such as food sovereignty (La Vía Campesina 2009), are coherent with these narratives (Rivera-Ferre 2012).

1.5 Agri-food management under different policy frames

As outlined below, there are various policy approaches to address the problem of hunger (McMichael and Schneider 2011; Clapp 2014; Jarosz 2014; McMichael 2015). In this section we briefly describe the main policies to address the questions related to the food issue that have emerged from the official and alternative frames of agri-food research, as suggested by Table 1.3.

1.5.1 Food security policies

The food security discourse starts in the early 1940s when the United Nations Food and Agricultural Organization (FAO) was created to stabilize world agriculture and establish global food security. The FAO agenda included both the scientific modernization of world agriculture and the UN's Universal Declaration of Human Rights; the last to consider food as a human right (Constance et al 2014: 28). Food security is defined as "*a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life*" (FAO 2002). But, since its definition other issues began to infiltrate, such as the concern for the industrialization of agri-food systems, warnings about the environmental consequences of new technologies, and health related problems (Maxwell and Slater 2003). But all these issues have not yet been addressed in an integrated way within the food security policies. In the science-policy nexus, food security policies derive from official frames of research. These policies tend to follow a productivist paradigm where food security is measured in quantitative/monetized terms of market transactions, i.e., there is a privatization of food security via the corporate food regime (McMichael 2005). This occurred when FAO vision of food security based on universal human rights, was replaced in 1986 when the World Bank redefined food security as the ability to buy food. In 1994, the World trade Organization (WTO) institutionalized the global free trade regime and the market vision of food security (Constance et al 2014: 28). Currently, food security is understood in market supply terms, which assumes that the problem of food supply

can be solved through ecological modernization and sustainable intensification[2] (McMichael 2014). As McMichael and Schneider (2011: 119, emphasis added) mention:

> *There is thus a renewed focus on agricultural development, which pivots on the salience of industrial agriculture (as a supply source) in addressing food security. The World Bank's new 'agriculture for development' initiative seeks to improve small-farmer productivity with new inputs, and their incorporation into global markets via value-chains originating in industrial agriculture. An alternative claim, originating in 'food sovereignty' politics, demanding small-farmer rights to develop bio-regionally specific agro-ecological methods and provision for local, rather than global, markets, resonates in the IAASTD*[3] *report, which implies agribusiness as usual ''is no longer an option'.* ***The basic divide is over whether agriculture is a servant of economic growth, or should be developed as a foundational source of social and ecological sustainability***.

In this line, food security emphasizes the reliance on the global economy based on liberalized global markets, while food sovereignty emphasizes a local/regional control and self-sufficiency. "*Food security is more of a technical concept, and the right to food a legal one, Food Sovereignty is essentially a political concept*" (Windfuhr and Jonsén 2005: 15). Therefore, it is necessary to rediscover food policy (Maxwell and Slater 2003). In this sense, the alternative policy goal of food sovereignty, a term coined by the international peasant movement La Vía Campesina, emerged in the 1990s, to include different claims related to institutions, governance, and agricultural systems which go beyond the technical focus of food security.

1.5.2 Food sovereignty policies

Food sovereignty is fairly a new alternative policy goal and movement, first brought to international attention at the World Food Summit organized by Food and Agricultural Organization (FAO) in 1996, championed by the farming and peasant movement Vía Campesina and opposite to the neoliberal view of agri-food systems (Patel 2009; Altieri and Toledo 2011; Desmarais and Nicholson 2013; Rosset and Martínez-Torres 2014). Food sovereignty is defined as the right of peoples and nations to "*healthy and culturally appropriate*

[2] Sustainable intensification's philosophy, including all possible solutions and technologies, can provide a cover for environmentally destructive practices as well as corporate concentration of agri-food production, inputs and distribution. Therefore, the term must be used with caution (Collins and Chandrasekaran 2012: 23). On the other hand, there is another proposal, the ecological intensification, which is context-specific and ecosystem-based. Examples of models of ecological intensification are the practice of agroecology, diversified farming systems, eco-agriculture, agroforestry (Tittonell 2014b). As ecological intensification needs to embrace the complexity of the landscape, actions to support ecological intensification may often require collective decision-making, and calls for institutional innovation (Tittonell 2014b: 58). In this sense, agro-ecology is closed to food sovereignty movements (Altieri 2009).

[3] International Assessment of Agricultural Knowledge, Science and Technology for Development.

food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems" (La Vía Campesina 2009: 147). Stemming from this definition some priority areas emerge which can be analyzed through the so-called pillars of food sovereignty: access to resources, production model based on agro-ecological approaches, trade and local markets, consumption and right to food, social organization and agri-food policies. Below there is a brief description (based on Ortega-Cerdà and Rivera-Ferre 2010: 56) of each type of food sovereignty pillar.

(a) **Access to resources**: Food sovereignty fosters the processes, at individual and collective (household and community/association) levels, for access and control of resources. These processes take into account the "use rights" of indigenous and native communities; with a particular emphasis on access to resources by women. The resources include: land, genetic (seeds and livestock breeds), water, forest, credit, insurance and subsides, human-constructed facilities (e.g., local irrigation systems, new road construction).

(b) **Production models**: Food sovereignty fosters the household production based on agro-ecological approaches; taking into account the traditional/indigenous knowledge. These production models are linked to small-scale/peasant agriculture.

(c) **Trade and local markets**: Food sovereignty fosters the right of peasants to sell their food products to feed the local population. To do this, food sovereignty fosters activities of distribution and retail without the inference of middlemen (or with a minimum of involvement, depending on the context), i.e., through local and regional markets, and with fair prices.

(d) C**onsumption and Right to food**: Food sovereignty advocates that people have the right to healthy, nutritious and culturally appropriate food produced from agro-ecological models and by local producers.

(e) **Social organization**: This pillar is related with the social capital of organizations that support the food sovereignty paradigm. Social capital is understood here as the value of trust generated by social networks to facilitate individual and collective cooperation on shared interests and the organization of social institutions at different scales (Brondizio et al 2009: 255). Food, for these organizations, is conceived as a way to create social and political change. They challenge (collectively) the foundations of the conventional food system (Follett 2009). Thus, social organization (based on shared interests) is an intrinsic pillar to build the other four pillars of food sovereignty and thus, the emancipatory Question of food.

(f) **Agri-food policies**: Food sovereignty advocates that peasants have the right to know about, participate in and influence local public policies related to the agri-food sector. Thus, agri-food policies are included on all pillars of food sovereignty as elements that promote them.

Food sovereignty questioned the potential impacts and risks of agriculture industrialization and globalization on social (Patel 2007; Akram-Lodhi and Kay 2009), ecological (Foley et al 2005; Geiger et al 2010) and economic (Patel et al 2007; van der Ploeg 2012) contexts, e.g., their impacts on farmers across the world (the Agrarian Question), their contributions to climate change (the Environmental Question) or the growth of nutrition-related illnesses (the Food Question). These societal and environmental concerns have also been taking emphasis within the academia which has resulted in a dialectic and dynamic relationship between science and activism (Martinez-Alier et al 2011) in order to transform agri-food systems (the Emancipatory Question) (Constance 2008; Bonanno 2009; Constance et al 2014). Consequently, agri-food studies should adapt to these new proposals. To do it is necessary the development of integrated frameworks focused on the study of agri-food systems taking into account the structure and agency of agri-food systems and paying special attention to their institutional, socio-economic, and agro-ecological dimensions, as suggested by alternative research frames (Table 1.3).

1.6 Research gaps in agri-food research

We recognize two main gaps in agri-food research that will be addressed by the following dissertation.

Firstly, we recognize that research on agri-food systems conceptualized as SES is still limited and it doesn't explicitly introduce the political goals that frame the reflection on present and future of agri-food systems. Though the framework proposed by Ericksen (2008a) introduce in agri-food research the systemic approach, this framework is still based on a food security perspective for defining the objective of outcomes evaluation and policy design; additionally, the participation of actors is not yet considered. The food security perspective, unlike food sovereignty, not centers its focus on the agency of actors as key factor for the management of agri-food system. Thus, its technical approach acts as a barrier to link the responses of agri-food systems with the role of the agency to study the processes of active transformation of that occur within system.

Additionally, although there are agri-food studies that assess agri-food systems under polices of food sovereignty, they have centered their research mainly in the development of food sovereignty indicators (Ortega-Cerdà and Rivera-Ferre 2010; Reardon and Pérez 2010; Badal et al 2011; Binimelis et al 2014). However, indicators are not enough when analyzing agri-food systems as complex SES. They are not able, for instance, to study the system interactions under

different drivers of change and how they affect specific outcomes, namely those leading to food sovereignty. A key challenge in current agri-food research is thus to conceptually and theoretically adapt a systemic approach and socio-ecological system analysis applied to agri-food systems within an alternative research frame and food sovereignty policies objective.

The application of socio-ecological system approach shows some challenges in its application to analyze agri-food systems. First, there is still a gap of literature concerning empirical applications of socio-ecological system analysis to agri-food systems (Marshall 2015). Second, a systemic approach has mainly been used to address management of natural resources in which society is embedded and where ecological principles are used to analyze social dynamics, problematically assuming that social and ecological dynamics are essentially similar. As currently conceptualized a socio-ecological system analysis does not allow introducing normative questions, such as "whose objective of future for whom?" leaving behind the role of agency, worldviews and power that affect agri-food systems and determine different configurations. Changes to socio-ecological system approaches have been proposed to meet social theory. Cote and Nightingale (2012) argue that normative factors, including power relations and cultural values, are integral to social change and to the institutional dynamics that mediate human-environment interactions. They suggest that power operates in and through SES in ways that link together the social and conceptual as well as empirical levels. Understanding the role of context-specific agency and institutional processes to respond to global drivers of change is thus required for alternative agri-food research processes and food sovereignty policies to achieve active transformations of agri-food systems (Folke et al 2010; Pelling 2011; Berkes and Ross 2013; Darnhofer 2014).

To respond to the abovementioned gaps in agri-food research the purpose of this dissertation is to address the food question adapting a systemic approach and including social dynamics studies in human–nature interactions under the food sovereignty paradigm.

1.7 Objectives

The general objective is to contribute to the advance of agri-food research by rethinking the way of conceptualizing the agri-food system and by designing and testing analysis tools capable to link the research process with the management dynamics found in the local territory, under the emancipatory political paradigm of food sovereignty, in order to co-produce knowledge and democratize the design of agri-food policies.

We have proposed three specific objectives to achieve the general objective. These objectives have been addressed in the three papers that are the core of this thesis:

- To develop a framework to conceptualize the agri-food system as socio-ecological system (SES) placing the analysis under the political paradigm of food sovereignty;
- To analyze and understand the role of social and institutional components on the configuration of local agri-food systems by using a case study research in Southern Ecuadorian Andes;
- To assess and discuss the future trajectories of transformation of local agri-food system linking the final outcomes of agri-food system with vulnerability dimensions and food sovereignty pillars by using a case study research in Southern Ecuadorian Andes.

1.8 Empirical case of study

In this section we describe the relevant policies linked to Ecuadorian agri-food sector and the local context where the case study is located.

1.8.1. Ecuadorian government agri-food policies

This section attempts to synthesize the agrarian context in Ecuador during the last decades[4]. Here I emphasize on issues as the access to productive resources (stemmed from land struggles) and social movements[5] emerged from 1908 to 2016 to demand their access (Table 1.4).

Table 1.4 Chronology of major agri-food policies (emphasizing the land issue) and social movement organization in Ecuador from 1908 to 2016

Year	Major events
1908	- *Law of Beneficence* (known as the Law of "dead hands"). This law was the first attempt to address the concentration of land. This law retrieved the large landholdings from the Catholic Church
1937	- *Law of Commons*. This law tried to establish a new control system over the Indians, but it ended up becoming the basis for future expansion of the indigenous movement
1944 - 1945	- The *Confederación de Trabajadores del Ecuador* (CTE) and *Federación Ecuatoriana de Indios* (FEI) were founded. They were close to the Communist Party of Ecuador (PCE). Both organizations struggled against the landowner system and to achieve land reform. The FEI proposed "the economic emancipation of Ecuadorian Indians"
1960	- Some processes converge: The rise of the peasant and indigenous movement. Attempts to modernize (a process generated within the same landowner class). The political influence of the agrarian reform implemented by the Cuban revolution. The temporary crisis in banana production, the decline of coffee prices and the

[4] A more detailed analysis about the building process of agri-food policy in Ecuador, during the period of restoration of democracy (1979-2006), is described by Rosero et al. (2011).

[5] Here we limit the analysis to regional and national organizations of the indigenous and peasant movement, we do not address lower-level organizations that will be described in the case study research (Chapter 3 and 4).

Year	Major events
	political conflicts between groups representing the interests of the ruling classes
1964	- *Law of Agrarian Reform and Colonization*. This law stated: Removal of the precarious relations of production. Fragmentation of state farms and adjudication to precarious peasants. Pushing forward the process of agrarian colonization. Dismantle farmers' unions (which were under the influence of leftist parties). This law created the *Instituto Ecuatoriano de Reforma Agraria y Colonización* (IERAC)
1965 – 1972	- New social organizations were born. In 1965, the *Federación Nacional de Organizaciones Campesinas* (FENOC, precedent of the current FENOCIN). In 1969, the *Federación Nacional de Trabajadores Agroindustriales, Campesinos e Indígenas Libres del Ecuador* (FENACLE). In 1972, the Ecuador Runacunapac Riccharimui (ECUARUNARI). In the 70s, the Coordinadora Nacional Campesina Eloy Alfaro (CNC-EA). To fight for the land and respond to the precarious living conditions and existing jobs in the agricultural sector. The slogan of "*tierra para quien la trabaja*" spreads throughout the country
1970	- *Decree 1001*: Declares abolished precarious work in the rice-growing areas - Influence of the ideas promoted by the Economic Commission for Latin America (CEPAL): Land reform would act as a pressure mechanism for large and medium landowners, to provoke their transformation into agricultural entrepreneurs
1973	- *Agrarian Reform Law*. This law promoted the idea of "development of productive forces" through planned operations of affectation and land redistribution, as well as, access to credit resources, education and technology - During the 70s and 80s there was pressure from the Chambers of Agriculture (representing the landowners interests) to revocation and/or modification of the agricultural legislation
1979	- *Law on the Promotion and Development of Agriculture*. Law according to the demands of the landowners sectors. This law guaranteed land security to lands "effectively worked". The real purpose of the law was: production, social control and neutralization of the agrarian reform
1980	- The *Consejo de Pueblos y Organizaciones Indígenas Evangélicas del Ecuador* (FEINE) was created, as an organization that defends the indigenous culture and their rights especially with projects in health and education - The speech of the "rural development" begins to replace agrarian reform. The land reform policy is reduced to a lower political expression: land titling - Pressure of the Chambers of Agriculture for the complete abolition of legislation that legally enable the land claim
1981	- *Law of Forest, Natural Areas and Wildlife*. It was part of an effort to preserve "intact" great property located within the areas of environmental protection
1986	- The *Confederación de Nacionalidades Indígenas del Ecuador* (CONAIE) was created. Among its objectives posed demands for transforming the traditional state onto a multi-ethnic and multi-national state
1990	- The *Confederación Nacional del Seguro Social Campesino- Coordinadora Nacional Campesina* (CONFEUNASSC-CNC), was created. - *Indian uprising*. The flowering of mobilizations for the land played a decisive role during the preparation and development of the indigenous uprising of June 1990.
1994	- *Law of Agrarian Development*. Law formulated during 1993 and 1994 by landowners sectors. This law, approved in 1994, revoked the Agrarian Reform Law. Its main features are: promoting the land market; removal of all possible restrictions to rural properties transfer; state guarantee to medium and large property; authorization for the division of communal lands and their transfer to third parties through market mechanisms. At the institutional level, the IERAC was removed and replaced by the *Instituto de Desarrollo Agrario* (INDA). Since then, the peasant pressure for land will be confronted by the official and institutional framework through 2 mechanisms: (i) land titling, supported by the Inter-American Development Bank (IDB/BID) through of funding the Project of Regularization and Administration of Rural Lands (PRAT); and, (ii) the exchange of external debt for funding the land purchases for small farmers, supported by the World Bank
2000	- Different social movements participated in several campaigns against the free trade agreement with U.S. The negotiations were suspended and the process was archived

Year	Major events
	in 2006
2006	- Correa was first elected president in 2006 after a campaign with the support of the small left-wing Ecuadorian Socialist Party (PSE) and FENOCIN (FENOCIN is a member of the Latin American Coordinating Body of Rural Organizations (CLOC) at the regional level; and, *La Vía Campesina* at the global level). The government's official ideology and program is *Buen Vivir* (Good Living) socialism. *Buen Vivir* is a concept from the Andean indigenous cosmovision which, in general terms, establishes the purpose of social and economic life as "living well" rather than accumulation or material consumption
2007	- Under the constitutional process that characterized the national context, the *Colectivo Agrario* (integrated by CAFOLIS, FIAN, HEIFER, IEE, Intermón – Oxfam, *Colectivo Agroecológico*, SIPAE, VECO) was formed to reflect and collaborate with social organizations, giving technical contributions about agricultural issues
2008	- *New Constitution*. The National Assembly (a new institution created to replace the Congress) re-wrote the country's constitution, following a similar process to those of Venezuela and Bolivia. The constituent Assembly was viewed as key to the nation's re-founding and to reverse neoliberal economic policies. - Social movement organizations (e.g., *Mesa Agraria*) also participated widely in the elaboration of the new constitution through different tribunals and committees on particular issues and policy areas, which explains why many long-time demands were included in the new constitution, such as: the definition of public services as rights, the declaration of Ecuador as a plurinational and intercultural state; the banning of genetically modified organisms (GMOs); the recognition of the rights of nature; the commitment to support the social and solidarity economy and the commitment that the state should guarantee food sovereignty
2009	- *Law of Food Sovereignty* (LORSA). This law regulates the exercise of the rights of good living concerning food sovereignty. LORSA created the Plurinational and Intercultural Conference on Food Sovereignty (COPISA). National body that includes civil society representatives (e.g., Consumers working group) that has been created to develop laws and policies under the food sovereignty framework.
2010	- *Organic Law of Citizen Participation*. As a result of this law the Ministry of Agriculture (MAGAP) has created a National Campesino-Citizen Council as well as a structure that has the function of giving voice to farmers within the MAGAP. These structures have a non-binding advisory role in terms of government policies. - *Organic Code of Territorial Organization, Autonomy and Decentralization* (COOTAD). This law has granted new powers to the most local level of governmental institutions in Ecuador, the *juntas parroquiales*. *Juntas parroquiales* have been granted new responsibilities and a new importance in terms of both political representation and responsibility over different policy areas including agriculture and economic development, which presents new possibilities for institutionalizing food sovereignty initiatives at local level
2011	- *Law of Popular and Solidarity Economy* (LOEPS). According to this law, 5% of the budget for public procurement should be reserved for popular and solidarity economy sector. The LOEPS created the *Ecuadorian Institute of popular and solidarity economy* (IEPS). The main government institution responsible for fostering the social and solidarity economy in the country - *Law of Market Control*. This law establishes price controls for agricultural goods in markets, both for producers and consumers
2013	- In the 2013 presidential election, left political groups criticized the government, in particular *Pachakutik* and the *Movimiento Popular Democratico* (MPD), who ran a slate of candidates against Correa with former Correa-ally Alberto Acosta as the Presidential candidate. These parties supported Correa at crucial moments during the first days of his government in 2007, when he did not have many deputies in the Congress. The role of these parties, as well as pressures from CONAIE and FENOCIN, help to explain the institutionalization of food sovereignty as well as other concepts such as plurinationalism and the social and solidarity economy into the 2008 Constitution
2014	- Trade agreement with the European Union

Year	Major events
2016	- *Law of Rural Lands and Ancestral Territories*. Approved on January 7 by National Assembly (still waiting for executive power approval). This law regulates the use and access to land ownership recognizing its social and environmental functions. However, since it was proposed, the law has been criticized by indigenous and union sectors who claim that this law will favor large food industry, against the rural sector.

Source: elaboration from Rosero (1992a), Viteri (2007), Albó (2008), Brassel et al. (2008), SIPAE (2011a), Clark (2013), Altmann (2014), Asamblea Nacional (2016)

The first agrarian reforms in Ecuador prior to the Law of 1994 had a double face. On the one hand they facilitated the consolidation of capitalism within the Ecuadorian agrarian sector through the promotion of large landholdings transformation into in large units of capitalist production. And on the other hand, they facilitated the access to land to a very large number of people (process combined with the colonization of new land), leading to the generation of new smallholdings (Pascual 2006 quoted in Brassel et al 2008: 20-21). Parallel to the failure of those reforms, the markets and international policies, under a "green revolution" model[6], guided field production towards agribusiness and agro-exports. Thus, since the seventies, the harvested area dedicated to staple foods (e.g., bean, lentil, lima beans, white lupin, tomato, potato, cassava) was reduced to favor agro-industrial products (e.g., bananas, coffee, cocoa) (Brassel et al 2011). Land distribution and the control over the production and marketing chains have impacted on peasant economies. Indeed, the reality of Ecuadorian agricultural structures continue being deeply unjust. Within the Latin American context[7], Ecuador is one of the countries with higher levels of land ownership concentration, together with Peru, Guatemala, Venezuela, Paraguay, Colombia, Brazil and Argentina. At country level, the land concentration is higher in the *Sierra* (Andean) (Gini 0.81) than in the *Costa* (Gini 0.75) (Brassel et al 2008). In large properties, the land is mainly used for cultivated pasture (livestock) and permanent crops (agro-industry and export), that is, land uses characterized by higher profitability but with smaller contribution to food sovereignty. However, in smallholdings land is mainly used for domestic food consumption, which is less profitable (Viteri 2007). For example, Álvaro Noboa, a businessman and the biggest producer of bananas in Ecuador[8], (personally) has 8400 hectares of bananas in the Ecuadorian Costa region; this means that he controls (statistically) a thousand times more land than a small Ecuadorian banana producer. Additionally, he controls a large part of the commercialization and exportation of bananas (Brassel et al 2011: 28). Another example is the

[6] The agricultural model based on monoculture and the massive use of pesticides began in Ecuador through banana production to exportation. The FAO information about imports of pesticides in the period between 1972 and 2002 by the Andean Region countries reveals that Ecuador increased the value of its pesticides purchases 47 times, while Colombia, Bolivia, Venezuela and Peru did it in comparatively small quantities. Perennial crops (banana, oil palm, sugarcane and passion fruit) and transitory crops (rice and potato) based on monoculture are high consumers of pesticides (Brassel et al 2011: 132-135).

[7] Latin America has the world's highest levels for land ownership concentration (Brassel et al 2008: 23-24).

[8] Ecuador is the world largest exporter of this fruit.

PRONACA company, which has absolute control of chicken's market; i.e., the company controls the price almost everywhere in the country. This fact is worrying because chicken, like other products, are staple products. Additionally, in terms of food production, peasant production of chicken and other small animals supplements the peasant domestic economy (SIPAE 2010).

Regarding foreign investment in Ecuador, 10% is directed to agriculture; a percentage higher than that invested in countries like Peru, Honduras, Chile and Brazil. The agroindustry sector is the main target of investments by foreign companies, in large part in agro-export activities such as banana and flower production (Brassel et al 2011). In Ecuador, agro-industry has much more political and economic power and historically government policies have generally favored this sector (Rosero et al 2011).

The political changes occurred in the last few years, mainly related to the promulgation of the new Constitution (2008), suggest that Ecuador has initiated a process of political transition. The new Constitution incorporates the political paradigm of food sovereignty (article 281). Social movements were influential in incorporating food sovereignty into the 2008 Ecuadorian Constitution (see table 3) that later developed into a food sovereignty legal framework with the approval of the Food Sovereignty Law (LORSA) in 2009 (Peña 2013). Specifically, it's conceivable a central role played by the federations FENOCIN, CONFEUNASSC, CNC-Eloy Alfaro and, then, FENACLE (all affiliated to *La Vía Campesina*), that since the end of the 90s began to articulate themselves and to place food sovereignty as a priority of their individual and common political agendas (Giunta 2014). Food sovereignty is placed as one of the central elements to achieve the Good Living or *Sumak Kawsay* (in the Quechua language) in the country (SENPLADES 2009). Here, Good Living is conceived as a way of life in which people coexist in diversity and harmony with nature. Within this constitutional advances introduced in 2008 which link the Good Living and the agri-food policy framework, the LORSA (Asamblea Nacional 2009) establishes the Plurinational and Intercultural Conference on Food Sovereignty (COPISA) as an entity of citizen power responsible for generating a broad participatory process to continue the food sovereignty institutionalization. Currently, COPISA has formulated nine-supplementary laws linked to issues as access to resources, communal property, commercialization and consumption, which are expected to be debated by the National Assembly.

Despite the novelty of the agri-food policy framework introduced, there are other national policies that could be away from food sovereignty and good living approaches (Acosta 2011; Clark 2013). In fact, the national government has not implemented any land redistribution process (Landivar and Yulán 2011) and the introduction of GMO are prioritized as a demand of national interest, without analyzing the negative social, economic and environmental potential

impacts of this food policy in rural areas (Cuvi 2014). Though the country shows advances in the democratization process, as the growth in social investment or the reduction of poverty and unemployment, these are mainly stemming from the oil surplus and higher tax revenues, and not from a process of wealth redistribution (Fernández et al 2014). Additionally, international agreements signed between Ecuador and European Union, poses new specific risks in areas such as: intellectual property and food sovereignty, government procurement and market for services (Jácome 2012). The gaps on technology, capital and productivity, make complicated a symmetric integration between EU and Ecuador (and with other Andean countries as Colombia and Peru which signed this agreement in 2012) (Serrano 2014; Acción Ecológica 2015). Thus, these national and transnational policies may be obstacles to transform the role of the state traditionally focused on agro-export model (Rosero et al 2011), and to put the peasant household economy at the core of agrarian policies (Carrión and Herrera 2012). However, more promising advances around agri-food policies linked to food sovereignty pillars are occurring at the level of parish (*parroquial*), municipal and provincial governments in Ecuador (e.g., Heifer 2008; Chauveau et al 2010; CAN 2011; Galarza et al 2012; Borja et al 2013; Proaño and Lacroix 2013; Soliz et al 2013; Heifer 2014; Solís and Casarín 2015) headed by civil society, such as peasant associations, agroecological networks or consumers organizations. For example, the number of agro-ecological farmer's markets in Ecuador has expanded significantly, sometimes with the support of local governments, and there are interesting projects being implemented at this level across the country, sometimes even with the support of the Ministry of Agriculture (MAGAP) and other public institutions (gathering of the national agro-ecological movement in Riobamba in April 2013, cited in Clark 2013: 25). This tendency suggests the relevance of local agri-food systems as spaces within the territory to institutionalize food sovereignty from local to national levels. For example, across the country, there are experiences developed locally by community-based organizations that have built alternative regulations to recognize agro-ecological peasant agriculture (MAGAP 2012).

1.8.2 A local agri-food system of the southern Ecuadorian Andes

In Ecuador the Andes are formed by two parallel mountain ranges, the Cordillera Occidental and the Cordillera Oriental (or Real), that cross north-south the country and in its extreme south the Cordillera Occidental merges with the Oriental. Ecuadorian Andean region comprises 42% of country area and are the most populated region (Baquero et al 2004). According to the last National Agricultural Census (SINAGAP 2000) the Andean Ecuadorian provinces (the *Sierra*),

included a total of 567 622 Agricultural Production Units (APU)[9] with agro-pastoral production. In general, the *Sierra* is characterized by smallholding farms (<5 ha) mainly located in areas of steeper slopes (SIPAE 2011a; SIPAE 2011b). Our study focuses in the Andean agro-ecosystems of the canton[10] of Loja, specifically in the rural parishes (*parroquias*) of *San Lucas* (3°44'47.5"S, 79°15'58.5"W) and *Jimbilla* (3°51'39.5"S, 79°10'22.2"W), located in the Southern Andes (Figure 1.1). Here the topography is rugged. Slopes are generally 30-60% in the interior valleys of the two cordilleras, and over 60% on the exterior flanks (White and Maldonado 1991). The annual average temperature is 16.4°C, and annual precipitation is 918.6 mm with 247 days of precipitation per year (INAMHI 2014).

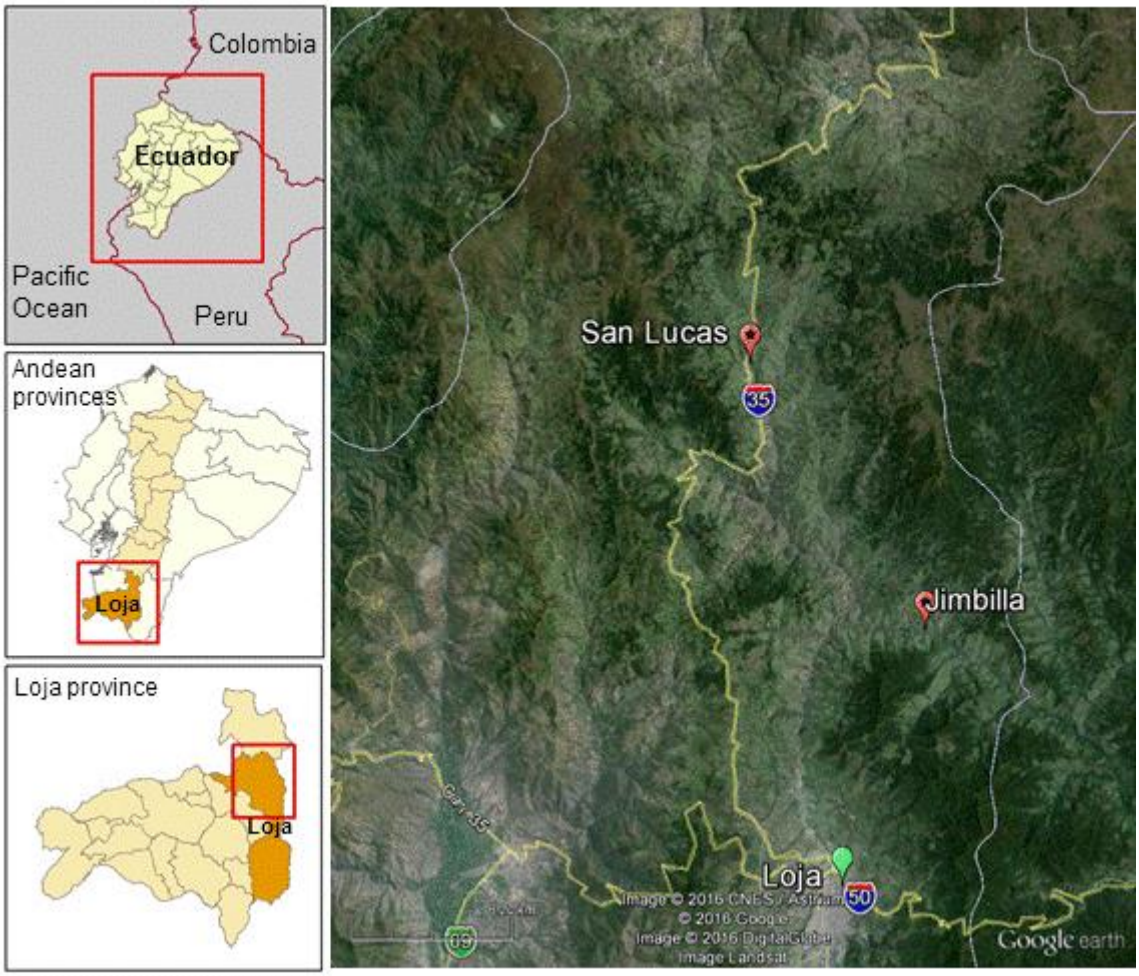

Figure 1.1 Location of the study area

[9] For this census the APUs are defined as plots of land with agricultural activities. The APUs are composed of one or more fields that share the same means of production (e.g. labor, inputs) and that are under the management of the same person or household or enterprise.

[10] Canton is a jurisdictional unit that hierarchically is located after the provincial unit. A canton comprises jurisdictional subunits called parishes (*parroquias*, which can be urban and rural).

The population of canton of Loja is predominantly urban (79%) and *mestizo* (90%). The indigenous population (3%) is a considerably smaller proportion of the total population contrary to the case of the northern Ecuadorian Andes (INEC 2010). In this zone, the major indigenous group is the *Saraguro* people; this group is concentrated in the northern of the province of Loja, specifically, in the canton of *Saraguro* and in the rural parish of *San Lucas* within the Loja canton (INPC 2012). In the last agricultural census (SINAGAP 2000), the rural population of the Loja canton was divided into 16,187 APU, which occupied 153,585 ha. In general, at provincial level[11], 51% of APU are smaller than 5 ha and occupy 6% of the land; the largest units, of 100 ha or over, represent 2% of the APU, but occupy 40% of the land area. The smaller units have similar percentages dedicated to crops and pastures, and smaller percentages (between 5-15%) to forest (SINAGAP 2000). Here peasants perform their agro-pastoral activities mainly between 1800 – 2800 m a.s.l. Forests (zone called *cerro*) are mainly used for firewood extraction and other non-timber forest products. They are also cleared to expand the pastures area. Andean crops are generally located above 2 000 m a.s.l., the main staple crop cultivated in the *chakras* is maize (*Zea mays*), in association with beans (*Phaseolus vulgaris*), tubers (e.g., *Solanum tuberosum*, *Tropaeolum tuberosum*, *Oxalis tuberosa*), and cucurbits (e.g. *Cucurbita pepo*). In the *huertas* they cultivate vegetables (e.g., *Brassica sp.*, *Allium sp.*, *Coriandrum sativum, Raphanus sativus*), fruit trees (e.g., *Cyphomandra betacea, Prunus sp.*), medicinal and ornamental plants. Subtropical-associated crops (e.g., *Manihot esculenta, Musa sp.*, *Saccharum officinarum*) are located at 1 800 m a.s.l (Belote 1997; Cueva 2010; informal interviews, February, 2014).

Regarding the political-administrative subdivision, the parishes (*parroquias*) are comprised by barrios. The barrio is a type of territorial organization which may be organized through the pro-improvement committee (*Comité pro-mejoras*), and consequently it can participate actively within the Decentralized Autonomous Governments (GADs) (LOPC, Art. 302, Asamblea Nacional 2010) in issues linked to the improvement of the barrio and the welfare of its inhabitants. Regarding the agro-ecosystems management, locally it can be influenced by different cultural factors and institutional[12] arrangements. In general, indigenous and *mestizos*[13] populations of Andean Ecuadorian provinces are organized in two types of community-based organizations: *comunas* and/or peasants' associations. *Comunas* are groups of indigenous or *mestizos* peasants (Martínez 1998) which traditionally have been associated with a core of communal and intercommunal practices. But these practices have not kept intact throughout the

[11] Data are not available at the cantonal level.

[12] Here institutions are defined as human-constructed constraints or opportunities within which individual choices take place and that shape the consequences of their choices (McGinnis 2011).

[13] *Mestizos* is a term used to identify the population formed from the mix of Spanish and indigenous descent. In Ecuador mestizos represent the biggest population within the country.

time. Social, cultural, demographic and economic changes have influenced them and the practices have been modified, but without completely disappearing (Martínez 2002). Although at present the Ecuadorian *comunas* do not act as a regulatory unit of resources and labor, c*omunas* have the potential to mobilize their members for political and social activities mainly linked to the struggles for land (Martínez 2002). Regarding the *comunas'* rules, these groups have formal regulations which have been elaborated under the coordination of the Ministry of Agriculture, Livestock, Aquaculture and Fisheries (MAGAP). The legal framework for communes is the Law of Organization and Management of Communes (Congreso Nacional 2004), a law emitted at 1937 and with last codification in 2004. The most important criticism made to this law is the fail to incorporate the notion of "commons", so any group of peasants can form a commune. Consequently, communes encompass groups of peasants from various origins, social composition and degree of development (Martínez 2002: 20-21). In the case study, the traditional *Saraguro* communities are not corporate communities, as defined by Wolf (1967) (quoted by Belote 2002: 160). Neither the community or their leaders control the rights over land or water supply (Belote 2002). In this sense, many of the Saraguro indigenous communes were the result of project implementation by *Misión Andina*[14]. The legalization of indigenous communities brought some conflicts. For instance, the new communal councils asked the representatives to meet certain criteria (e.g., literacy). These criteria discriminated against the traditional leaders, called "*mayorales"* or "*hombres con barba"* (wise elders within the traditional communities) (Belote 2002: 155-162). However, as Martínez (2002) suggests, despite the major fissures within the social fabric, the consolidation of this new leadership has led to important advances such as the promotion of second degree organizations, training of indigenous leaders, and common search of solutions of rural and urban sectors. Thus, it is relevant the revalorization of the commune as a political instance for agricultural demands. Peasants' associations can also be integrated by indigenous or *mestizos* peasants; and, at the same time, these associations can be part of networks. In southern Andes of Ecuador the *Red agroecológica Loja* (RAL) is a network that follows the food sovereignty paradigm. It articulates peasant associations (from *Loja* and *Zamora Chinchipe* provinces) to facilitate the dissemination and conservation of agro-ecological techniques and land management practices within their members, key factors to perform agri-food production activities within fragile environments like those of southern Andean region.

[14] Entity founded in 1956 as a development agency sponsored by the United Nations.

1.8.2.1 Brief history of the Red Agroecológica Loja (RAL)

In 1995, in Loja province, the training processes in agroecology began with the support of the *Consorcio Latinoamericano de Agroecología* (CLADES). These initiatives were driven by the *Coordinadora Ecuatoriana de Agroecología* (CEA). These training processes were aimed at professionals and peasant leaders, both women and men. From the peasant sector there was participation from the *Federación Unitaria Provincial de Organizaciones Campesinas y Populares de Sur* (FUPOCS; created in 1981), *Unión Popular de Mujeres de Loja* (UPML; created in 1984), and the *Red Agroecológica Loja.*

RAL was created in 2006 and has worked in and spread the agroecological production model within their organizations (Huaca et al 2015). It launched its first agroecological fair in 2007. The activism processes that have characterized RAL were carried out by some of its members before the creation of the network. These processes had a high participation of peasant women, both indigenous and *mestizas*. Social mobilization processes favor link creation between local and national organizations, fighting for food sovereignty at national level (see table 1.4); as well as, to build local processes for the materialization of food sovereignty locally (e.g., through the establishment of agroecological fairs as described below).

> *Since 2000 I walked with my partners in organization processes (…) and with Pedro De la Cruz*[15] *of the FENOCIN who organized a march from Macará to Quito in order to avoid the signing of Free Trade Agreement. (…) We went from here, from Saraguro to Quito; we represented to FIIS*[16] *(…) also participated partners of the ACOSL*[17]*. (…) All of us were in the mobilizations, in the marches, always present. (…) Since then, we thought in organizing in order to have a fair in Loja markets.* (*Saraguro* indigenous peasant women member of the FIIS and the RAL)

In building this process it has been important the support and dialogue between cultures (*Diálogo de saberes*), for example, in our case study, between the *mestizo* and Saraguro indigenous cultures:

> *In our peasant association, since 2000 we began to think in creating a legal organization (…) Partners of San Lucas visited our neighborhood and helped us to organize, because they have more organizational experience. (…) The organization process took from 2000 to 2006. Before this, we were only a facto association.* (Peasant women and leader of a *mestizo* peasant association member of RAL)

[15] Former president of FENOCIN.
[16] Acronym of Federación Interprovincial de Indígenas Saraguro
[17] Acronym of Corporación Andina de Organizaciones Sociales de Loja

The development of agroecological fairs implied an organizational process with monthly meetings to know the problems, proposals and bets (Huaca et al 2015). Initially, RAL lobbied with the provincial government of Loja and the National University of Loja. At the same time, RAL had a relationship with the *Coordinadora Ecuatoriana de Agroecología* (CEA) and other NGOs in order to embrace the proposal based on agroecology.

> *In the broader context, RAL arises from a reflection that occurred in the first national meeting of Agroecology* [October, 2005], *here one of the axes was local markets. In the southern region, this led to debates, socializations, discussions and reflections about the local markets. These processes convened to several organizations. (…) After several months of collective dialogue, we saw the need to work in local markets (…), launch an agroecological fair and a fabric that keeps this fair. Other actors supporting us were CEA, Heifer, VECO, but the initiative was always from here, as an articulation of small producers' organizations.* (Member of CEA and leader in RAL)

Additionally, the process of building RAL was supported by similar experiences that were underway in the Andean region of Southern Ecuador; especially by the *Red Agroecológica del Austro* (RAA of Cuenca city; Chauveau et al 2010) which in turn was being supported by the agroecological project led by FENOCIN. These articulations allow to visualize the dynamics of the institutionalization of initiatives for food sovereignty within the territory, a process which is carried out mainly by peasant women within a context that links local, regional and national indigenous and peasant organizations.

> *One of the important steps for the creation of RAL was given during the second meeting of "Semillas Agroecológicas del Austro" in November 2005. The meeting was performed with organizations from Cañar, Azuay and Loja. The project of FENOCIN and organizations as FIIS and ACOSL were the main protagonists of this meeting*. (Member of FENOCIN and leader in RAL)
>
> *RAL has always been emerging as an initiative of small producers where women are the protagonists, ther has always been a majority of women. From there it has been built up spaces for dialogue, for example with the provincial and municipality governments (…).Gradually, the RAL is becoming an actor for the public policy making in favor of the peasant and indigenous sector.* (Member of CEA and leader in RAL)

In absence of a clear legislation and in order to guarantee the respect of agro-ecological principles and build trust among producers and between producers and consumers, RAL has self-organized the design and implementation of a governance tool of social control of the activities. This tool is the Participatory Guarantee System (PGS). The rules of PGS (e.g.,

objectives and criteria, rules for sanctions, etc.) have been collectively discussed, approved and validated by the organizations involved in RAL following a participatory process. Compliance with the PGS is the primary obligation of producers to participate in agro-ecological fairs.
The PGS, through a system of farmer-to-farmer visits, validates the on-farm application of agro-ecology principles and management practices. Moreover, the PGS guarantees to consumers the quality of products sold. In the local markets, peasants pursue consumers' recognition of fair prices for the provision of agro-ecological products, healthier and tastier than conventional ones. RAL began with a monthly agroecological fair (in *Complejo Ferial*) with the support of the provincial government of Loja. Between 2007 and 2008, conversation with the municipal government of Loja resulted in the possibility of participating in free fairs at two local markets (Saturday in *La Tebaida* and Sunday in *San Sebastian*). Three years later, RAL extended its participation to another city market (Wenesday in *Nueva Granada*). Thus, the RAL manages three agro-ecological fairs[18] per week within the city of Loja. Since April 2015, RAL is also participating on a monthly agro-ecological and organic fair[19], a fair jointly organized with the municipality, to promote healthy products and ancestral gastronomy within urban consumers of Loja city.

As we described above, RAL has a collective capacity to negotiate with municipality (GAD of the canton of Loja), governmental (e.g., MAGAP) and non-governmental (e.g., *Heifer, Intercooperation, MESSE*) institutions. As well as with others community-based organizations (e.g., FENOCIN) in order to foster opportunities for training in agro-ecological production as well as to establish spaces for access to local markets. In this thesis research we analyze the role of community-based organizations (agroecological associations, comunas) in the local agri-food system configuration (chapter 3) and its future trajectories of transformation (chapter 4).

Table 1.5 Principal aspects of rules, norms and structures of barrios, comunas and RAL

Rules/ norms/ structures	**Barrios**	**Indigenous communes**	**Agroecological Network of Loja (RAL)**
Decision-making structures:			
Main bodies	General Assembly Pro-improvement committee (*Comité pro-mejoras*)	General Assembly Communal council Special commissions	General Assembly Commissions
Main function	In general terms: work for the improvement of the barrio and welfare of its inhabitants In specific terms: those	In general terms: legitimization of values, ways and indigenous practices; political representation and	Instrument for solution to common problems linked to the performance of agro-ecological production and the achievement of food

[18] Agroecological fairs inserted within municipal free fairs. This implies that agroecological producers compete with middlemen and sellers of conventional products.
[19] An exclusive agroecological fair.

Rules/ norms/ structures	Barrios	Indigenous communes	Agroecological Network of Loja (RAL)
	referred to the internal rules of each barrio	defense; social management of natural resources (e.g., water); social and ideological cohesion; works of common benefit (including the call to *mingas*); management for achieving basic services (e.g., schools, health centers, community centers, etc.) and for celebration of ritual and ceremonial activities (e.g., agricultural and religious festivals) In specific terms: those referred to in the internal rules of each Commune	sovereignty, such as: transition and / or strengthening of agroecological production models, access to training (in issues as production, transformation, distribution, consumption and social organization), access to local markets, interlocution with governmental and non-governmental institutions
Authorities	President Vice president Secretary Treasurer Syndic *Vocales*	President Vice president Secretary Treasurer Syndic *Vocales* (in some cases overlaping with the *mayorales*: wise elders within the traditional community)	President Coordinator Secretary Fairs Commission Guarantee Commission Financial Services Commission Territorial Guarantee Committee Local organization Assembly Committee agroecological commitment Technical Committee
External representativeness	Some peasant are members of organizations described for indigenous comunas (for the case of indigenous barrios) and RAL (for the case of indigenous and *mestizo* barrios)	CODENPE, CONAIE, ECUARUNARI, FENOCIN Some indigenous Saraguro are members of: FIIS, ACOSL, CORPUKIS and other local indigenous associations	CLOC-Vía Campesina, MAELA, CEA, Some peasant are members of: FENOCIN, ECUARUNARI, FIIS, ACOSL, UCOCP, FEPROCOL and other local peasant and indigenous associations
Support by government laws	National Constitution (Arts. 248) COOTAD (Arts. 302, 306) LOPC (Arts. 1, 2, 61, 70, 30-36)	National Constitution (Arts. 10, 57, 60, 171, 248, 257) Codification of the Law of Organization and Management of Communes COOTAD (Arts. 93, 97, 302, 308) LOPC (Arts. 1, 2, 61, 70, 30-36) LOEPS (Arts. 15)	National Constitution (Arts. 96, 98, 281) COOTAD (Arts. 134, 302) LOPC (Arts. 1, 2, 30-36) LOEPS (Arts. 18) LORSA (Arts. 3, 31)
Rules over land rights and distribution	Private access and management	Both possibilities: private and collective access and management	Private access and management (but the agricultural practices are linked to agroecological production models)

1.9 Thesis overview and chapters' summary

This thesis dissertation is a compilation of three central chapters, and includes this general introduction, a general discussion and main conclusions (Figure 1.2).

At the time of writing, three chapters correspond to published and submitted for publication articles. A first article (chapter 2) has been published in *Regional Environmental Change*, a second article (chapter 3), submitted in *International Journal of the Commons*, is under review, and a third (chapter 4) has been recently submitted to *Society & Natural Resources*. The following paragraphs provide an overview of the structure of this thesis and show a summary of the chapters.

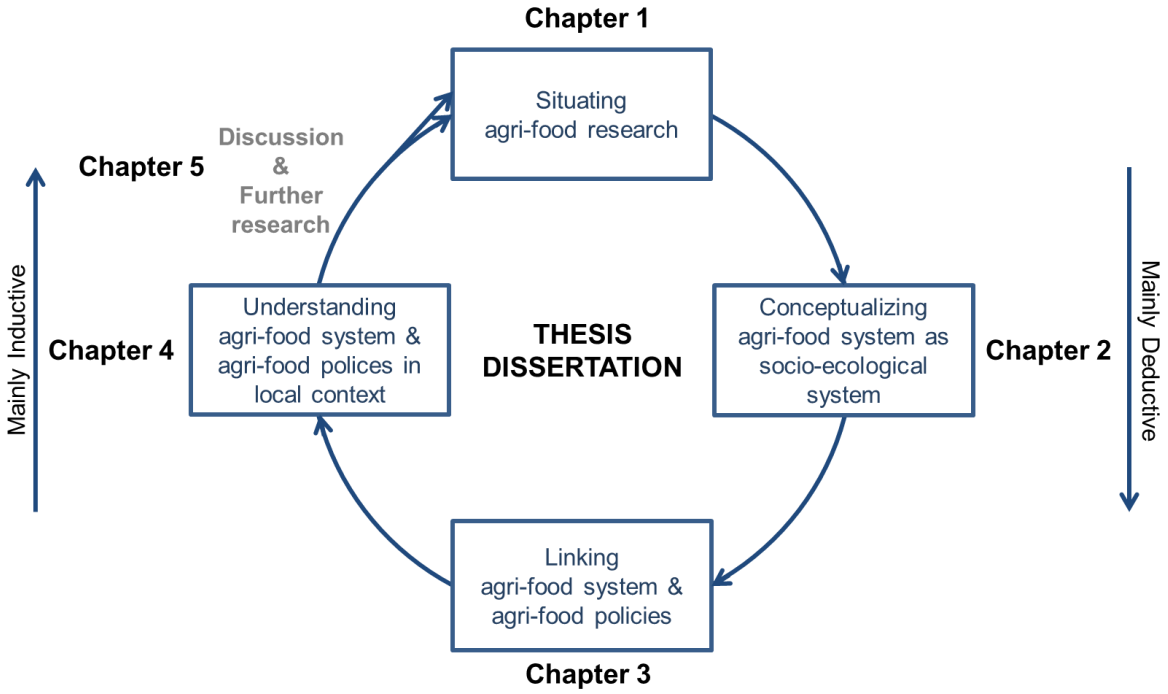

Figure 1.2 Structure of thesis dissertation

The thesis has followed a two-pronged research strategy, combining two scales of analysis in a learning cycle process of research on action:

- A theoretical and deductive approach, consisting in clarifying and integrating concepts and theories allowing for the methodological proposal and posing different research questions.
- An empirical and inductive approach, in the form of a case study through which the initial framework was developed and tested, feeding the theoretical approach and generating new research questions for future research.

After this introductory **chapter 1**, **chapter 2** crosses different fields of knowledge to clarify concepts and develop a framework for agri-food system assessment, which integrates general concepts and methodological approaches of the socio-ecological system (SES) framework (a system-oriented framework) proposed by Elionor Ostrom (2007) with the theoretical and methodological framework of vulnerability (an actor-oriented framework). Conceptually, the SES framework provides a common language and a logical linguistic structure for classifying those factors deemed to be important influences on the SES configuration. Then, the vulnerability framework takes into account context-specific characteristics of sensitivity and capacity to adapt (at individual and collective level) generated and influenced by multiple factors and process, including the perception of actors about vulnerability for whom, at which scale and to what. Methodologically, the SES framework allows us identifying the boundary and components of SES, moving across spatial scales and institutional levels. The framework enables to analyze how interactions may produce different agri-food system configurations. The integration between the system-oriented and the actor-oriented frameworks allows us analyzing the relationships between institutional, socio-economic, and agro-ecological dimensions, as suggested by alternative frames for agri-food research under the political paradigm of food sovereignty. Chapter 2 concludes with the initial steps of the empirical application of the integrated framework developed to assess vulnerability of local agri-food systems to global change in the southern Ecuadorian Andes, taking into account the role of peasant institutions (agroecological associations, comunas) and indigenous culture. The following research questions emerge: *What is the role of social and institutional factors in determining the current configuration of local agri-food system? What is the role of vulnerable actors and key players to address the future trajectories of transformation of local agri-food system*? These questions will be addressed in the next empirical chapter of the thesis.

Chapter 3 applies to a case study research the integrated framework proposed, addressing the initial question on the role of social and institutional factors which determine a given agri-food system configuration under the political paradigm of food sovereignty. We applied a survey to smallholders from two geographical zones and different social groups (*Saraguro* indigenous and *mestizo* peasants). The results show the significant, but differentiated, role of novel institutional arrangements (i.e., *Agroecological Network of Loja*), the belonging to specific social groups (i.e., *Saraguro* indigenous culture) and different income generation strategies (i.e., marketing of agri-food products and off-farm work) in determining agri-food systems configuration. The chapter concludes with the discussion on how these factors are related with different indicators within the food sovereignty pillars.

Chapter 4 addresses the combination of the vulnerability approach to the SES analysis and envisions the future trajectories of transformation of local agri-food system. We adopted a participatory scenario development as main method to assess the impact of drivers of change on Andean agri-food systems taking into account the perceptions of local actors and their institutions. Specifically we focus on the *Agroecological Network of Loja* (RAL) and the peasants who are part of this institutional arrangement. They are characterized by high degree of vulnerability (i.e., vulnerable actors), and, at the same time they have influence on the local management of the food system (i.e., key players). Within the group of RAL actors, we also take into account the perceptions linked to culture. Thus, we identify two groups of actors regarding the culture: indigenous *Saraguro* (which can be organized under communal councils) and *mestizo*. The actors built four exploratory scenarios (narrative stories) to represent the future trajectories of transformation of their local agri-food system. The design of future scenarios allowed making a link between the components of vulnerability framework (exposure, sensitivity and adaptive capacity) with the ecological and social components of agri-food system under the political paradigm of food sovereignty. From these results the group of RAL actors has emphasized the role of other actors, such as urban consumers, local governments, governmental organizations, community-based organizations, as key actors in present and future trajectories of local agri-food system directed towards active transformation. This constitutes a research issue to be addressed in future research.

Chapter 5 shows a general discussion about the theoretical and methodological contributions of the integrated framework developed as well as the contributions from the empirical application of the analysis and assessment of the local agri-food system of southern Ecuadorian Andes. Additionally, we present new questions that have arisen during the research and methodological process which should be addressed in future research based on an alternative frame to study and manage agri-food systems. Finally, we show the main conclusions that have emerged from this thesis research.

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Peasant household, rural parish of "Jimbilla" (2015). Photo by author.

"*En la Red nos informamos lo que nos afecta, ahí es cuándo hemos abierto los ojos, porque hemos estado en la Red. Si fuéramos una productora individual ni siquiera nos enteraríamos lo que nos afecta. Entonces la organización es la que nos ayuda*"

(Peasant woman of RAL)

CHAPTER 2: Developing an integrated framework to assess agri-food systems and its application in the Ecuadorian Andes

2.1. Introduction

In knowledge societies, policies are generally developed following evidence-based assessments through close connections between science and policy (Sanderson 2002). In the case of agri-food systems, this is not an easy task since food has both material and symbolic power that embodies complex links among nature, human survival, health, culture, and livelihood (McMichael 2000). Agri-food research, guided by the linkages between science and development and the role given to agriculture in society, tends to follow two different frames: an official frame, which separately analyzes the social and ecological components of agri-food systems, suggesting blueprint approaches to predict changes and design fundamentally growth-oriented policies with small or null participation of actors, and an alternative frame, which integrates the social and ecological components of agri-food systems, conceptualized as complex socio-ecological systems (SES), to consider their social, cultural, and environmental context, address uncertainty of drivers of change, and favor actors' participation (Rivera-Ferre 2012). The need for alternative frames of research was raised late in the 1970s and has been growing since then (Middendorf and Busch 1997; Sellamna 1999; Fjelsted and Kristensen 2002; Weiner 2003; Vanloqueren and Baret 2009). It was in the 1970s and 1980s, driven by the failure of technology adoption by small-scale farmers worldwide, that the concept of Farming Systems Research was born, aiming to understand the way farmers made decisions at farm level (Darnhofer et al 2012). However, the focus was only on technology adoption, and the level was the farm and the agricultural system. Later, agri-food sociology emerged, which focused on the whole agri-food system from a sociological perspective but lacked in its ecological component (Bonanno 2009). In parallel, agroecology emerged as the discipline addressing ecological and also economic, social, and cultural crises of modern agricultural systems, suggesting alternative pathways of research and management of agricultural systems (Altieri 2002; Martínez-Torres and Rosset 2014). Recently, there has been an increasing recognition of the need to address cross-level and cross-scale interactions among components of agri-food systems to deal with more complex agri-food challenges and unpredictable dynamics of change, following a systemic approach (Ericksen 2008a; Enfors 2013; Tittonell 2014a).

Probably the best known framework conceptualizing the whole agri-food system as SES is that of Ericksen (2008a) under the Global Environmental Change and Food Systems Project. However, this framework fails to fully integrate institutional processes and actors' agency as well as the normative character of the agri-food system's outcomes. Indeed, drivers of change in

agri-food systems have a strong social and political component (Thompson and Scoones 2009) that require specific methods and tools for analysis. As these drivers of change can lead to systems' transformations, desirable or not, there is growing concern about their implications for future agri-food systems and their vulnerability (Ericksen et al 2009; Ziervogel and Ericksen 2010; Vermeulen et al 2012; FAO 2013). Though at the local level agri-food systems' vulnerability is linked to social and institutional sensitivity and adaptive capacity (Agrawal and Perrin 2008), to date, assessments of agri-food systems' vulnerability to global environmental change have given little attention to social and institutional factors. Indeed, vulnerability studies applied to agri-food systems have mostly focused on the nexus between agriculture (food production) and climate variations (FAO 2008; Nelson et al 2010; Ericksen et al 2011; Smith and Gregory 2012), even when they include societal factors such as poverty and policy (Appendini and Liverman 1994; Hertel and Rosch 2010).

In parallel, new policy proposals are emerging that aim to address hunger and poverty from a more systemic perspective. For instance, Ecuador has incorporated food sovereignty at the constitutional level (McKay et al 2014) and serves as an excellent case to study complex SES responses to this policy proposal. From a theoretical standpoint, this represents a favorable political environment for peasants and indigenous communities to self-define strategies to favor their livelihoods linked to pathways that enhance agri-food systems' adaptive capacity through social equity and ecological resilience (Windfuhr and Jonsén 2005; Pimbert 2009). However, current national agri-food policies (e.g., regarding land redistribution, water, genetically modified organisms [GMOs]) contradict the objectives of the National Constitution (Acosta 2011; Clark 2013; Fernández et al 2014) and may threaten peasants' livelihoods. In Ecuador, 48% of the rural population works in agricultural activities (INEC 2010), and at the same time, peasant production is the main source of food for national consumption (Novoa 2013). In the Andean region, a great majority of peasants (i.e, *people of the land* that have a direct relationship with land through agri-food production; La Vía Campesina 2009, quoted in Edelman 2013: 10) carry out small-scale production activities, usually in marginal and fragile environments and mainly using traditional management practices based on agroecology (Altieri 1999; CAN 2011). Assessing the responses of these agri-food systems to implemented policies requires alternative frames of research capable of gathering the complexity of the system.

Considering all the above, this article aims to draw an integrated framework that links the agroecological context and the social function of agriculture, including actor's agency and institutional processes in the assessment of agri-food systems' responses to drivers of global change. To do this, we link theories and methodologies from complex system thinking and vulnerability studies applied to the agri-food system as the unit of analysis. We later analyze the relevance of the proposed framework to study an empirical case of local agri-food systems in the southern Ecuadorian Andes in the face of global change under food sovereignty policies.

2.2. Concepts and theoretical background

2.2.1. Food sovereignty policy proposal

Food sovereignty is a policy proposal to address hunger and rural poverty that encompasses both a social countermovement and a policy discourse that explicitly challenges the current food regime (McMichael 2011). First brought to international attention at the World Food Summit in 1996, it was championed by the farming and peasant movement La Vía Campesina. Food sovereignty is defined as the right of peoples and nations to "healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems" (La Vía Campesina 2009: 147). In operationalizing the concept, food sovereignty studies have centered their research on the development of food-sovereignty indicators from local to international levels (Binimelis et al 2014). As indicators are not enough to analyze the complex links within the agri-food system (Thompson and Scoones 2009) under the many-faceted term of food sovereignty (Patel 2009), we propose an assessment based on complex system thinking as the SES framework (McGinnis and Ostrom 2014).

2.2.2. SES framework

The SES framework proposed by Ostrom bridges ecological and social-sciences research, establishing a *common* language and logical structure for classifying those factors deemed to be important influences on the structures and functioning of complex SES (Ostrom 2007). Ostrom (2009: 419) defined SES as a complex system:

> *composed of multiple subsystems and internal variables within these subsystems at multiple levels* (…) [where these subsystems] *are relatively separable but interact to produce outcomes at the SES level, which in turn feed back to affect these subsystems and their components, as well other larger or smaller SESs*.

A recent definition of SES as epistemic objects (Becker 2012) can help introduce modifications in the framework to address social dynamics in human–nature interactions. In this sense, social scientists suggest that the incorporation of human agency, culture, and power's role is necessary to understand social dynamics in SES (Cote and Nightingale 2012). These considerations allow introducing normative questions (i.e., those involving subjective value judgments or beliefs; Binder et al. 2010) such as *whose goals for whom?* Following this approach, we propose to integrate both SES and vulnerability frameworks to assess food sovereignty policies based on the context and actors' agency.

2.2.3. Vulnerability of agri-food systems to global change

Vulnerability has been conceptualized from diverse perspectives (McLaughlin and Dietz 2008). Our vulnerability approach is based on the conceptualization provided by Adger (2006), taking into account the contextual interpretation (O'Brien et al 2007) and the constructivist perspective (Tansey and O'Riordan 1999). Adger (2006) conceptualized vulnerability as a characteristic of a system, which is a function of exposure, sensitivity, and adaptive capacity, where exposure is the nature and degree to which a system experiences social, economic, political, and/or environmental changes; sensitivity is the degree to which a system is modified or affected by changes; and, adaptive capacity is the ability of a system to evolve in order to accommodate changes and to expand the range of variability with which it can cope (Adger 2006: 270). The contextual interpretation allows focusing on the institutional, social, economic, technological, and biophysical conditions that affect the extent of exposure of the system to changes and the ways in which the exposed system can respond (O'Brien et al 2007); the constructivist perspective points out that human agency and culture make some people and places more vulnerable than others even when they confront seemingly identical risks (Tansey and O'Riordan 1999). In this sense, agri-food research performed under alternative frames has an increasing emphasis on active transformation pathways of agri-food systems as opposed to forced transformation (Folke et al 2010). Here, active transformation means that the system no longer appears as a *given* but as something actively *constructed* by human agents (Roling and Wagemakers 2000), which facilitate us to address the root causes of vulnerability (Feola 2013). In this sense, it is proposed that food sovereignty policies strengthen agroecological resilience (Altieri 2002), as well as individual (Patel 2012) and collective adaptive capacity (McMichael 2011) through the active transformation mediated by actors who depend on the agri-food system.

2.3. Conceptualizing and operationalizing the integrated framework to agri-food system analysis

2.3.1. Agri-food system as SES under food sovereignty

Following Ostrom (2007; 2009), we propose to first identify the boundary and the ecological and social components of the agri-food system (see Fig. 1), taking into account scales and levels. Agro-ecosystem boundaries (RS) constitute both agro-ecosystem (e.g., farm) and human-constructed facilities (e.g., road system, industry). Agro-ecosystem units (RU) include the inputs to perform the agri-food activities (e.g., species richness, animals). Agri-food governance

system (GS) constitutes both institutions and their governance arrangements, which can be both formal and informal (e.g., manufacturing standards, participatory guarantee systems). Agri-food system actors (A) involve individuals, organizations, or groups of organizations that participate in the performance of agri-food activities (e.g., peasants, middlemen, consumers; McGinnis and Ostrom 2014). Based on Cash et al. (2006), we define the scales as spatial, temporal, institutional, and networks that allow the study of each subsystem and the levels as the units of analysis that are located at different positions on a scale (e.g., levels of operative, collective, and constitutional rules within the institutional scale).

In agri-food systems, cross-level and cross-scale interactions (I) occur when actors perform the agri-food activities (production, processing, distribution, and consumption; Ericksen 2008b); *focal action situation* is when interactions occur producing certain outcomes (O; McGinnis and Ostrom 2014). Applying this categorization to agri-food-system responses to food-sovereignty policies, the focal action situations are the six so-called pillars of food sovereignty: access to resources, agroecological production models, local markets, food consumption—right to food, social organization, and agri-food policies (modified from Ortega-Cerdà and Rivera-Ferre 2010). Pillars linked to both ecological and social subsystems include access to resources (mainly from interactions between RS and GS) and production model (mainly from interactions between RU and A) while the other four pillars are more closely linked to social subsystems (mainly from interactions between GS and A), showing the relevance of the social elements in determining agri-food systems' outcomes. Figure 2.1 shows the analysis of agri-food systems as SES, the most relevant cross-scale and cross-level interactions and the main relations between the SES components and food sovereignty pillars.

As agri-food activities result from interactions within and between the agri-food subsystems (RS, RU, GS, and A), each pillar of food sovereignty has relation with one, two, or more agri-food activities. Appendix 2.1 allows visualizing these relations.

We select the particular variables (second tier of SES framework) relevant to analyze each pillar of food sovereignty and some proposed indicators (third tier) to analyze them. To design the indicators, we followed the categories proposed by Ortega-Cerdà and Rivera-Ferre (2010) and performed a literature review on food sovereignty. Appendix 2.2 shows the selected food sovereignty indicators linked to SES variables. The way agri-food activities are carried out, their feedback, and the sources of exogenous drivers will determine different outcomes from agri-food activities. Using the vulnerability framework, the outcomes are explored through the study of agroecological resilience and individual and collective adaptive capacity.

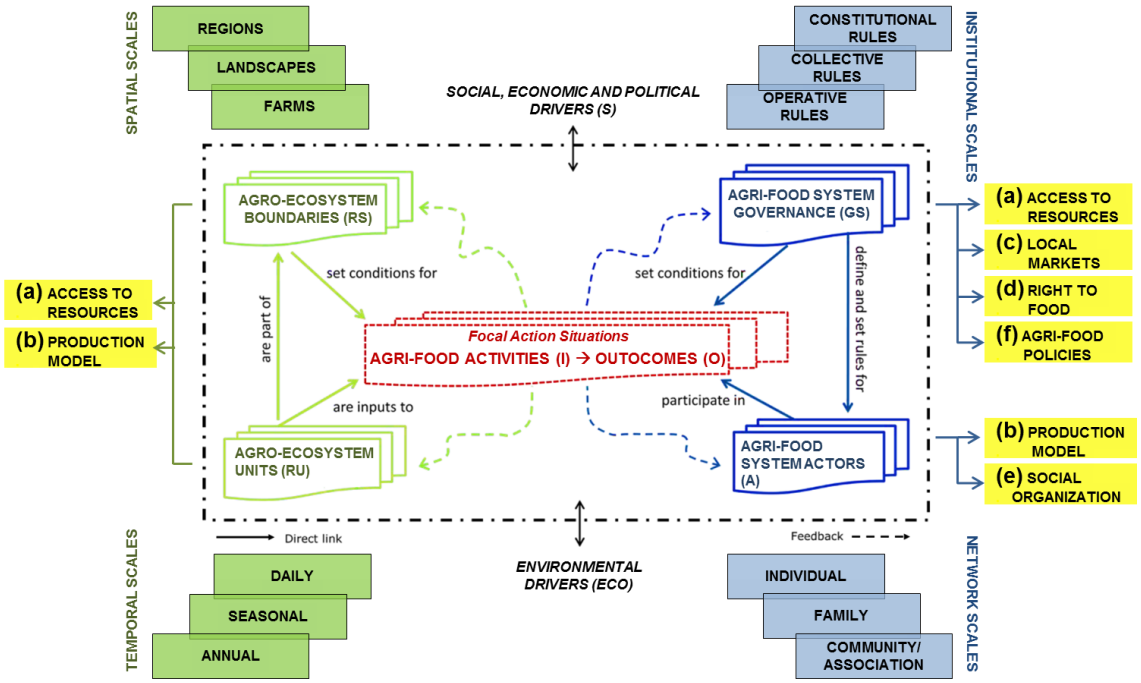

Figure 2.1 Agri-food system as socio-ecological system (SES) using Ostrom's framework (adapted from McGinnis and Ostrom 2014) under the food sovereignty paradigm. At the left side the ecological subsystems (RS and RU, boxes in green) and at the right side the social subsystems (GS and A, boxes in blue) with their respective scales and levels. For each subsystem we highlight the main links with food sovereignty pillars (boxes in yellow). At the center the agri-food activities and outcomes (boxes in red). The links between each agri-food activity and food sovereignty pillars is detailed in Appendix 2.1.

2.3.2. Assessment of agri-food systems' transformation

To operationalize the vulnerability framework to assess local agri-food systems transformations, we propose to adapt Fraser's (2007; 2011) proposal and combine it with participatory scenario analysis (Ravera et al 2011; Reed et al 2013). Fraser's (2007; 2011) framework allows analyzing multidimensional agri-food systems' vulnerability through the study of three features: (1) agro-ecosystem resilience that measures the extent to which the agro-ecosystem (RS and RU) can tolerate climatic shocks and remain productive, (2) individual capacity that measures the socioeconomic attributes of actors (A) to be sensitive to and to be able to adapt to global changes, and (3) collective capacity that measures the extent to which the multilevel institutions (GS) respond and/or adapt to changes. Participatory methods and scenario analysis allow answering of normative questions (Binder et al 2010) by including different actors' perceptions about historical and current drivers of change as well as future impacts on prioritized goals of the agri-food system transformation.

A three-step methodology is proposed. The first step is aimed at introducing the normative question of *Vulnerability of what and to what?* From the actors' narratives, we select a subset of drivers of change (i.e., social, economic, political, and environmental drivers [S and ECO]) linked to the agri-food components, which constitute the sources of exposure. Different actors might also define vulnerability differently, especially when linked to food sovereignty goals. Secondly, different narratives of historical and current perceptions of change, exposure, and impacts of the local agri-food system are explored in order to answer normative questions: *Vulnerability for whom? At which scale?* The actors identify what they mean for maintaining and/or achieving the desired outcomes of food sovereignty over time and what the scale of assessment of the current sensitivity and capacity to adapt the agri-food system is. In a third step, not presented in this article, actors envision future trajectories of transformation under different drivers through participatory scenario analysis and qualitatively assess how they might affect the interactions between components of the agri-food system and their final outcomes.

2.4. Framework applied to an empirical case study

In this section, we illustrate Steps 1 and 2 of the suggested operationalization procedure to assess our case study as well as to formulate an initial hypothesis about current drivers of change and vulnerability perceptions of farmers. The local agri-food system is located in the canton of Loja, in the southern Ecuadorian Andes, specifically in the area comprising the rural towns of *San Lucas* (3°44'47.5"S, 79°15'58.5"W) and *Jimbilla* (3°51'39.5"S, 79°10'22.2"W). The altitudinal range of this area ranges from about 1800 to 3000 m.a.s.l., which correspond to a temperate climate (Cepeda et al 2007: 46), averaging 12 to 15 °C of mean annual temperature. Rainfall average is 1291 mm/year (INAMHI 2015a). *San Lucas* is mainly inhabited by *Saraguro* indigenous (81%) and *Jimbilla* by *mestizos*[20] (95%; INEC 2010).

A survey was conducted between December 2013 and March 2014 based on questionnaires and interviews[21]. Questionnaires were addressed to households (N = 116; householders aged 18–89; 60% women and 40% men) in four communities in *San Lucas* (N = 61) and four in *Jimbilla* (N = 55). To select the communities, the sample was stratified to capture a statistically significant group of households that belonged to *comunas* and the *Agroecological Network of Loja* (hereafter RAL, in Spanish) as well as to include communities located in different altitudinal zones. Thus, the sample was deliberately skewed in order to capture cultural, institutional, and ecological diversity, as required to study the agrarian dynamic in this Andean region (Cepeda et al 2007). The questionnaire served to explore the following topics: (i) household information (e.g., household size and age, gender, and education of respondent), (ii) production activities

[20] Cultural/biological mixing: Spanish – indigenous (Belote 2002: 28–29).
[21] Details are shown in Appendix 2.5 (script of questionnaire) and Appendix 2.6 (scripts of interviews).

(e.g., access and uses of land, credit, training, agricultural practices, crops and livestock management, production destination), (iii) process and distribution activities (e.g., artisanal processing, commercialization, access to markets, and income sources), (iv) consumption activities (consumption habits), and (v) social relations (e.g., participation in social exchanges and community-based organizations). In all sections, we included questions about rights (e.g., access to land), agency (e.g., decisions about crops and livestock management), and power (e.g., gender-role division of tasks and responsibilities within the household in the different agri-food activities). Quantitative data obtained from the surveys were analyzed descriptively using *SPSS* statistical software.

Interviews were addressed to key informants (N = 14; 36% women and 64% men) selected using a snowball sampling. The sample included representatives of peasant and indigenous organizations and officials from government organizations, non-government organizations (NGOs), and academy. The interview was structured in two main sections: (i) the structure and coordination of organizations, competencies, and degree of influence in decision-making about the agri-food system and (ii) the actors' perceptions about current drivers of change. Qualitative information obtained from interviews was transcribed, coded, and systematized using *Atlas.ti* software to analyze agri-food system governance and actors' perceptions on drivers and impacts linking food sovereignty pillars and vulnerability. Appendix 2.3 shows the list of key informants and their organizations as well as the codes used.

As previously stated, Step 3 of the framework regarding future vulnerability through participatory scenario analysis was not performed at the time of writing this article since it required the processing of the data presented here.

2.5. Results and discussion

2.5.1. Agri-food system as SES under the food-sovereignty pillars

We present the linkages among the set of food sovereignty indicators used and the SES components for describing the agri-food system in the studied area (Figure 2.1). We describe the food sovereignty pillars through the cross-scale and cross-level interactions among the different components of the system (Table 2.1).

Table 2.1 Households' questionnaires responses (N=116) to analyze the southern Ecuadorian Andes agri-food system, rural area of the canton of Loja

SES variables and tiers			Food sovereignty pillar & main cross-scales interactions	[a]	Value of indicator ± S.D.
First	**Second**	**Third (food sovereignty indicators)**			
			Cross-scale: Spatial-Jurisdictional-Temporal		
RS	RS3	Size of farm (ha)	Access to resources	116	3.6 ± 5.9
		Temporal lease of pastures	Access to resources	116	Yes = 30.2%; No = 69.8%
	RS4	Access to main roads paved	Access to resources	116	Yes = 52.6%; No = 47.4%
	RS5	Crop yield of associated-soft corn: *Zea mays* (t/ha)	Production model	-	0.4 [b]
		Crop yield of associated-bean: *Phaseolus vulgaris* (t/ha)	Production model	-	0.2 [b]
		Milk yield (liters)	Production model	78	9.6 ± 6.2
		Processed dairy: fresh cheese (kg)	Production model	78	8.8 ± 5.6
	RS9	Total annual precipitation (mm)	Access to resources	-	1290.5 [c]
RU	RU5	Cattle (mean number)	Access to resources	85	4.0 ± 2.7
		Specific richness of farmed species [d] (mean number)	Production model	116	16.5 ± 9.8
		Infra-specific richness of farmed species (mean number)	Production model	116	17.9 ± 11.9
		Types of small animals [e] (mean number)	Production model	113	2.5 ± 1.0
	RU6	Dietary produced diversity (mean number)	Right to food	116	7.9 ± 1.5
	RU7	Land use (%)	Production model	-	Crops = 7.0%; Pastures = 53.3%; Forests= 34.6%; Others = 5.2% [f]
			Cross-scale: Institutional-Jurisdictional		
GS	GS4	Land title (yes/no/both: properties with & without titles)	Access to resources	116	Yes = 14.8%; No = 63.9%; Both = 21.3%
		Access to land (inheritance/ purchase/ loaned/ borrowed/others)	Access to resources	116	Only inheritance = 53.4%; Only purchase = 8.6%; Inheritance & purchase=29.3%; Loaned=2.6%; Borrowed =3.4%; Others (donated/gifted) = 2.6%
			Cross-scale: Institutional-Network		
	GS5	Access to retailing location in local markets	Agri-food policies & Local markets	105	Yes = 18.1%; No = 81.9%
	GS6	Member of RAL (*Red Agroecológica Loja*)	Social organization	116	Yes = 14.7%; No = 85.3%
		Member of *comuna*	Social organization	116	Yes = 26.7%; No = 73.3%
			Cross-scale: Network-Institutional-Spatial		

SES variables and tiers			Food sovereignty pillar & main cross-scales interactions	[a]	Value of indicator ± S.D.
First	**Second**	**Third (food sovereignty indicators)**			
A	A1	Household size (mean number)	Production model	116	5.2 ± 2.3
		Labor force (people in working age: >15 years) [g]	Production model	116	3.4 ± 1.7
	A2	Indigenous self-identification	Social organization	116	Yes = 50.0%; No = 50.0%
		Who performs agri-food activities [h]	Production model	116	Women = 52.6%; Men = 5.2; Both = 42.2%
		Who performs off-farm work	Production model	116	Women = 5.9%; Men = 86.8%; Both = 7.1%
		Access to training	Agri-food policies & Access to resources	116	Yes = 32.8%; No = 67.2%
		Marketing of surplus crops	Local markets	116	Yes = 59.5%; No =40.5 %
		Marketing of dairy	Local markets	78	Yes = 71.8%; No = 28.2%
		Marketing of small animals	Local markets	113	Yes = 60.2%; No = 39.8%
		Marketing of cattle	Local markets	85	Yes = 22.4%; No = 77.6%
		Off-farm works	Production model	116	Yes = 58.6%; No = 41.4%
		Access to credit	Access to resources	116	Yes = 22.4%; No = 77.6%
	A6	Participation in *mingas* [i]	Social organization	116	Yes = 73.3%; No = 26.7%
		Participation in exchanges of services	Social organization	116	Yes = 36.2%; No = 63.8%
		Participation in exchanges of seeds	Social organization	116	Yes = 32.8%; No = 67.2%
	A8	Importance of crops for HH consumption (% from total species farmed) [j]	Right to food	116	Mainly consumption = 72.9%; Consumption & selling = 25.4%; Mainly selling = 1.7%
		Importance of small animals for HH consumption (% from total types of bred animals) [j]	Right to food	113	Mainly consumption = 59.1%; Consumption & selling = 31.7%; Mainly selling = 9.2%
		Importance of dairy for HH consumption (% from total produced) [j]	Right to food	78	Mainly consumption = 28.2%; Consumption & selling = 29.5%; Mainly selling = 42.3%
		Importance of traditional foods (frequency of consuming corn: times per week) [k]	Right to food	116	Low = 16.4%; Medium = 29.3%; High = 54.3%
		Dependence of non-traditional foods (frequency of consuming rice: times per week) [k]	Right to food	116	Low = 6.9%; Medium = 16.4%; High = 76.7%
		Dependence of non-traditional foods (frequency of consuming noodles: times per week) [k]	Right to food	116	Low = 25.9%; Medium = 43.1%; High = 31.0%
		Income diversification (mean number) [l]	Production model	116	3.8 ± 1.5
		Importance of on-farm incomes (% of income diversification due to on-farm incomes)	Production model	116	56.9 ± 25.3
		Dependence on middleman to marketing crops	Local markets	69	Yes = 4.5%; No = 85.5%
		Dependence on middleman to marketing dairy	Local markets	78	Yes = 33.9%; No = 66.1%;

SES variables and tiers			Food sovereignty pillar & main cross-scales interactions	(a)	Value of indicator ± S.D.
First	Second	Third (food sovereignty indicators)			
		Frequency of selling (times per week)	Local markets	105	Less than once per week = 16.2%; Once per week = 68.6%; More than once per week = 15.2%
	A9	Use of chemical fertilization on crops	Production model	116	Yes = 7.8%; No = 92.2%
		Use of chemical fumigation on crops	Production model	116	Yes = 17.2%; No = 82.8%
		Use of organic control on crops	Production model	116	Yes = 29.3%; No = 70.7%
		Use of chemicals to control small animals' diseases	Production model	113	Yes = 52.2%; No = 47.8%
		Use of ethnoveterinary to control small animals' diseases	Production model	113	Yes = 27.4%; No = 72.6%
		Use of native seed in crops (%) (m)	Access to resources	116	78.4 ± 13.7
		Use of modern seed in crops (%)	Access to resources	116	21.3 ± 13.7
		Use of native & modern seeds within the same species of crop (%)	Access to resources	116	0.4 ± 1.6

Notes: **RS**=Agro-ecosystem boundaries; RS3=Size of resource system; RS4=Human-constructed facilities; RS5=Productivity of system; RS9=Location. **RU**=Agro-ecosystem units; RU5=Number of units; RU6=Distinctive characteristics; RU7=Spatial and temporal distribution. **GS**=Agri-food governance system; GS4=Property-rights systems; GS5=Operational-choice rules; GS6=Collective-choice rules. **A**=Agri-food system actors; A1=Number of relevant actors; A2=Socioeconomic attributes; A6=Social capital; A8=Importance of resource; A9=Technology used. S.D. = Standard deviation. (a) Number of respondents. (b) These data correspond at provincial level (province of Loja; ESPAC 2013). (c) This data corresponds to meteorological station M0432 (INAMHI 2015a). (d) It includes farmed species (except medicinal and ornamental) (e) Types considered include: sheep, pig, poultry, guinea pigs, beekeeping and aquaculture. (f) These data correspond at cantonal level (canton of Loja; SINAGAP 2000). (g) Number of people (they may or may not have employment) with >15 years (INEC 2014). (h) If 50% or more of agri-food activities are performed by women, male or both. Agri-food activities considered are: eight to agricultural production, animal production according to animal types that have the household, three to processing (food preservation for self-consumption, dairy and no-dairy products to sell), three to distribution (crops, livestock, dairy products). (i) If any of household members during the last three years participated in working groups convened by the community (*mingas*). (j) Mainly for consumption=75% or more for consumption; Consumption and selling=50% for consumption and 50% for selling; Mainly for selling=75% or more for selling. For crops, percentage obtained based on the total number of cultivated species. For small animals, percentage obtained based on the total number of types of small animals. (k) Low=1 time or less/week; Medium=2-3 times/week; High=4 times or more/week. (l) Types considered are: five on-farm incomes (sell of crops, dairy and no-dairy products, small animals and livestock), one off-farm incomes (works), and three non-farm incomes (government subsidies *Bono de Desarrollo Humano* (*BDH)*, remittances, land lease). (m) Includes crops locally called *criollos* & *acriollados*.

2.5.1.1. Social organization

The pillar of social organization shows direct interactions with the pillars of access to resources production model and agri-food policies through the SES components of culture and associations or organizations. In the study area, households belong to *Saraguro* indigenous (50%) and *mestizo* (50%) culture. Ecuadorian indigenous cultures have historically been related to the mobilization of their members for political and social activities, mainly linked to the struggles for land and pluri-ethnic national recognition (key informants from rural town of San Lucas I-COM-1,I-GADP-1; Rosero 1992b). For instance, *Saraguro* people have obtained investment projects (GS1, GS2, I5) funded by international and national organizations (e.g., International Fund for Agricultural Development-IFAD and Fondo Ecuatoriano Populorum Progressio-FEPP; MBS-SSDR/IFAD/IICA 1991). However, at present, the projects and trainings related to the agri-food sector have decreased. Only 33% of households in the area received training last year (2013).

Both indigenous and *mestizo* populations can be organized into two types of community-based organizations: *comunas* (27%) and/or peasants' associations (15%). *Comunas* have formal regulations (GS6; Congreso Nacional 2004) elaborated under the coordination of the Ministry of Agriculture (GS1). These collective rules influence the access to technical and/or financial resources from governmental and/or international cooperation. According to our informants in the *comunas* (I-COM-1; I-COM-2), these resources have been primarily used for access to basic infrastructure and services (RS4; I5).

Peasants' associations have collective rules (GS6) elaborated under the consensus of their members. They can be part of higher-scale networks such as the RAL. According to our informants from RAL associations and public university (I-RAL-1; I-ASOR-1; I-MA-1; I-UNL-1), RAL increases the collective capacity of their members all along the agri-food activities. For example, through lobbying actions (I6) within production and process activities, RAL has achieved greater access to training from the public university (GS1) and NGOs (GS2). Also, through information sharing (I2) and monitoring (I9), RAL has achieved implementation of a participatory guarantee system based on agroecological principles (A9; see e.g., MAGAP 2012). Within distribution activities, RAL has succeeded in influencing market policies (GS1) at the municipal level.

One of the arguments often presented to demonstrate the feasibility of Ecuadorian rural communities as not only an organizational instance of the population but also as a potential hub of implementation of social policies has been the presence of solidarity (*mingas*: traditional community groups) and reciprocity (exchanges of services) relations within and between families (Martínez 1996). These forms of cooperation (A6) are not exclusive to indigenous communities. Within the study area, the participation in *mingas* is high (73%), while the

reciprocity has a tendency to decrease (36%). These trends allow analyzing the links among the pillars of social organization, access to resources, and agri-food policies (network-spatial-institutional cross-scale interactions).

2.5.1.2. Access to resources

The pillar of access to resources shows linkages with the production model, social organization, and local market pillars through the SES components describing the livelihoods strategies. The land available per household (RS3) in the area is on average less than 5 ha and is mainly located in areas of steeper slopes (RS9). Access to land (GS4) mainly occurs by inheritance (83%). Most of the properties (64%) do not have titles, which affects access to public credit (GS1, A2). In the last year (2013), only 22% of households had access to credit. Land (RU7) is mainly used for pastures; livestock activities are an important livelihood strategy. Households with low extensions of land often lease pastures to maintain livestock production.

Regarding the access to water, given the high monthly precipitation (RS9), water is not a limiting factor but rather the lack of infrastructure for storage and distribution (RS4). Regarding access to seeds, households make use of native seeds (A9) for most crops (mean = 78%; e.g., *Zea mays, Cucurbita maxima, Phaseolus vulgaris, Vicia faba*). Modern seeds are mainly used for horticultural crops (e.g., *Beta vulgaris, Brassica oleracea, Raphanus sativus*). Although horticultural production is important for the revival of the Ecuadorian peasant economy, the dependence on imported modern seeds (especially from the United States) is detrimental to food sovereignty at the national level (Álvarez et al 2014). This process displays the cross-scale interactions of access to resources at both local and national levels.

Finally, as previously shown, indigenous culture shows interactions with access to infrastructures. Households of *San Lucas* (mainly indigenous) have a main road paved while *Jimbilla's* (mainly *mestizo*) have an unpaved road. Although different communities' connection to their respective main road is often through trails, informants in *Jimbilla* (I-ASOR-1;I-ASON-1) indicated that road-system conditions (RS4) influence the frequency of deliveries to local markets. This displays links between the pillars of access to resources and local markets through livelihood strategies based on marketing of agri-food products.

2.5.1.3. Production model

The pillar of production model shows interactions with the pillar of social organization through the SES components describing the livelihoods strategies. Indeed, the diversity of productive activities has resulted in a diversity of livelihood strategies. Among households engaged in agriculture (n = 116), 60% sell their production while from total crop harvest (mean = 17

farmed species per household), only 27% are intended for sale; the rest are kept to guarantee household self-sufficiency. Among households raising small animals (n = 113), 60% sell their production; from the total types of small animals (mean = 3 small animals per household; e.g., guinea pigs, pigs, poultry, sheep), 41% are intended for sale. Among households with cattle (n = 85 households with cattle), 22% sell live cattle while for those with dairy cattle (n = 78 households with dairy cattle), the milk is primarily intended to produce fresh cheese (100% households); 72% of households sell them.

At the same time, the diversity of productive activities shows the importance of agri-food systems (A8) to support livelihoods strategies. Fifty-seven percent of household income diversification (mean = four types of income sources) comes from on-farm activities. The remaining sources are associated with off-farm and no-farm incomes (e.g., 59% of households have off-farm work, 73% of households receive government subsidies as *Bono de Desarrollo Humano-BDH*). In some households, allocation of these strategies is influenced by sexual division of labor. For example, on-farm activities are more related to women (53%) while off-farm activities are related to men (87%).

As previously described, some agricultural practices (A9) may be influenced by the culture (A2) and the RAL rules (GS6). Similar farming activities include the use of animal traction for plowing (*yunta*), hand tools for planting (*tola*), and intercropping and the use of compost to increase soil fertility. Within livestock activities, the use of on-farm inputs for animal feed (except for poultry, which it is often supplemented with purchased maize) and the use of artisanal methods for milk processing are common. Other production activities that may be influenced by the pillar of social organization, according to our informants from RAL and rural town of *San Lucas* (I-RAL-1;I-ASOR-1;I-GADP-1), include maintenance of crops and animal diversity (RU5) or the use of chemical inputs. RAL members maintain greater diversity of crops and animals. Despite the fact that in the studied area, the use of chemical inputs to fertilize and fumigate is low (8% and 17%), the RAL rules influence households to limit their use (I9) and promote alternatives (A9) like the *bioles* (herbal preparations), which play a dual role: feeding the plants and pest control. Within livestock activities, households tend to use chemical inputs for animal care (52%), but the RAL rules encourage the use of ethno-veterinary practices. Previous studies suggest the importance of rules for the use of agroecological practices (Guthman 2000); the significance of these network-institutional-spatial cross-scale interactions will be analyzed in later studies.

Livelihood strategies may also influence farming practices (A9). As noted above, the technology used is labor intensive, but among the strategies to diversify incomes is off-farm work (A2); therefore, within the system, non-linear interactions between used strategies could be occurring. As livelihood strategies are determined by multiple factors (Ellis 2000), these network-institutional cross-scale interactions must be deeply analyzed in further research.

2.5.1.4. Access to local markets

A clear interaction in the system occurs among the pillars of local markets, social organization, and access to resources (as previously illustrated). Agri-food products (RS5, RU5) are sold in the markets of Loja. Regarding their destination (A8), crops are mainly sold to consumers (86%) while dairy products are partly sold to intermediaries (34%). According to our informants from RAL (I-RAL-1;I-ASOR-1;I-MA-1), product destination is influenced by RAL rules (GS6); the lobbying activities (I6) with municipal authorities (GS1) have resulted in better access to markets (GS5). Previous Andean studies also emphasize the role of agroecological networks to link peasants with local Ecuadorian markets (i.e., network-institutional cross-scale interactions; Chauveau et al. 2010).

2.5.1.5. Right to food

The diversity of production activities is also related to the high dietary diversity (micronutrient richness containing the crops and animals, adapted from Kennedy et al. 2013; RU6) produced on-farm (mean = eight index of dietary produced diversity per household). This displays an interaction between the pillars production model and right to food. Also, among households, there is a positive tendency to prioritize subsistence agricultural activities (interaction production model - right to food) while livestock activities are mainly focused on marketing (interaction production model - local markets; A8).
There is also an increasing trend of consuming purchased food such as noodles and rice (A8). Currently, in Ecuador, the high consumption of these types of carbohydrates, especially in areas with fewer economic resources, is a public health problem (Freire et al 2013); so it will be interesting to assess whether the networks and associations linked to food sovereignty (i.e., those that promote healthy and culturally appropriate food) influence consumers' and farmers' behavior at the household level (network-institutional cross-scale interactions).

2.5.2. Vulnerability and transformations of the agri-food system: Current perceptions of the main drivers of change

Social (S: agri-food policies, migration, social and cultural changes) and ecological (ECO: environmental changes) drivers of change were obtained from in-depth interviews of key informants and literature review (see Appendix 2.4). In our case study, drivers of change are those affecting the pillars of food sovereignty, and hence, the agroecological resilience, the

individual and collective sensitivity, and capacity of adaptation to change of the local agri-food system (Fraser 2007; Fraser et al 2011).

2.5.2.1. Agri-food policies

Within international agri-food treaties and policies, local informants from peasant organizations (Perception #1) perceived that current trade agreements with the European Union would decrease the individual capacity of peasant producers, mainly those involved in livestock activities, through the introduction of imported dairy products. This trend was confirmed by Jácome (2012), Serrano (2014), and Acción Ecológica (2015). They also perceived that current national policies related to the implementation of good manufacturing practices threaten the use of artisanal methods for milk processing. Bingen and Busch (2006) suggested that these kinds of rules and regulations can entrench corporate agri-food systems and devastate those based on artisanal practices and local markets. Therefore, there is a double exposure, both from international and national levels, threatening livestock activities, which are relevant and common within the Andean agri-food system at the local level.

Regarding national agri-food policies, local informants from peasant, indigenous, governmental, and NGOs (Perceptions #2 and #7) perceived a contradiction in agricultural public policies between the current model proposed by the National Constitution (2008) based on the *sumak kawsay* (good living) and food sovereignty and the national projects that tend to favor the conventional production model. This contradiction was also raised by Fernandez (2014). Indeed, these policies can impact traditional agroecological practices and livelihoods based on peasant agriculture (i.e., affecting the agro-ecosystem resilience and individual capacity of peasants). Regarding access to seeds, local informants from peasant organizations (Perception #3) mentioned that current agrarian policy facilitates the future introduction of GMOs, which could affect the individual adaptive capacity of peasants through the reduction of their seed autonomy at farm level (see Cuvi 2014).

With respect to access to land, current policies supporting land legalization, which can be positive for access to public credit, are perceived as a control mechanism over peasant families for tax collection (Perception #4). Regarding this issue, Vandecandelaere et al. (2011) showed a growth trend in rural land taxes between 2010 and 2011. However, some aspects of the tax design severely limit its redistributive potential (e.g., small farmers, who generally have more difficulties to prove that they have a productive activity, end up paying more tax per hectare than large landowners, who can more easily access tax exemptions; Laforge 2008; Vandecandelaere et al. 2011). Thus, this process could result in no-linear interactions with households' individual capacity. Indeed, previous studies (Sietz et al 2012) highlighted that

particular combinations and levels of access to resources can result in different patterns of climate vulnerability for smallholders at the household level.

Public agri-food policies also impact the production model and access to resources. Local informants from peasant, indigenous, governmental, and NGOs (Perception #5) perceived that current policies to favor access to credit encourage the use of conventional technology packages and promote agribusiness, which affect agro-ecosystem resilience through discouraging agroecological practices as well as the individual adaptive capacity of actors through limiting access to financial resources. This trend has been shown by FIAN (2010: 47) and Ospina et al. (2011). Also, informants from peasant, indigenous, and governmental organizations (Perception #6) stated that current municipal policies are not strengthening market spaces such as free fairs (references in literature not available). If confirmed, this could affect households' individual capacity, impeding the farmer's direct sale of products. Previous studies show that farmers selling directly to consumers have a higher adaptive capacity in their socioeconomic attributes (Eitzinger et al. 2014).

Additionally, informants from peasant, indigenous, and governmental organizations (Perception #13) perceived that the lack of regulation to food imports (e.g., fruit) encourages their sale in local markets. This may result in decreased individual capacity of both producers (e.g., decreasing economic resources from sales) and consumers (e.g., influencing eating habits and dependence of non-local foods, affecting their right to food) of the area. However, the State has recently established a temporary tariff surcharge in order to control the general level of imports (COMEX 2015) of certain fresh agri-food products.

Within local agri-food policies linked to access to public infrastructure, local informants from peasant organizations (Perception #8) suggested that the lack of a road system limits access to local markets, affecting the individual adaptive capacity through the reduction of income from the sale of food. Studies in the research area reported the relevance of rural roads to link producers to local markets (Bernardi De León 2009).

2.5.2.2. Migration: Rural to urban areas and/or to foreign countries

Local informants from peasant, indigenous, and governmental organizations (Perception #9) perceived that agri-food policies supporting the agro-export model (a chronology of national agricultural policies is presented by Rosero et al 2011) encourage rural–urban migration as shown by Carrión and Herrera (2012: 11–13). This, in turn, impacts culture (e.g., through the introduction of new, unhealthy eating habits and displacement of traditional meals; INPC 2012: 36) and social organization (e.g., limiting the possibility to participate in *comuna* assemblies and cooperation activities; Martínez 2005), affecting the collective adaptive capacity of peasants.

2.5.2.3. Social and cultural changes

Local informants from peasant, indigenous, and governmental organizations (Perceptions #10, #11, and #12) considered the new process of peasantry's self-organization (i.e., RAL) as a social change that helps to increase their collective capacity to face non-favorable public policies (Vergara-Camus 2014) as well as to manage internal conflicts and advance gender issues (e.g., inclusion of women in leadership; Soliz et al. 2013). In relation to cultural changes in consumption habits, these are linked to migration (whose effects were described above) and, as Popkin (2006) showed, to global agricultural policies (e.g., those focused on creating cheaper grains and animal-source foods) along with mass media, favoring imbalanced diets with implications for health (e.g., overweight and obesity). Also, local informants perceived (Perception #13) that local foods are not valued by consumers. According to Espinosa (2004), one of the main factors affecting the production of Andean roots and tubers (e.g., *Oxalis tuberosa, Tropaeolum tuberosum*) is the decreasing and limited demand for these products at urban centers.

2.5.2.4. Environmental changes

Ecological drivers are prioritized by few local informants as constraints to the production model. Informants from peasant organizations (Perception #14) perceive that rainfall patterns are changing, and this could induce changes in the traditional agricultural calendar and/or change crop yields and dietary diversity. However, from available meteorological yearbooks (1990 to 2012; INAMHI 2015b), we cannot establish conclusions on this matter. Additionally, they perceive that soil fertility is decreasing (de Koning et al 1997), and this could decrease food production. These changes can affect both the individual capacity of peasants and the resilience of agro-ecosystems. Finally, other environmental drivers relevant in the literature, such as deforestation (see e.g., Pohle et al 2010), were not mentioned by the interviewed informants. Thus, in the study area, we can see that drivers of change linked to policies are perceived as the most significant influences on the local agri-food system's vulnerability rather than ecological ones. More information about the informants and perceived drivers is detailed in Appendix 2.4.

2.6. Final remarks

The food sovereignty policy proposal aims at promoting the right to food through reasserting the value of local, agroecological foods and creating social and political change. Assessing food

sovereignty represents a theoretical and practical challenge within social- and ecological-sciences research. An analysis under this policy paradigm requires taking into account the role of context-specific agroecological, socioeconomic, and institutional components of agri-food systems, and thus, conceptualizing agri-food systems from a system approach. The main added value of our framework is based on two points: (1) The SES framework, which enables the establishment of a link between pillars of food sovereignty with the social and ecological components of the target area or sector of research within the boundaries of a given agri-food system. SES conceptualization enables the analysis of the cross-scale and cross-level interactions between social and ecological components of the system when agri-food activities take place. It also enables the analysis of agri-food system interactions and outcomes responses to drivers of change, and the non-linear interactions among agri-food system outcomes. For example, our initial exploration in distribution activities showed that access to local markets is largely influenced by culture, municipal policies, governmental manufacturing standards, and transport infrastructure. These determinants affect outcomes contributing to the pillar of local markets and the SES components of livelihoods strategies linked to on-farm activities (incomes from selling agri-food products). (2) The integration of SES and vulnerability frameworks, which allow including the agency of agri-food system actors and normative issues in the research. The vulnerability linkage enables the analysis of transformations of the system when different strategies, including emergent properties like self-organization, are used by actors to reduce their agri-food system vulnerability. For example, peasant associations can influence policies to access local markets (as well as contribute to the pillar of social organization) and to influence the collective capacity dimension to reduce their vulnerability.

The framework developed in this paper was used to identify key system interactions linked to food sovereignty pillars and to analyze the policies (operating at different scales over time), acting as their major determinants in agri-food system management. The integrated framework can help assess how agri-food policies (source of exposure) may change the configuration of local agri-food systems, determine if and how peasant (RAL) and indigenous institutions (*comunas*) or culture deal with these policy drivers, and analyze to what extent these policies are consistent with livelihoods' reproduction of local communities.

Recent Andean studies have also analyzed the role of social factors and their influence on future vulnerability at different scales within agri-food activities, for example, regarding the role of access to resources at the household level (Sietz et al 2012), the access to markets at farm level (Eitzinger et al 2014), and the public government policies at regional level (Ramirez-Villegas et al 2012). But these studies do not address all agri-food activities neither cross-scale interactions. Analysis of each agri-food activity individually is not sufficient to address agri-food systems' vulnerability. The developed framework may be particularly useful to formulate hypotheses about current functioning and likely transformations of peasant-based agri-food systems for

which the value of food goes beyond the material, as with those found in Andean region. Further research will analyze the validity of this framework to assess future drivers of change.

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Home garden (*huerta*), Saraguro indigenous commune "Bucashi" (2015). Photo by author.

"*Aquí para reclamar al municipio, al concejal, a cualesquiera,*
se necesita la unión. Si no nos unimos, una sola no se hace. (…)
Uniendo se puede hacer, mientras no nos unimos,
no nos reunimos, no conversamos, nunca saldremos,
***seguiremos ultrajados de ellos*"**

(*Saraguro* indigenous peasant woman of RAL)

CHAPTER 3: The role of social and institutional factors in agri-food system configuration: a case study research in the Andean Ecuadorian region

3.1. Introduction

The conceptualization of agri-food systems as socio-ecological systems (SES) is having a central importance within agri-food research (Ericksen 2008; Rivera-Ferre 2012). This involves developing new methodological frameworks that integrate the social, cultural and environmental context of the target area of research, and its interactions. This conceptualization facilitates the study and management of the whole agri-food system (Rivera-Ferre et al 2013), and the assessment of alternative political paradigms such as food sovereignty (Vallejo-Rojas et al 2015). In this context, different research approximations to SES highlight the importance of social and institutional factors in influencing their configuration. For instance, SES-based research has emphasized the significant role of collective action in the management of complex SES, facilitating cross-level governance, long-term protection of ecosystems and the well-being of different populations (Ostrom 1990; Brondizio et al 2009; Cox et al 2010; Ostrom and Cox 2010; Anderies and Janssen 2013). The link within institutions[22] and networks through interactions based on reciprocity and trust determine the level of success of collective action (Ostrom and Ahn 2003). Additionally, research based on the sustainable rural livelihoods framework has highlighted the need to include socio-economic factors within the analysis of outcomes leading to support well-being and natural resource sustainability (Scoones 1998). The role of social and institutional factors linked to indigenous cultures has also been highlighted by the Andean research community. Indigenous and subsistence agricultural practices have emerged over centuries of cultural and biological evolution and resulted in ingenious strategies of agro-ecosystem appropriation (Denevan 2001; Garay and Larrabure 2011; Velásquez-Milla et al 2011) that ensure ecological outcomes, e.g., food production, conservation of crop diversity. Andean indigenous cultures have also been related to social outcomes linked to access to resources and influence on policies (Bebbington and Perreault 1999; Perreault 2003; Boelens et al 2009; Bebbington et al 2010). Finally, agri-food research has emphasized the role of social and institutional factors to achieve social and ecological outcomes in agri-food systems. For instance, regarding the production activities, agroecological production models have been suggested to support agro-biodiversity conservation, increase food production or increase

[22] Human-constructed constraints or opportunities within which individual choices take place and which shape the consequences of their choices (McGinnis 2011: 39).

climate change resilience (Pretty and Smith 2004; Rosset et al 2011); regarding the distribution activities linked to access to local markets, it is highlighted their role in building direct relations between small food producers and urban consumers or increasing the income levels from marketing agri-food products (Cuéllar-Padilla and Calle-Collado 2011; Gyau et al 2014); regarding the consumption activities, those linked to alternative food networks contribute to achieve the conservation of local agro-biodiversity to increase the customer loyalty and build local food systems (Sage 2003; Simoncini 2015). However, the analysis of the role of social and institutional factors in assessing agri-food systems under a systemic view is still scarce. Our research contributes to fill this lacuna, by analyzing the linkages of Andean agri-food systems conceptualized as SES and the food sovereignty policy proposal. Thus, the main goal of this article is to analyze how agri-food system configuration (through the activities of production, processing, distribution and consumption; Ericksen 2008) is related to social and institutional factors.

We adopt a case study research located in the canton of Loja, in the southern Ecuadorian Andes. This rural area is of special interest to analyze the role of the social and institutional factors in the functioning of local agri-food systems. First, it has a population clearly divided into two ethnic groups whose members identify themselves as *Saraguro* indigenous and *mestizo*[23]. The inclusion of *Saraguro* culture is relevant since it can influence the components of agri-food activities such as those linked to biodiversity management (Pohle and Gerique 2006), the adoption of agricultural practices (Gonzalez et al 2010) and the access to resources (Belote 2002). Additionally, given that food sovereignty has been incorporated at the constitutional level of governance (Ecuadorian Constitution 2008) as one of the central elements to achieve the Good Living or *Sumak Kawsay* (in Quechua) at national level (SENPLADES 2009), the policy includes perspectives arising from indigenous knowledge (Gudynas and Acosta 2011; Houtart 2011). Second, it is an area of influence of the *Agroecological Network of Loja* (*RAL*, in Spanish terms). The inclusion of Ecuadorian agroecological networks is relevant since they can influence the components of agri-food activities such as those linked to the policy proposal of food sovereignty, e.g. agroecology, local markets, gender and social organization (Chauveau et al 2010; MAGAP 2012; Proaño and Lacroix 2013; Soliz et al 2013). Three specific objectives are formulated for the empirical case of the canton of Loja: (1) to select the main explanatory variables that influence the local agri-food system configuration; (2) to verify the key role played by selected social and institutional factors on agri-food system configuration; and, (3) to understand the agri-food system configuration in terms of food sovereignty pillars.

[23] Cultural/biological mixing: Spanish - indigenous (Belote 2002: 28-29).

3.2. Background information of the case study

Our study focuses in the Andean agro-ecosystems of canton and province of Loja, located in the Southern Ecuadorian Andes. Here the topography is rugged. Slopes are generally 30-60% in the interior valleys of the cordilleras, and over 60% on the exterior flanks (White and Maldonado 1991). The annual average temperature is 16.4°C, and annual precipitation is 918.6 mm with 247 days of precipitation per year (INAMHI 2014a). The rainy seasons correspond to September to May; and the dry season to the summer (June to August). As figure 3.1 shows, the agricultural calendar of the area is linked with these periods (MBS-SSDR/IFAD/IICA 1991; Neill and Jørgensen 1999; INPC 2012; INAMHI 2014b). Andean associated crops (e.g., white corn, beans, potatoes) are located mainly over the 2000 m.a.s.l. Subtropical associated crops (e.g., cassava, banana, sugarcane) are located mainly under 2000 m.a.s.l. The space where corn is grown with their associated crops is locally called *chacra*. While space mainly dedicated to planting short-cycle vegetable is locally called *huerta*. In general, at provincial level[24], 51% of agricultural production units (APU) are smallest units of 5 ha or less which occupy 6% of the land area; the largest units, of over 100 ha, represent 2% of the local APU, but occupy 40% of the land area.

In the Ecuadorian Southern Andes the agricultural production, based on crop and a marginal production of beef and dairy cattle, supports local livelihoods (Wilkinson 2009). Income of 48% of the population depends on strategies of income generation related to the agri-food sector (from this 52% is on-farm; INEC 2010). At the provincial level, only 14% of the APU sell their production directly to consumers (SINAGAP 2000). Off-farm work is also a relevant strategy of income generation for 63% of population (from this, 34% is not related to the agricultural sector) (INEC 2010). Inclusion of the strategies of income generation are relevant since they can influence the components, interactions and outcomes of agri-food system such as agro-biodiversity levels (Major et al 2005), dietary diversity produced (Jones et al 2014) or income diversification (Ellis 1999; Lanjouw 1999).

[24] Data are not available at the cantonal level.

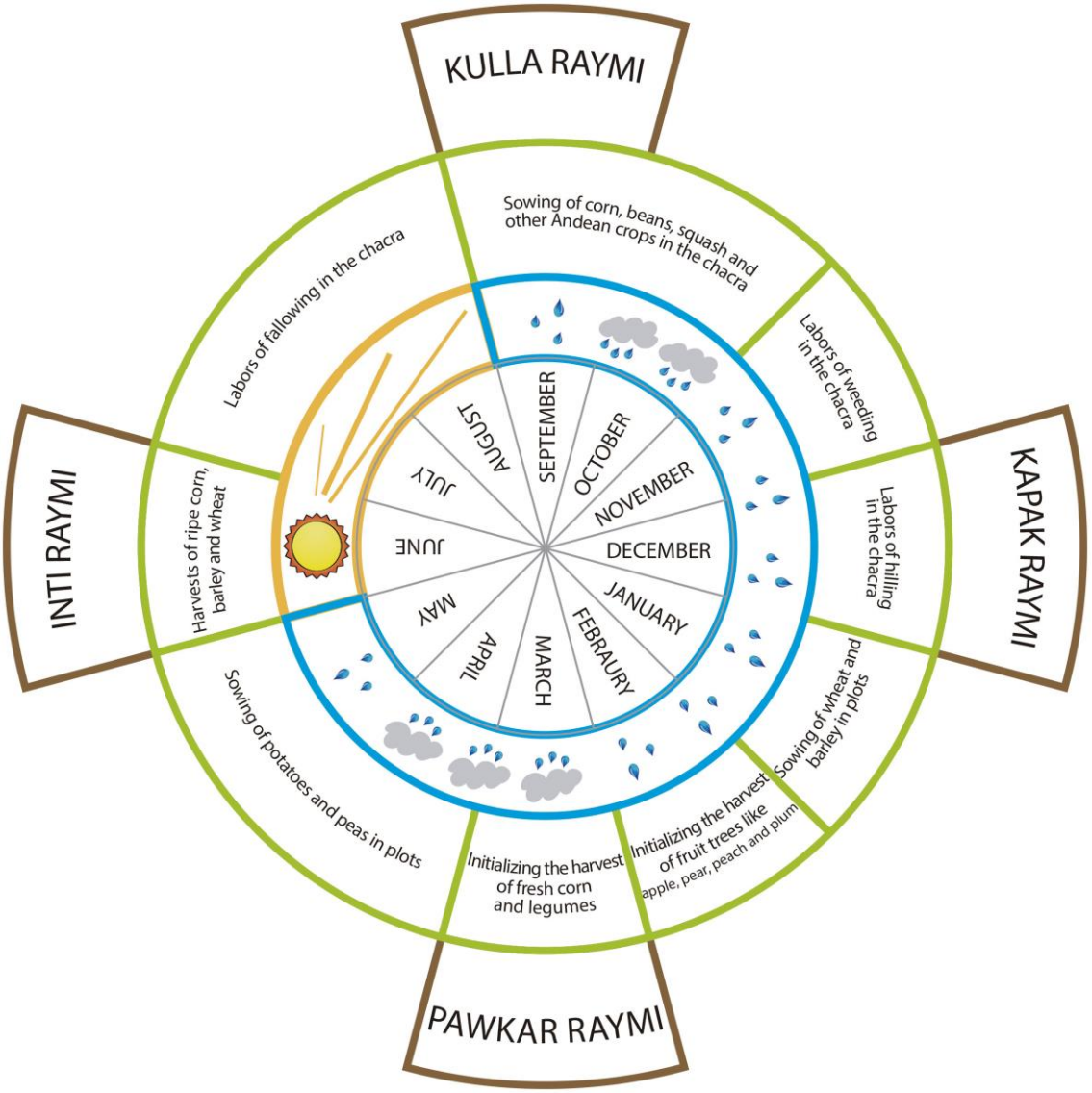

Figure 3.1 Agricultural calendar of the area study area, canton of Loja, Ecuador. The rainy season correspond to September to May (periods of high rainfall are usually during October and March-April); and the dry season to June to August. In September planting of corn associated with bean, squash and other Andean crops begins; and, in January the planting of barley and wheat. While from March begins the harvest of fresh beans; in April begins the planting of potatoes and peas; and, in June the harvests of ripe corn, barley and wheat. The agricultural calendar is linked to traditional Andean indigenous celebrations (shown in the external circle). Source: informal interviews and MBS-SSDR/IFAD/IICA (1991), Neill and Jørgensen (1999), INPC (2012), INAMHI (2014b). Own elaboration.

The rural population of canton of Loja is predominantly *mestizo* (83%) being the indigenous population (10%) a considerably smaller proportion of the total population (INEC 2010). The major indigenous group is the *Saraguro* people (INPC 2012). *Saraguros* are part of the large and diverse Quechua group, whose population is dispersed mainly throughout the Ecuadorian,

Peruvian, and Bolivian Andes (King 2001). Regarding the organizational scope, *Saraguro* culture keeps a very elaborated system of traditional festivals and celebrations which are coupled to the local agricultural calendar (figure 3.1) and relates the agricultural, religious, ethnic and political spheres (Hurtado 2004; INPC 2012). The traditional *Saraguro* communities are not corporate communities, as defined by Wolf (1967) (cited in Belote 2002: 160). However, despite land ownership is individual; the defense of their interests is collective. Their mobilizations around the struggles for land have had an influence at the national level, e.g., they played a decisive role in the development of indigenous uprising in the 90s (Rosero 1990, cited in Criollo 1995: 164). The *mestizo* peasants do not keep the distinctive traditional festivals system and Andean celebrations of the *Saraguro* indigenous culture.

Both indigenous and *mestizos* are organized in community-based organizations, i.e., the traditional *comunas* and farmers associations. Both types of institutions develop collective rules which have the potential to influence the agri-food system management. While the *comunas* are community-based organizations primarily linked to areas of indigenous population, associations and networks of farmers are a form of organization preferred by both the indigenous and *mestizo* populations (Martínez 1998). Factors associated with this preference include the complicated process to legalize the *comunas* and mainly, the changes experienced by farmers and their families regarding their traditional way of life and organization which result from the new type of market relations within rural areas (Martínez 1998). For our case study, we have focused on the role that collective rules play on households belonging to *comunas* and *RAL*. In the study area *comunas* are integrated by indigenous people and their formal rules have been elaborated under the coordination of the Ministry of Agriculture (Martínez 1998). These organizations are governed by the Law of Commons (1937) and have as representative body the *cabildo* (Martínez 2002). In *Saraguro* communities the *cabildo* is the central entity of political organization (Ávila 2012; INPC 2012). Despite the *Saraguro* communities do not act as regulatory units (Belote 2002), inclusion of *comunas* in the analysis is relevant because they have consolidated their political and organizational bases which may affect communities ability to respond to changes (Martínez 1998).

RAL is a new organization integrated by both indigenous and *mestizos* farmers' organizations. It was born in 2006 in order to respond to the rapid socio-economic, cultural and political changes that affected both social organization and culture (Martínez 2002; Martínez 2005), the loss of traditional crops and foods (Espinosa et al 1996; Sherwood et al 2013) and the progressive dependence from intermediaries in urban markets (Chiriboga and Arellano 2004; Proaño and Lacroix 2013). The collective rules of *RAL* have been elaborated under the consensus of its members. The core of *RAL*'s governance system is the participatory guarantee system (PGS). The PGS is a validation tool of agro-ecology implementation at farm level; as well as a

consumer assurance regarding the type and quality of the products bought. The articulation from the production to distribution activities through the agro-ecological production model and local markets is based on the joint participation of *RAL* with local institutions. Here representatives from *RAL*, the municipality of Loja and the local public university are involved. Through this articulation, there is a support to the process of agro-ecological certification farms and training for both agro-ecological production and marketing. The inclusion of agro-ecological networks is relevant since their collective rules can influence the components, interactions and outcomes of agri-food system such as those linked to biodiversity conservation (Pretty and Smith 2004; Simoncini 2015), productivity and resilience to climate change (Rosset et al 2011; Altieri and Nicholls 2013), exchange of knowledge (Cuéllar-Padilla and Calle-Collado 2011; Martínez-Torres and Rosset 2014) and access to markets (Chauveau et al 2010; Gyau et al 2014).

3.3. Methods

To conceptualize and analyze the agri-food system as SES we adopted an integrated framework previously developed (Vallejo-Rojas et al 2015). This framework enables the establishment of links between food sovereignty pillars and the social and ecological components of the target area of research within the boundaries of a given agri-food system. The components of the agri-food system are described using the Ostrom language for classification of the second-tier variables of the SES framework (McGinnis and Ostrom 2014). The working definitions used for these variables are shown in Appendix 3.1.

3.3.1. Data sources

Data sampling was conducted between December 2013-February 2014 in the area comprising the rural towns of *San Lucas* (3°44'47.5"S, 79°15'58.5"W) and *Jimbilla* (3°51'39.5"S, 79°10'22.2"W). The sample was deliberately skewed in order to capture the cultural, institutional and ecological diversity of agrarian dynamic in Ecuadorian Andean region (Cepeda et al 2007). *San Lucas* is mainly inhabited by *Saraguro* indigenous (81%), while *Jimbilla* by *mestizos* (95%; INEC 2010), thus the survey included four communities in each area. To select the communities the research sample was stratified to capture a statistically significant group of households that belonged to *comunas* and *RAL*, as well as to include communities located in different altitudinal zones, from low (1800-2200m.a.s.l.; N=24) to middle (2200-2600m.a.s.l.; N=61) and high (2600-3000m.a.s.l.; N=31) zones (Cueva 2010). The survey covered 60% women and 40% men (householders with age between 18-89 years). The questionnaire included information on: (i) household (e.g., size and division on age and gender) and individual (e.g., ethnic self-identification and educational level) characteristics, (ii) production activities (e.g.,

access and uses of land, credit, training, agricultural practices, crops and livestock management, production destination), (iii) process and distribution activities (e.g., artisanal processing, commercialization, access to markets and incomes sources), (iv) consumption activities (e.g., consumption habits), and (v) social relations (e.g., participation in social exchanges such as *minga* [exchange of work by food, mainly for community purposes], *prestamanos* or *randi-randi* in Quechua [exchange of work by work, mainly at household level], exchanges of seeds; and, community based organizations). In all survey sections we included questions about: rights (e.g., access to land), agency (e.g., decisions about crops and livestock management) and power (e.g., gender role division of tasks and responsibilities within the household in the different agri-food activities).

3.3.2. Data analysis: selection of variables

Based on previously analyzed narratives from key local informants (Vallejo-Rojas et al 2015), and a literature review linked to the target goal of this study, we classified the variables describing the agri-food system configuration as explanatory, intermediate control variables which influence components of the agri-food activities (dependent variables). The classification of variables is shown in Table 3.1.

Explanatory variables

Explanatory variables linked to our target goal refer to social and institutional variables that might influence the components of agri-food systems and their interactions, and therefore determine different configurations from agri-food activities.

Control variables

Control variables refer to variables that could influence the configurations from agri-food activities but which are not part of our target goal of study.

Intermediate variables

We also included in our analysis intermediate variables, i.e., variables that the literature has shown to be relevant to influence the configurations from agri-food activities but at the same time can be influenced by other explanatory variables, target of our study.

Dependent variables

Dependent variables refer to variables that can be used to measure the components of agri-food activities (Ericksen 2008) focusing on those linked to food sovereignty pillars (Ortega-Cerdà and Rivera-Ferre 2010; Binimelis et al 2014) and available observations.

Table 3.1 Classification of variables of the SES framework in explanatory, control, intermediate and depended variables in order to analyze the agri-food system configuration according to literature review, narratives from key local informants and available observations.

Second-tier [(a)]	**Third-tier**	**Linkages with system interactions and references**	**Key informants**[(b)]
	EXPLANATORY VARIABLES		
GS6	GS6.1 – Member of agro-ecological network of Loja (RAL)	It can influence interactions such as production and monitoring activities linked to adoption of agro-ecological models (Pretty and Smith 2004; Rosset et al 2011); distribution activities linked to better access to markets (Chauveau et al 2010; Cuéllar-Padilla and Calle-Collado 2011; Gyau et al 2014) and alternative food networks (Sage 2003; Simoncini 2015); self-organizing activities linked to influence on agri-food policies (Desmarais 2008; Rosset et al 2011; Desmarais and Nicholson 2013)	I-RAL-1, I-ASOR-1, I-MA-1, I-UNL-1
GS6	GS6.2 – Member of community- based organizations (*comunas*)	It can influence local agri-food system interactions such as self-organizing activities that influence agri-food policies (Martínez 2002)	I-COM-1, I-COM-2
A2	A2.1– Self-identification as *Saraguro* indigenous	It can influence interactions such as production activities linked to sustainable crop management practices (Denevan 2001; Velásquez-Milla et al 2011), distribution activities linked to incomes from on-farm activities (Winters et al 2002), and self-organizing activities linked to access to resources (Bebbington and Perreault 1999; Perreault 2003)	I-COM-1, I-GADP-1, I- GADP-2
	A2.2 – Gender equality in the distribution of labor responsibilities	It can determine the power space within the household in the different agri-food activities (Weismantel 2001; Fadiman 2005); and, it can influence interactions such as production activities linked to reduced use of chemical inputs (Cole et al 2011), and consumption activities linked to improving nutrition at household level (Quisumbing et al 1995; Schreinemachers et al 2014)	-
	A2.3 – Marketing of agri-food products	It can influence production activities linked to increased crop diversification (Major et al 2005; Jones et al 2014), increased dietary diversity and on-farm incomes (von Braun 1995; Minot et al 2006; Herforth 2010; Jones et al 2014)	I-RAL-1, I-ASOR-1, I-MA-1
	A2.4 – Off-farm work	It can influence production activities linked to decreased crop diversification (Winters et al 2006; Kasem and Thapa 2011) and decisions to investment in livestock (Tegebu et al 2012), and distribution activities linked to increased income diversification (Lanjouw 1999; Marchetta 2013)	I-MA-1, I-FEN-1, I-COM-1, I-ASON-1, I- GADM-1

Second-tier [a]	Third-tier	Linkages with system interactions and references	Key informants[b]
	CONTROL VARIABLES		
RS3	RS3.1 – Size of farm	It can influence crop diversification (Winters et al 2006; Kumar et al 2012; Sichoongwe et al 2014), choice and accumulation of livestock (Tegebu et al 2012), productivity (Fan and Chan-Kang 2005) and incomes from on-farm activities (Elbers and Lanjouw 2001; Winters et al 2002)	I-RAL-1
RS4	RS4.1 – Access to roads paved	It can influence crop diversification (Kumar et al 2012; Sichoongwe et al 2014), incomes diversification (Castaing et al 2015) and incomes from on-farm activities (Winters et al 2002).	I-ASOR-1, I-ASON-1
RS9	RS9.1 – Location in altitudinal zones	It can influence crop diversification (Velásquez-Milla et al 2011), choice and accumulation of livestock (Tegebu et al 2012)	-
	RS9.2 – Location in protected area	It can influence food production (Castro et al 2015)	-
GS4	GS4.1 – Land tenure	It can influence access to other assets as credit (Stanfield 1990)	I-COM-1, I-COM-2, I-ASOR-1, I-ASON-1
A1	A1.1 – Size of labor force	It can influence crop diversification (Winters et al 2006; Velásquez-Milla et al 2011; Kasem and Thapa 2011; Kumar et al 2012) and choice and accumulation of livestock (Tegebu et al 2012)	-
	A1.2 – Gender of respondent	We included the sex of survey respondents in order to avoid gender bias (Twyman et al 2015)	-
	INTERMEDIATE VARIABLES		
GS5	GS5.1 – Access to retailing location	It can influence crop diversification (Kasem and Thapa 2011; Kumar et al 2012) and farmers' decisions to use middlemen for accessing markets (Abdelali-Martini et al 2013). Additionally, this access can be determined by institutional factors as membership to farmers groups and/or agro-ecological networks (Hellin et al 2009; Shiferaw et al 2011; Fischer and Qaim 2012; Gyau et al 2014)	I-RAL-1, I-ASOR-1, I-MA-1
A2	A2.5 – Access to training	These assets play an important role on crop diversification (Winters et al 2006; Kasem and Thapa 2011; Kumar et al 2012), choice and accumulation of livestock overtime (Tegebu et al 2012) and incomes diversification (Winters et al 2002). Additionally, these assets can be determined by social factors as indigenous culture (Bebbington and Perreault 1999; Perreault 2003) and by institutional factors as	I-RAL-1, I-ASOR-1, I-MA-1, I-UNL-1

Second-tier [a]	Third-tier	Linkages with system interactions and references	Key informants[b]
		membership to farmers groups and/or agro-ecological networks (Hellin et al 2009; Kasem and Thapa 2011; Isaac 2012; McCune et al 2014)	
	A2.6 – Access to credit	Ibid	I-GADP-1
A6	A6.1 – Participation in community-based working groups	These social relations can influence crop diversification (Winters et al 2006; Fuentes et al 2012) and income diversification (Winters et al 2002). Additionally, these social relations can be determined by social factors as culture (Walsh-Dilley 2012; Peña-Venegas et al 2014) and by institutional factors as membership to farmers groups and/or agro-ecological networks (Pretty and Smith 2004; Isaac 2012).	I-RAL-1, I-ASOR-1, I-MA-1
	A6.2 – Participation in services exchanges	Ibid	Ibid
	A6.3 – Participation in seeds exchanges	Ibid	Ibid
	DEPENDENT VARIABLES		
RS5	RS5.1 – Production of processed dairy	Variable included in terms of processing activities (Kristjanson et al 2007; Delgado et al 2008)	-
RU5	RU5.1 – Crop richness	Variable included in terms of production activities (Velásquez-Milla et al 2011; Kasem and Thapa 2011; Kumar et al 2012; Tegebu et al 2012; Sichoongwe et al 2014; Assa et al 2015)	-
	RU5.2 – Small animal richness	Ibid	
	RU5.3 – Number of cattle	Variable included in terms of production activities (Kristjanson et al 2007; Delgado et al 2008; Tegebu et al 2012)	-
RU6	RU6.1 – Dietary diversity produced	Variable included in terms of consumption activities (Herforth 2010; Oyarzun et al 2013; Jones et al 2014)	-
A8	A8.1 – Importance of crops for self-consumption	Variable included in terms of consumption activities (Paterson et al 2001; Devendra and Chantalakhana 2002; Marchetta 2013)	-
	A8.2 – Importance of small animals for self -consumption	Ibid	-
	A8.3 – Importance of traditional foods	Variable included in terms of consumption activities (Velásquez-Milla et al 2011)	-
	A8.4 – Dependence of non-traditional purchased foods low in micronutrients	Variable included in terms of consumption activities (Freire et al 2013; Oyarzun et al 2013).	-
	A8.5 – Income diversification	Variable included in terms of distribution activities (Escobal 2001; Winters et al 2002; Marchetta 2013)	-

Second-tier [a]	Third-tier	Linkages with system interactions and references	Key informants[b]
	A8.6 – Importance of on-farm incomes	Variable included in terms of distribution activities (Kasem and Thapa 2011)	-
	A8.7 – Dependence on middlemen	Variable included in terms of distribution activities (Abdelali-Martini et al 2013)	-
	A8.8 – Weekly frequency of sell	Variable included in terms of distribution activities (Nsoso et al 2004)	-
A9	A9.1 – Use of organic inputs on crops	Variable included in terms of production activities (Altieri 1995; Guthman 2000)	-
	A9.2 – Use of chemical inputs on crops	Ibid	-
	A9.3 – Use of ethno-veterinary products	Ibid	-

(a) **RS**=Agro-ecosystem boundaries; RS3=Size of resource system; RS4=Human-constructed facilities; RS5=Productivity of system; RS9=Location. **RU**=Agro-ecosystem units; RU5=Number of units; RU6=Distinctive characteristics. **GS**=Agri-food governance system; GS4=Property-rights systems; GS5=Operational-choice rules; GS6=Collective-choice rules. **A**=Agri-food system actors; A1= Number of actors; A2=Socioeconomic attributes; A6=Social capital; A8=Importance of resource; A9=Technology available.

(b) Based on previously analyzed narratives from key local informants (Vallejo-Rojas et al 2015). I-MA-1= Movimiento Agroecológico de América Latina y Caribe (MAELA) & Red Agroecológica Loja (RAL); I-FEN-1= Federación Nacional de Organizaciones Campesinas e Indígenas (FENOCIN); I-RAL-1= RAL; I-ASON-1= "Amigos de la Naturaleza" association; I-ASOR-1= "San Antonio" association & RAL; I-COM-1= Comuna "Pueblo Viejo"; I-COM-2= Comuna "Ramos"; I- GADM-1= Autonomous decentralized government (GAD) of canton of "Loja"; I-GADP-1& I- GADP-2= GAD of rural parish of "San Lucas"; I-UNL-1= National university of Loja (UNL).

3.3.3. Statistical techniques and qualitative analysis

To select the main variables influencing the agri-food system configuration (objective 1) we performed a Redundancy analysis (RDA). RDA is a form of constrained ordination that examines how much of the variation in one matrix of explanatory variables explains the variation in another matrix of response variables (Leps and Smilauer 2003). Within the explanatory matrix we included the explanatory and control variables; and, within the response matrix we included the dependent and intermediate variables. Prior the RDA we used a log-transformation (Leps and Smilauer 2003) for all numerical and ordinal variables[25]. To exclude from the model the collinear variables we performed a collinearity test using the variance inflation factor (VIF); a VIF > 10 indicates that a variable has a high level of collinearity (Zuur et al 2010; Oksanen 2013). Then, we applied a model building technique to reduce and find the significant variables (from the explanatory matrix) that determinate the agri-food system configuration (i.e., response matrix) of the empirical case study. Model building was performed using the *step* function (Oksanen 2013) of the *Community Ecology Package vegan* of R software (Oksanen et al 2015). The *step* function uses Akaike's information criterion (AIC) to select the best model among all the possible combinations of available variables within the explanatory matrix. To validate the model prediction the function uses a permutation test at each step. Thus, all included variables in the final model are significant and all excluded variables not significant (Oksanen 2013). The results from RDA were visualized by a biplot graph.

To evaluate the key role played by the social and institutional factors on the components of agri-food activities in order to determinate the agri-food system configuration (objective 2), we conducted a separate non-parametric bivariate tests[26] for each significant social and institutional variable obtained from RDA using *SPSS* statistical software.

Finally, to understand the agri-food system configuration in terms of food sovereignty (objective 3), following the framework previously developed (Vallejo-Rojas et al 2015), we linked qualitatively food sovereignty pillars, i.e. access to resources, agroecological production models, local markets, food consumption/right to food, social organization and agri-food policies (modified from Ortega-Cerdà and Rivera-Ferre 2010) with the agri-food activities.

[25] We used ln(x); and, for those variables that range from zero, we used ln(x+1).

[26] We used Mann-Whitney-*U* test for numerical variables; and, chi-squared test for nominal, dummy and ordinal variables.

A summary of variables used for the different analysis performed in the study is shown in Appendix 3.2.

3.4. Results

Our model building results show that in our case study the variables determining the agri-food system configuration were institutional factors as collective rules from the agro-ecological network of Loja (GS6.1: *RAL*), socio-cultural factors as *Saraguro* indigenous culture (A2.1: *Indigenous*), and socio-economic factors as strategies of income generation (both A2.3: *Sell* and A2.4: *OffFarm*) and size of farm (RS3.1: *LandSize*). The RDA indicated a statistically significant association ($p<0.0001$, from 999 permutations) between these variables and the agri-food system configuration (variables of the response matrix). The first three axes explained 93.4% of the total variance (Appendix 3.3). The RDA biplot representing the first two axes with variables of the explanatory and dependent matrixes is shown in Figure 3.2. The first axis of the RDA (67.7% of the variance) revealed a trade-off between the explanatory variables related to strategies of income generation: marketing of agri-food products (*Sell*) (negative axis 1) and off-farm works (*OffFarm*) (positive axis 1). Axis 1 also revealed a gradient for the control variable land area (*LandSize*) (negative axis 1). Household with larger sizes of land often have income generation strategies related to marketing of agri-food products. Axis 2 of the RDA (19.4% of the variance) is related to the explanatory variables membership to *RAL* (positive axis 2) and *Saraguro* indigenous culture (*Indigenous*) (negative axis 2). RDA also shows groups of dependent and intermediate variables. The first axis is related to variables of ecological (RU5.1; RU5.2; RU6.1) and economic (A8.5) diversification; as well as variables linked to livelihood strategies related to livestock (RU5.3; RS5.1). The second axis is related to variables of production model practices (A9.1; A9.2; A9.3), dependence of purchased foods low in micronutrients (A8.4) and middlemen (A8.7), seed exchanges (A6.3), access to human resources (A2.5) and access to market (GS5.1).

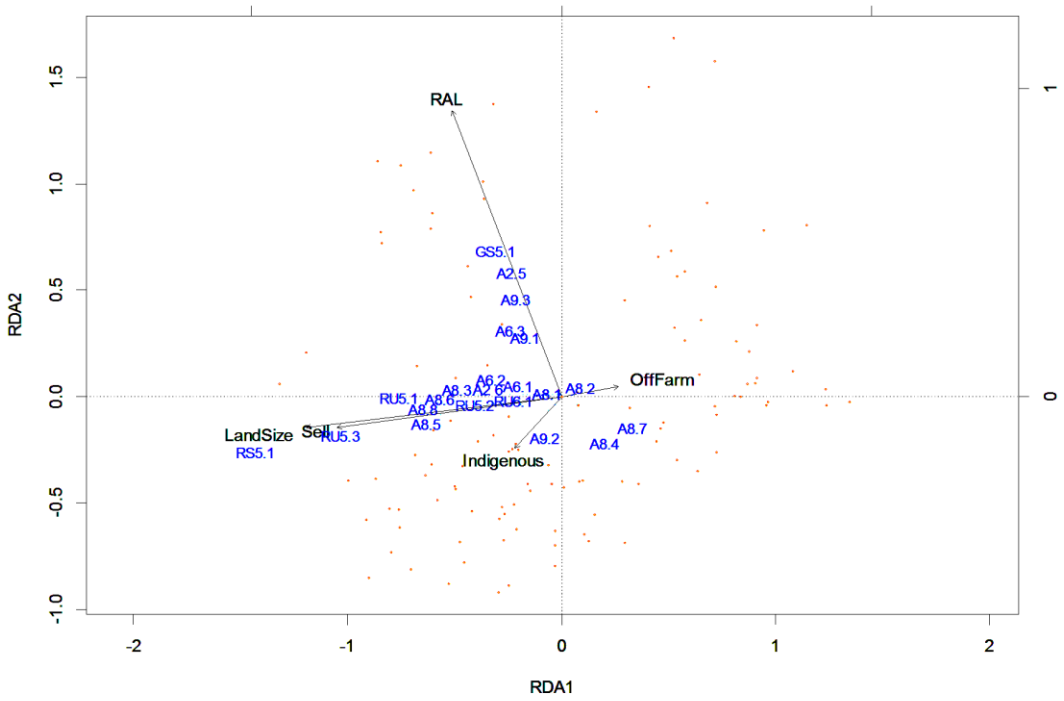

Figure 3.2 Redundancy analysis biplot showing the explanatory and control variables (labeled in black on arrows) that explain the configuration of the third-tier SES dependent and intermediate variables (labeled in blue). Small red circles represent the households surveyed on study (N=116). Percentage variance explained: RDA 1 (67.72%), RDA 2 (19.36%).

The bivariate tests (see Figure 3.3 and Appendix 3.4), indicated which selected explanatory variables had a statistically significant influence on some components of agri-food activities to determinate different agri-food system configurations related to food sovereignty pillars, in some cases mediated by other variables. The text below explains these relationships and the link with the pillars of food sovereignty.

3.4.1. Saraguro indigenous culture and the pillars of access to resources, production model, local markets and social organization

With regards to production and processing activities, *Saraguro* indigenous culture has significant positive relation with access to credit (A2.6) and a negative relation with training (A2.5), i.e., indicators from the pillar access to resources. Furthermore, access to credit positively influences number of cattle (RU5.3) and production of processed dairy (RS5.1), i.e., indicators from the pillars access to resources and production model. According to our survey,

in the study area access to credit has occurred mainly through savings and credit cooperatives (69%), i.e., from private sector. With regards to distribution activities *Saraguro* has positive influences on income diversification (A8.5) and weekly frequency of selling (A8.8), i.e., indicators from the pillars of production model and local markets. Additionally, *Saraguro* has a marginal significant positive relation with participation in community-based working groups (A6.1), i.e., indicator from the pillar of social organization, which in turn also influence income diversification.

3.4.2. *RAL* collective rules and the pillars of access to resources, production model, local markets, right to food and social organization

With regards to production activities, *RAL* collective rules have significant positive relations with agro-ecological practices such as use of organic inputs on crops (A9.1) and ethno-veterinary (A9.3); and, a negative relation with conventional practices, such as use of chemical inputs on crops (A9.2), i.e., indicators from the pillar of production model. Additionally, *RAL* has significant positive relations with access to training (A2.5), i.e., indicator from the pillar of access to resources, which in turn also influences agro-ecological practices. Participation in seed exchanges (A6.3), i.e., indicator from the pillar social organization, is also related to *RAL*, influencing crop richness (RU5.1), i.e., indicator from the pillar of production model. With regards to distribution activities, *RAL* has a significant positive relation with importance of on-farm incomes (A8.6), i.e., indicator from the pillar of production model. Additionally, *RAL* has significant positive relations with participation in services exchanges (A6.2) and access to retail location (GS5.1), i.e., indicators from the pillars of social organization and local markets, which in turn also influences the importance of on-farm incomes variable. With regards to consumption activities, *RAL* has a significant negative relation with dependence of non-traditional purchased foods low in micronutrients (A8.4), i.e., indicator from the pillar of right to food, which in turn is also influenced by training.

3.4.3. Marketing of agri-food products and the pillars of access to resources, production model and right to food

With regards to production activities, marketing of agri-food products has significant positive relations with number of cattle (RU5.3), crop (RU5.1) and small animal (RU5.2) richness, i.e., indicators from the pillars of access to resources and production model. With regards to distribution activities, it has a significant positive relation with income diversification (A8.5),

i.e., indicator from the pillar of production model. With regards to consumption activities, marketing of agri-food products has significant positive relation with dietary diversity produced (RU6.1); and, significant negative relation with importance of small animals for auto-consumption (A8.2) and dependence of non-traditional purchased foods low in micronutrients (A8.4), i.e., indicators from the pillar of right to food.

3.4.4. Off-farm work and the pillars of production model, right to food and social organization

With regards to production activities, off-farm work has significant negative relation to agro-ecological practices as use of ethno-veterinary products (A9.3), i.e., indicator from the pillar of production model. Concerning distribution activities, it has a significant positive relation with income diversification (A8.5) and a significant negative relation with importance of on-farm incomes (A8.6), i.e., indicators from the pillar of production model. Additionally, off-farm work has significant positive relation with participation in community-based working groups (A6.1), i.e., indicator from the pillar of social organization, which in turn also influences on income diversification. With regards to consumption activities, off-farm work has significant negative relation with dietary diversity produced (RU6.1), i.e., indicator from the pillar of right to food.

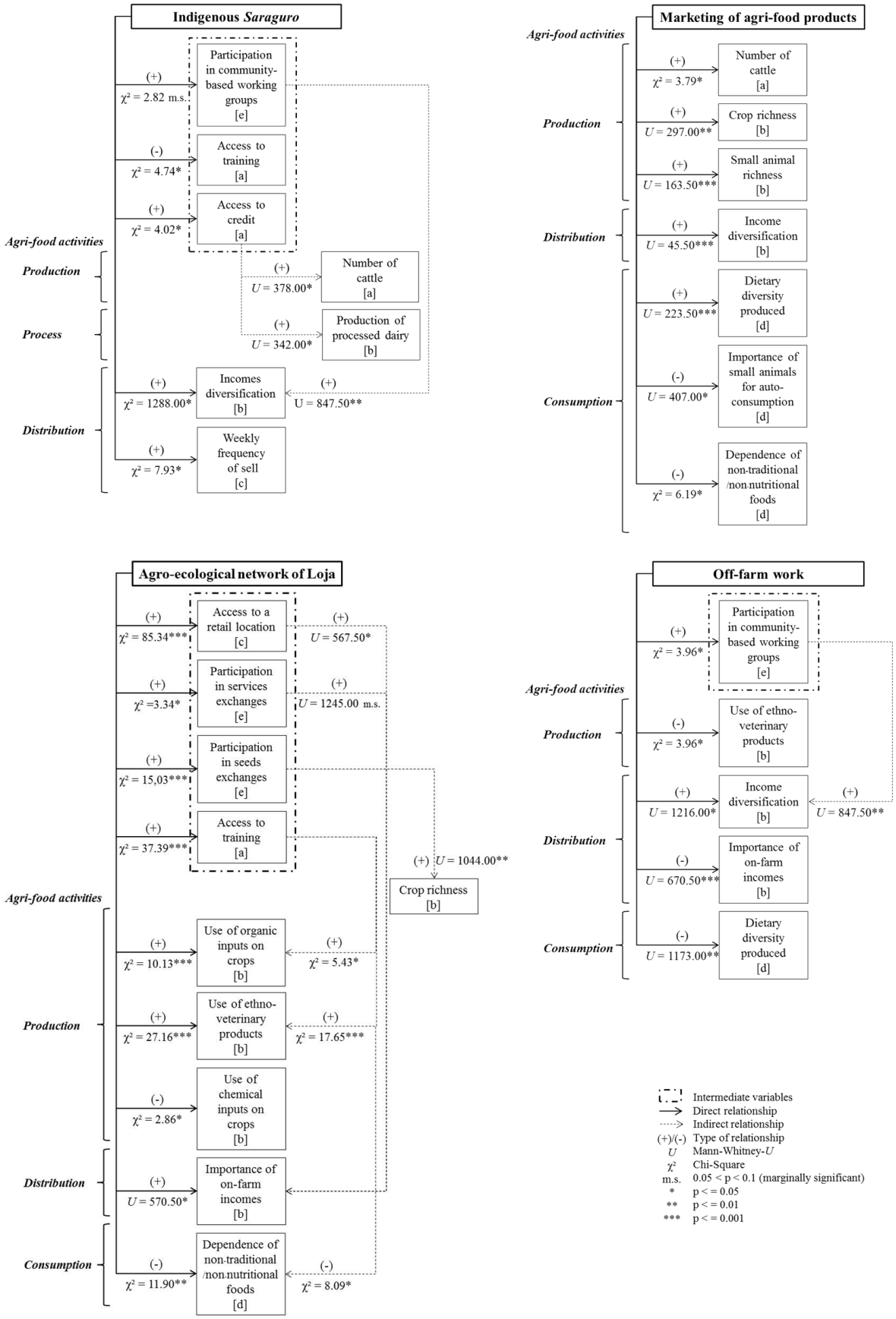

Figure 3.3 Description of agri-food system configurations through the role of the social and

institutional variables: Indigenous Saraguro, Agroecological network of Loja (RAL), marketing of agri-food products and off-farm work, on the components of agri-food activities. The scheme shows the statistical significance of the relationship between each social and institutional variables with their intermediate and dependent variables. Letters within brackets shows the relation of each component of agri-food system to food sovereignty pillars: [a] access to resources, [b] production model, [c] local markets, [d] right to food, [e] social organization.

3.5. Discussion

3.5.1. Role of social factors on agri-food system configuration

Our findings contribute to *Andean* studies that show that indigenous communities and their social capital facilitate the access to other forms of capital, both directly and through engaging with State, market, and other civil society actors (Bebbington and Perreault 1999; Perreault 2003). This influence can be assessed through ecological and socio-economic components of the agri-food activities of the local agri-food system. The results show that indigenous culture facilitates the access to credit in order to mainly support livelihood strategies related to livestock. This result is corroborated by other studies on *Saraguro* culture showing that livestock ownership is (jointly with land) an indicator linked to success of local livelihoods (Belote 2002) which are mainly based on the income from selling cheese (Belote 2002; Pohle et al 2010). Given access to training is negatively related to the *Saraguro* indigenous group, we might observe that they have lower access to the information necessary for the adoption of agricultural practices than *mestizo* people (Gonzalez et al 2010). However, our results show that this factor does not influence on crop and small animal diversification. In line with other research, our results on income diversification suggest that migration to urban areas and/or foreign countries has been an adaptation strategy for *Saraguro* people (Belote and Belote 2005). In these sense, the access to road is a contextual factor that seems to be relevant during distribution activities to influence income diversification. *San Lucas* parish has access to a paved road and at the same time *Saraguro* culture is related positively to frequency of sell. This result corroborates other findings showing that access to road infrastructure system improves the connectivity and thus, access to markets (Bernardi De León 2009); facilitating income diversification. A better connection to markets leads to the development of multiple activities because the opportunities to diversify are greater (Castaing et al 2015). Therefore the road network seems to have mixed effects (i.e., for access to markets and income diversification).

Additionally, we found no difference associated with membership to *comuna* between the *Saraguro* people. As noted by Belote (2002), *Saraguro* communities do not act as regulatory units. This can explain why this institutional factor was not significant for the indicators used to describe the local agri-food system. In subsequent research we will present their institutional role in developing strategies to address future changes of the agri-food system. Furthermore, from a food sovereignty framework our results suggest that in the agri-food system configuration, indigenous *Saraguro* culture has a central feature in the interaction between the pillars of social organization and access to resources. This interaction could be considered as a starting point to visualize the influence of this socio-cultural factor on the other components and interactions of the agri-food system and consequently its links with other pillars of food sovereignty.

Our findings also suggest that income generation plays an important role on agri-food system configuration and is related with ecological, nutritional and economic components of the agri-food activities. Regarding the on-farm strategies, we confirm that the strategy of market-orientation influences on farm levels of agro-biodiversity (Trinh et al 2003; Major et al 2005). In fact, households that perform the marketing of agri-food products had higher levels of diversity in terms of total number of species (richness); and, as noted by other studies (Herforth 2010; Jones et al 2014), the high levels of crops and animal richness at the farm level was associated with high levels of dietary diversity produced. Therefore, marketing of agri-food products, through farm production diversity, has the potential to influence the diversity of household diets, an important nutrition outcome associated with the nutrient adequacy of diets and the nutritional status of individuals (Jones et al 2014). However, our results also show that households that perform the marketing of agri-food products have low scores for auto-consumption of small animals, an undesirable outcome related to consumption of nutritional foods within the pillar of right to food. This is consistent with recent studies performed in the Ecuadorian Andes (Oyarzun et al 2013; Berti et al 2014) as well as studies found elsewhere in the Andean region (Berti et al 2010). Additionally, the results also illustrate that such households have low levels of dependence of non-traditional purchased foods low in micronutrients. Since in Ecuador food consumption of low nutritional quality, especially in areas with fewer economic resources, is a public health problem (Freire et al 2013), these results are important for understanding the potential capacity of agri-food system to meet human nutritional needs in fragile and marginal areas, i.e., contribute to right to food at household level. Finally, as mentioned in the literature (von Braun 1995; Minot et al 2006), our results

support that marketing of agri-food products contributes to income diversification within the household.

Regarding the influence of off-farm work on agri-food system configurations, we find that this type of strategy supports income diversification (Ellis 1999; Ellis 2000), helping to increase farm income of rural households living at subsistence level and thus, to diversify against risk (Lanjouw 1999; Reardon et al 2001). However, it leads to a minor importance of revenue obtained from the marketing of farm products and a less dietary diversity produced which can influence food consumption at the household level (as explained above). Given that in the area the production model is intensive in labor, this lower diversification may be related with the reduction of available labor within households (Rozelle et al 1999; Pfeiffer et al 2009). Additionally, the results show a relationship between social ties, expressed through *mingas*, and income diversification. In this sense, recent research (Vanwey and Vithayathil 2013) show the importance of social ties to securing off-farm work through linking farm residents to jobs outside the farm property and/or influence their likelihood for participating in off-farm work. But from the available data and results we cannot fully confirm these findings, even more when there are studies in Ecuadorian Andean communities (Martínez 1996) that note that *mingas* have a more limited effect and that they are related to works that the community implements where the communal action (water supply, road construction, etc.) participation is high, but is very low where the community do not perform these actions. Therefore, this is a variable that could be acting as a contextual factor. Finally, regarding the economic characteristics of the household, our results suggest that livelihood decisions are strongly affected by family land. Households with small farms are more likely to have off-farm works in order to diversify their income sources (Lanjouw 1999; Escobal 2001). In fact, land is a relevant factor for maintaining livestock, the main activity linked to on-farm income generation within the study area (Belote 2002; Pohle et al 2010).

From food sovereignty framework our results suggest that income generation plays a central role in the interaction between the pillars of production model and right to food. This interaction could be considered as a starting point to visualize the influence of these socio-economic factors on the other components and interactions of the agri-food system and consequently its links with other pillars of food sovereignty in the agri-food system.

3.5.2. Role of institutional factors on agri-food system configuration

Our findings contribute to studies based on the institutional agri-food sociology and agroecology research that show that the collective organization under the agro-ecological paradigm is the core on which the food sovereignty components are built (Sage 2003; Pretty and Smith 2004; Cuéllar-Padilla and Calle-Collado 2011; Rosset et al 2011; Gyau et al 2014; Simoncini 2015). In our case *RAL* facilitates access to training (through lobbying activities with the local public university) and exchange of seeds which in turn positively influences the adoption of agro-ecological production model. Previous studies, as well as our key informants, point out the key role of social organization for the adoption of agro-ecological models through the dialogue of wisdoms (*diálogo de saberes*) (Martínez-Torres and Rosset 2014), e.g., in agroecology or farmers schools (McCune et al 2014) and/or in meetings organized by these networks as seed exchange fairs (Dusen et al 2005; Hermann et al 2009). *RAL*, under its system of collective rules, whose core is the PGS, strengthen and monitor the implementation of agro-ecological practices within farms of producers. Previous studies also highlight the key role of PSGs to strengthen agro-ecological practices (Cuéllar-Padilla and Calle-Collado 2009; MAGAP 2012).

RAL also increase the importance on-farm incomes; the access to markets may explain the diversification of income due to on-farm activities within *RAL* households. In fact, it is one of the pillars more strengthened by *RAL* through performing lobbying activities with the municipality (Vallejo-Rojas et al 2015). Other Ecuadorian agro-ecological networks (Chauveau et al 2010; MAGAP 2012; Proaño and Lacroix 2013) also have achieved these desirable outcomes within distribution activities. Regarding eating habits at the household level, our results show the importance of access to training by *RAL* through performing lobbying activities with the NGOs. But our key informants also highlight the roles played by the collective rules and social ties built by *RAL*. Collective rules from *RAL* influence on decision making within households, these rules establish that the food production must be focused firstly to meet household nutritional needs; therefore, marketing of agri-food products goes to second place. The latter is relevant because it would involve avoid the undesirable levels of indicators linked to the strategy of marketing agri-food products within pillar of right to food as those related to low levels of self-consumption (explained above). Additionally, social ties strengthen the exchange of knowledge in the gastronomic and nutritious fields. Previous studies also highlight the role of social networks as determinants of consumer habits (Fonte 2013; Williams et al 2015). Moreover, the relation of *RAL* with services exchange is an important aspect within the Ecuadorian Andean communities, where these forms of exchange become increasingly scarce

(Martínez 2002). Reciprocity contributes to the development of long-term obligations between people, which is an important part of achieving positive environmental outcomes in agri-food systems (Pretty and Smith 2004). Previous studies, as well as our key informants, indicate that these exchanges are mainly related to activities within the farm (e.g., planting, harvesting) (Martínez 1996; Gray 2009).

From a food sovereignty framework these results suggest that RAL's collective rules play a central role in the interaction between the pillars of social organization and agri-food policy (mainly to mediate the access to markets and training). This interaction could be considered as a starting point to visualize the influence of this institutional factor on the other components and interactions of the agri-food system and consequently its links with other pillars of food sovereignty.

Although it was not possible to establish a quantitative relationship between women involvement in decision making and main tasks of agriculture with the adoption of agro-ecological practices and other components of agri-food activities as shown in the literature (e.g., Quisumbing et al 1995; Quisumbing et al 2015; Dinis et al 2015), we have to remark that the majority of *RAL* members are women. Thus, our observations can be reframed within the feminist political ecology research that see gender as salient within policy and practice across a variety of scales, and within institutions central to natural resource governance (Resurreccion and Elmhirst 2008). As suggested by other authors (Gray 2009), in rural parishes of Loja province the number of women in the household working in the farm increased with male driven out-migration and remittances. Indeed, in our area of study men are engaged in off-farm work (Vallejo-Rojas et al 2015) mainly linked to construction sector (INEC 2010) in order to diversify their sources of livelihood (Katz 2003; Deere 2005) and women have increased their participation in on-farm labor, confirming a feminization of agricultural activities (Katz 2003). On the one hand, such gender division of labor can explain the attitudes to natural resource conservation and management (Agarwal 2000; Radcliffe 2014) during the performance of agricultural activities. On the other hand, the adoption of an agro-ecological production model is due to the existence of a collective agency built by RAL. Women grouped by *RAL* jointed their efforts, independently on ethnic and class divisions, and through their rules (at collective level) have achieved the successful adoption of the agro-ecological production model (at farm level) and the access to local markets (at collective level) by performing lobbying activities with government and nongovernment organizations. Additionally, they demonstrated an increase of self-esteem and economic independence (at individual level). These results confirm other

studies focused on collective agency and women (Gabrielsson and Ramasar 2013). Recent Ecuadorian Andean studies (Cole et al 2011) also suggest that greater understanding among women of crop management options and more equal household gender relations are associated with less use of conventional practices.

From a food sovereignty framework these results suggest that a qualitative link between women and the pillar of production model, under the context of our case of study, has as components structural (feminization of agricultural activities) and agency (collective agency) factors from the agri-food system actors.

3.6. Conclusions

The complexity of the relationships described suggests that agri-food systems management needs to consider the interaction between different social and institutional variables together with farm resources. For example, our results suggest that the increased political influence of local indigenous communities and their organizations could foster food sovereignty through the pillar of access to resources. The strategies of income generation both from the on-farm and off-farm sources improve the income diversification. However, the strategies linked to marketing of agri-food products could improve not only the economic components of agri-food activities but also food sovereignty through the pillar of right to food. The collective rules from agro-ecological networks could explain the adoption of sustainable management practices based on a dialogue of wisdoms. For instance, the *RAL* brings together indigenous and *mestizo* peasants from the southern region of Ecuador, and includes links with academia, municipalities and NGOs. These networks, through social organization, could foster food sovereignty through the pillars of agro-ecological production model, local markets, right to food and agri-food policies, the latter could be increased through participation of peasants within the policy making process (e.g., by strengthening current processes based on lobbying with government organizations to address marketing issues.). In designing policies to improve the income-generating capacity of small-producers, such as policies to enhance the levels of agricultural production, the government needs to recognize the role of these factors. In particular, interventions need to recognize and respect the production model that promote the agro-ecological organizations and include programs to enhance the role of formal and informal organizations, both from peasants and indigenous communities. Similarly, if the government decided to put resources to generally improve the nutrition and health levels of population investing in programs in collaboration with agroecological networks is likely to have the broadest and greatest impact on consumer habits at household level within the rural sector. In contrast, if agricultural programs are focusing on a

single crop (monocultures), they may leave smallholders' farms and farming families vulnerable and result in agri-food system configurations with poorer ecological, nutritional and economic levels in their components of agri-food activities from a food sovereignty perspective. Additionally, regarding the policy focused on conservation, policy-makers interested in promoting the sustainable utilization of natural resources (soil, water, forest) need to consider not only inclusion of communities living in protected areas into conservation programs, but also the role of agro-ecological networks collective rules and women agency to improve the adoption of sustainable local production practices in and around protected areas. There are multiple connection and interactions among different elements, and thus, decision-making based on the assessment of single variables and simple cause-effect approaches is incorrect. In sum, ignoring the role of social and institutional factors constitute a missed opportunity to improve the management of agri-food systems at local levels, as our case in Ecuador demonstrates.

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Participatory workshop, rural parish of "San Lucas" (2015). Photo by David Tarrasón.

"*Yo vería hasta cierto punto como una amenaza*
el tema de implementación de políticas públicas en mejorar
la educación o dar paquetes de tecnologías de punta,
del lado que no esté amigable con la naturaleza,
del lado que no esté vinculada con el quehacer campesino,
con el quehacer del indígena;
porque no se olvide que todo eso compramos,
***eso no producimos*"**

(*Saraguro* indigenous man, local leader of the rural parish *San Lucas*)

CHAPTER 4: Future trajectories of transformation for the Andean Ecuadorian agri-food system

4.1. Introduction

Agri-food systems, conceptualized as complex socio-ecological systems (SES) (Ericksen 2008a; Rivera-Ferre 2012; Vallejo-Rojas et al 2015), are characterized by strong (usually non-linear) interactions between the multiple components (located at different levels and scales) constituting the system. The complexity of these interactions and feedback loops make difficult to distinguish cause from effect (Costanza et al 1993). Here the surprises emerge from coupling of spatial and temporal scales with other SESs located at higher or lower levels of analysis (Ostrom 2009). Therefore, the dynamic interactions of agri-food systems (i.e., endogenous, from agri-food activities; and exogenous, driven by external changes and pressures) are associated with high levels of uncertainty (Anderies et al 2007).

The complexity and uncertainty that characterizes agri-food systems' interactions influence how they respond (Ingram and Brklacich 2006; Ericksen 2008b). In this sense, the final effect of such drivers can lead to systems' transformations. These transformation can be desirable or not to a wide array of actors (Ingram 2009). To assess and achieve desirable transformation objectives, i.e., to answer to question: *whose goals for whom?* we need to make emphasis on the role of actors' agency and institutional processes, as proposed by alternative frames of agri-food system research and management (Rivera-Ferre 2012; Rivera-Ferre et al 2013), overcoming a known gap on SES scholars (Ostrom 1990; Brondizio et al 2009).

Within this alternative frame is located the policy paradigm of food sovereignty. Food sovereignty is defined as the right of peoples and nations to "*healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems*" (La Vía Campesina 2009). Thus, food sovereignty emphasizes the role of social and political dimensions to achieve agri-food systems resilience. Therefore, to understand the role of these dimensions, Vallejo-Rojas et al (2015) proposed to include the vulnerability conceptualization within the SES framework to include actors' perceptions in assessing agri-food system responses to drivers of change. Indeed, the vulnerability approach, which emerges from social theory to assess actors' dynamics, complements the systemic approach (Miller et al 2010) to understand the role of actors and their institutions on future trajectories of transformation of agri-food systems conceptualized as SES. Here transformability is defined as the capacity to create a fundamentally new system when

ecological, economic, and/or social structures make the existing system untenable (Folke et al 2010), while active transformation starts through deliberation processes (as the food sovereignty policy paradigm requires) to develop strategies of coping and adaptation within the agroecological (Altieri 2002) and social dimensions at individual and collective levels (McMichael 2011; Patel 2012).

Given that the perceptions and the social and cultural evaluation of stresses influence on both the recognition of stresses and the decisions of coping and adaptation (Tansey and O'Riordan 1999; Kasperson et al 2005), different actors may expect different outcomes from agri-food system or even make different strategies to achieve the same goals. This requires the application of participatory methodologies that take into account actors' agency to assess the vulnerability of agri-food systems to drivers of change under a context of uncertainty (Ziervogel and Ericksen 2010). Conceptually, scenarios, which are defined as plausible descriptors about the future, incorporate feedbacks and surprises to research and prepare for the uncertainties that characterize complex systems (Reed et al 2013). Methodologically, participatory scenario development has been proposed as a tool to assess different actors perceptions under high uncertainty conditions regarding the drivers of change from different levels and scales (Ravera et al 2009; Ravera et al 2011b; Reed et al 2013). Recently, the incorporation of arts-based research, a genre within qualitative research that uses modes of artistic expression (e.g., visual art) to co-create knowledge with local actors and to collect and communicate information (Saldaña 2011), complements the participatory scenario design by its ability to represent the subjective experiences from a specific social context (Leavy 2009). Within agri-food research the participatory scenarios development is a tool that can be used by actors to envision possible future trajectories of transformation of their agri-food systems and to explore active transformation to help their systems to be less vulnerable to uncertainty and drivers of change.

The aim of this study is to explore and reflect about the different trajectories of transformation that local agri-food systems in the Andean region can have by 2030. The Andean region is facing a diversity of environmental (MAE 2012), social (Martínez 2002; Herrera et al 2005; Martínez 2005), economic (Larrea 2004; Carrión and Herrera 2012) and political (Viteri 2007; Brassel et al 2011; Rosero et al 2011) drivers, and has a socio-economic (Vaillant et al 2007), cultural (Guerrero 2000; Belote 2002) and institutional (Martínez 1998; Bebbington and Perreault 1999; Korovkin 2001) diversity. Our study focuses on the Andean region of southern Ecuador and we address the local agri-food system managed by peasants belonging to the Agroecological Network of Loja (RAL in Spanish). We selected members of local barrios and communities characterized by high degree of dependence on the local system, because they

produce, distribute and consume food based on their local agroecological system (i.e., vulnerable actors of the local agri-food system). They have institutional arrangements which influence the management of the agri-food system. For instance, they are collectively organized into peasant movements that perform self-organizing, monitoring and lobbying activities for the management of their local agri-food systems (i.e., they are key players of the local agri-food system). Within the group of RAL actors, we also take into account the perceptions linked to culture (seen as a social factor that could potentially influence agri-food systems' practices). We identified two groups of actors: indigenous *Saraguro* (which can be organized under communal councils) and *mestizo*[27].

Previous studies in the Andean region of southern Ecuador have mainly focused on the drivers of change linked to ecological dynamics, such as deforestation and soil erosion (Adams 2009; Pohle et al 2010). Other drivers more linked to social dynamics, such as the socio-cultural (INPC 2012), political and economic (Ospina et al 2011) changes, have been little treated. Our study, through the integration of the social and ecological components of agri-food system, i.e., through its conceptualization as SES, addresses this gap. This study also helps to understand the role of social and institutional settings to adaptation to drivers of change.

The paper is organized as follows: in the second section we address the context of the study area and methodology used. In the third section we describe the future trajectories of transformation for the local agri-food system under drivers of change prioritized by RAL actors. We emphasize the role of agency and institutions during the construction of plausible scenarios toward desired and undesirable states. The final outcomes, that show the influence of collective rules from RAL, communal councils and culture perceptions, are also discussed. Finally, in last section, we present the conclusions of the participatory scenario development process for the local agri-food system.

4.2. Methods

4.2.1. Study area

The local agri-food system under study is located in the canton of Loja, in the southern Ecuadorian Andes, specifically in the area comprising the rural towns of *San Lucas* (3°44'47.5"S, 79°15'58.5"W) and *Jimbilla* (3°51'39.5"S, 79°10'22.2"W). The altitudinal range

[27] Cultural/biological mixing: Spanish – indigenous (Belote 2002: 28-29).

of this area varies from about 1800 to 3000m.a.s.l. which correspond to a temperate climate (Cepeda et al 2007: 46), averaging 12 to 15°C. Rainfall average is 1290.5 mm/year (INAMHI 2015a). *San Lucas* is mainly inhabited by *Saraguro* indigenous (80.5%), while *Jimbilla* by *mestizos* (95.3%; INEC 2010). Both indigenous and *mestizos* are organized in community-based organizations, through traditional *comunas* and farmers associations. Both types of institutions manage their collective rules, having the potential to influence agri-food system management. For our case study, we focused on the role of collective rules on households belonging to the *Saraguro* people *comunas* and those belonging to RAL[28]. In the study area *comunas,* integrated by indigenous people, are organizations that have as representative body the *cabildo* (Martínez 2002). *Comunas* have consolidated their political and organizational bases which may affect their ability to respond to changes (Martínez 2002). RAL is a new organization integrated by both indigenous and *mestizos* farmers' organizations. RAL was born in 2006 in order to respond to the rapid socio-economic and cultural changes affecting the social organization and culture (Martínez 2002; Martínez 2005), the loss of traditional crops and foods (Espinosa et al 1996) and the progressive dependence from intermediaries in urban markets (Chiriboga and Arellano 2004; Proaño and Lacroix 2013). RAL collective rules have been elaborated under the consensus of its members. The core of RAL governance system is the participatory guarantee system (PGS; RAL 2012). The PGS is a validation tool of the on-farm implementation of agroecological practices; as well as a consumer assurance regarding the type and quality of the products sold. Agroecological networks are relevant because their collective rules can influence agri-food system outcomes, such as those linked to biodiversity conservation (Pretty and Smith 2004; Simoncini 2015), productivity and resilience to climate change (Rosset et al 2011; Altieri and Nicholls 2013), exchange of knowledge (Cuéllar-Padilla and Calle-Collado 2011; Martínez-Torres and Rosset 2014), or access to markets (Chauveau et al 2010; Gyau et al 2014).

4.2.2. Methodological framework, data collection and analysis

In order to explore the agri-food system outcomes conceptualized as SES (Ericksen 2008a; Rivera-Ferre 2012; Vallejo-Rojas et al 2015) we used the vulnerability framework adapted by Fraser (2007; 2011). This framework allows the incorporation of actor's agency and institutional processes in the assessment of agri-food systems' responses to drivers of change. Thus, we have given emphasis to active transformation processes (Folke et al 2010), i.e., those

[28] The selection of only one group of actors (in our case only those belonging to RAL) was due to time and financial restrictions to conduct the study.

mediated by human agents, as required by the food sovereignty policy proposal. We used the participatory scenario methodology (Ravera et al 2009; Ravera et al 2011b; Reed et al 2013) to design the methodological steps for understanding how actors envision future trajectories of agri-food system transformation under different drivers of change. A combination of methods (Table 4.1) including two rounds of interviews and workshops was used mainly to (1) include and prioritize the drivers of change; (2) envision different trajectories of the drivers of change and how such trajectories might affect the interactions between agri-food system components (i.e., scenarios); (3) assess the final outcomes of the future agri-food system expressed in terms of its vulnerability vs. resilience under different scenarios. The analysis of qualitative information obtained from the first round of interviews and a literature review about the drivers of change (Vallejo-Rojas et al 2015) were the base to design the second round of interviews. Qualitative information obtained from the second round of interviews was transcribed, coded and systematized through content analysis (Saldaña 2011). The numeric responses were quantified and descriptively analyzed using *SPSS* statistical software. The results from interviews allowed introduce the normative questions of *vulnerability of what and to what; vulnerability for whom;* and *at which scale?* That is to say, the interviews allowed understanding the sources of exposure (social, economic, political and environmental drivers) and how they are impacting the components of the local agri-food system. These interviews also allowed identifying with RAL peasants the indicators useful to express the desired outcomes expected in the transformation of the agri-food system. Following Fraser (2007; 2011) the indicators of outcomes were identified in the three dimensional space of vulnerability: agro-ecosystem resilience, defined as the extent to which the agroecosystem can tolerate climatic shocks and remain productive; individual (socio-economic) sensitivity and ability to respond to change, defined as the extent to which households will have access to the assets needed to maintain livelihoods in the event of a variety of stresses and shocks acting on and within SESs; and collective capacity to mitigate effects of change and adapt, defined as the extent to which institutions in society will provide effective crisis relief.

The participatory workshops were performed separately for each culture. We adopted participative techniques such as group discussions and posters, collage, draws techniques and visual art (painting) and participatory assessment to collectively validate the information obtained from the interviews, building the "stories" of future scenarios and assessing the outcomes-based indicators expressed in terms of vulnerability vs. resilience (Kok et al 2006; Soliva 2007; Leavy 2009; Ravera et al 2009; Reed et al 2013; Beach and Clark. 2015). The research team was formed by two facilitators and two other people that took notes and

photographs of the discussions. The main drivers of change were presented and collectively validated during the workshops and then they were later prioritized by level of uncertainty and importance. For the scenario development, each group was randomly divided in two subgroups after choosing two "rapporteurs". Two dimensions were used for the drivers' prioritization: their importance in agri-food activities performance and their perceived uncertainty (Peterson et al 2003). The most important and uncertain drivers were chosen as starting point to draw the scenario, but the trend of the drivers (positive or negative) and, as consequence, the development of the scenario was decided within each subgroup. A local *Saraguro* indigenous artist, Luis Lozano, was present during the performance of the workshops. His function was to represent and transmit (through painting) the registered perceptions about the future of the local agri-food system. Information obtained from workshops was then transcribed, coded, systematized and qualitatively analyzed through content analysis (Saldaña 2011). The final representations of future scenarios were drawn by the *Saraguro* indigenous artist. For heuristic representation of the future trajectories of transformation, we transformed the qualitative trends into quantitative data, to obtain an average based on the indicators prioritized by each culture within the three dimensions of vulnerability. The values used were: ↓↓ = -2; ↓ = -1; ↔ = 0; ↑ = 1; ↑↑ = 2, and "poor" = -1; "regular" = 0; "good" = 1. In order to perform a brief evaluation we carried out a short interview about the usefulness of scenario analysis to visualize the future of local agri-food system. The responses were qualitatively categorized according to the following learning dimensions: awareness and understanding, attitudes and values, social and cooperative skills (Heras 2015: 120).

Table 4.1 Fieldwork data collection strategy in canton of Loja, Ecuador

Type of method	Selection	Respondents	Focus of data collection
In-depth interviews (February – March, 2014)	Key informants selected using snowball sampling	14 key informants (36% women and 64% men) from: peasant organization (n = 5); indigenous organization (n = 2); government organization (n = 3); academy (n = 1); and non-government organization (n = 3).	(i) The structure and coordination of organizations, competencies, and degree of influence in decision-making about the agri-food system and (ii) actors' perceptions about current drivers of change.
Semi-structured interviews (April – May, 2015)	RAL's peasants selected using snowball sampling	25 RAL's peasants (96% women and 4% men, with age between 22-64 years) from: *Saraguro* indigenous culture with collective rules from *comuna* (n =	(i) Producer information (e.g., age, gender, how long belongs to the RAL), (ii) perceptions about drivers of change (social, economic, political and environmental drivers) that affect agri-food activities, (iii) the adaptive strategies and coping

Type of method	Selection	Respondents	Focus of data collection
		6) and without this collective rules (n = 6), and *mestizo* culture (n = 13).	mechanism implemented to address the drivers of change (e.g., agricultural practices, social and economic strategies), (iv) perceptions about the individual capacity of women peasants related to membership to RAL (e.g., self-esteem, incomes), (v) perceptions about the indicators used to identify the agri-food system outcomes (e.g., production for self-consumption, access to markets to sell).
Workshops (July, 2015)	RAL's peasants selected firstly among interviewees and secondly using snowball sampling.	One group for each peasant culture: a group for *Saraguro* peasants (n = 16; 81% women and 19% men, with age between 28-64 years) and a group for *mestizo* peasants (n = 14; 71% women and 29% men, with age between 23-63 years).	(i) Presentation and validation of drivers of change obtained from the interviews, (ii) design of future scenarios for local agri-food system and discussion of adaptive strategies /coping mechanisms, (iii) presentation and validation of indicators of final outcomes of local agri-food system, (iv) assess how drivers of change might affect final outcomes, and (v) brief final evaluation by participants.

4.3. Results and discussion

4.3.1. Main drivers of change

The analysis of the drivers of change allowed identifying which internal and external factors are operating on potential future trajectories for the local agri-food system at different scales and levels. Results from interviews indicated similar perceptions for the drivers of change among *Saraguro* indigenous and *mestizo* peasants. Both cultural groups prioritized *agri-food policies* in terms of high uncertainty degree and high importance on the effects over the local agri-food system and its vulnerability. Additionally, during the workshops, the *Saraguro* indigenous mainly prioritized *cultural changes*, while the *mestizo* mainly prioritized *environmental changes* (Appendix 4.1). A detailed explanation, of such prioritized drivers and the local perceptions on how they are operating in the local agri-food system, is discussed below.

4.3.1.1. Agri-food policies

The prioritized political changes were **commercialization policies**. RAL's peasants perceived that products from peasant farming have low prices, in many cases at levels below production costs. Those most affected by price instability are small farmers, while large farmers, with more

control over their marketing channels, enjoy relative stability. As noted by Carrión (2013) the international food crisis has led to an increase in prices of agricultural goods in the domestic market. Agribusiness products were the biggest beneficiaries; e.g., the price of bananas grew 327% in nine years, while the price of potatoes and wheat, typically peasant products, only increased 33% in the same period in Ecuador. Thus the low competitiveness of peasant agriculture results from the lack of appropriate agricultural policies addressed to peasants that under dollarization[29] and trade liberalization, do not allow them to compete with production from neighboring countries (e.g., Colombia and Peru) neither with the excess of production from developed countries (Martínez 2005). This declining peasant competitiveness is one of the structural phenomena explaining the growth of rural migration (which consequences are later explained). Additionally, regarding the access to local markets, RAL's peasants perceived that the establishment of spaces for exchange (e.g., agroecological fairs) jointly with the support from government institutions favors the promotion of agroecological production model to urban consumers at local level. This result is also cited by other studies performed in Ecuadorian agroecological networks (Chauveau et al 2010). Also, RAL's peasants perceived that current trade agreements with the European Union would decrease peasant's individual capacity, mainly in livestock activities, through the introduction of imported dairy products. This trend was confirmed by Jácome (2012), Serrano (2014), and *Acción Ecológica* (2015). In fact, RAL's peasants, as well as social scientists (Fernández et al 2014), perceive a contradiction in agricultural public policies between the current model proposed by the National Constitution (2008) based on the S*umak Sawsay* (Good Living in Quechua language) and food sovereignty and the national projects that tend to favor the industrial production model.

Other key political change is linked to **policies related to land**. Current policies supporting land legalization, which can be positive for access to public credit, are perceived by RAL's peasants as a control mechanism over peasant families for tax collection. According to Vandecandelaere et al. (2011) there is a growth trend in rural land taxes. This perception is reinforced by current tax design, which severely limit its redistributive potential (e.g., small farmers, who generally have more difficulties to prove that they have a productive activity, end up paying more tax per hectare than large landowners, who can more easily access tax exemptions; Laforge 2008; Vandecandelaere et al. 2011). RAL's peasants also perceived that local projects in the peri-urban area prioritize urbanization and expansion of industrial parks leaving apart the option of agricultural land use. Indeed, the municipal Territorial Ordering Plan projects a future urban

[29] Dollarization refers to a rise in the cost of labor, inputs and capital (Larrea 2004).

expansion on lands with agricultural potential, which could leave without access to land to peri-urban small farmers. Indeed, there is only one municipal ordinance that prioritizes agricultural land use on peri-urban areas; revealing the lack of local governmental norms to face this future trend (GAD-Loja 2012: 531-534).

Other key political change is linked to **food safety** policies. RAL's peasants perceived that current national policies related to the implementation of good manufacturing practices threaten the use of artisanal methods for milk processing. This trend has also been shown in other parts of the world (Escurriol et al 2014) and it has been noted that these kind of rules and regulations can entrench corporate agri-food systems and devastate those based on artisanal practices and local markets (Bingen and Busch 2006). Therefore, livestock activities, which are relevant and common within the Andean agri-food systems at the local level, suffer a double exposure, both from international and national policies.

Other key political change is linked to **access to assets**, particularly credit and training. Regarding the access to credit, peasants perceived that the access to financial capital enables access to other productive resources. But historically, small peasants have had limited access to credit from public and private sources (Rosero et al 2011). Actually, the Organic Law of Popular and Solidarity Economy (Asamblea Nacional 2011) makes visible the historical relevance of the economic practices aimed at the reproduction of life of individuals, groups and communities, emphasizing on the key role of the self-organizing potential of these groups to perform their activities autonomously. Regarding the access to training, peasants highlighted that training is mainly performed by NGOs (a trend also shown at national level; Rosero et al 2011) and the local public university. They perceived that training linked to agroecology, healthy diets, social organization and policy themes is related to positive outcomes within agro-ecological production, consumption and self-organizing activities. Other studies in the Ecuadorian Andean region have shown the relevance of training in agroecology for these outcomes (Soliz et al 2013; CEA 2014; Heifer 2014).

4.3.1.2. Rural-urban migration

The social change most prioritized was **rural-urban migration linked to off-farm work**. RAL's peasants perceived that despite this strategy allows increasing income diversification at household level; it also reduces farm's labor force, an increase of dependence on purchased foods, changes in consumption habits and a decrease of social relations (e.g., reciprocity), the

latter at community level. Therefore, migration can be linked to negative outcomes within the activities of production, consumption, and social organization. At household level, the reduction of available labor can diminish on-far diversification (Pfeiffer et al 2009), and thus, increase the dependence on purchased foods. As a result, the potential of the farm as a source of highly nutritious food is supplanted by less nutritious alternatives, such as sugar, oils, noodles, and high fructose and carbonated drinks (INPC 2012; Oyarzun et al 2013). At community level, migration processes can undermine solidarity relations in the farm work (Martinez 2005). In the absence of sufficient family labor available, these families with less family labor force avoid exchanges with other families because they cannot meet with these reciprocity relations.

4.3.1.3. Changes in cultural context

Cultural changes prioritized were changes in identity and local knowledge, changes in consumption habits by urban consumers and at household level, and changes in valuation of Saraguro traditional festivals. Regarding changes in **identity and local knowledge**, RAL's peasants perceived that the process of peasantry's self-organization is a social change that helps to increase their collective capacity to face non-favorable public policies. According to social research this is a central claim of rural movements (Soliz et al 2013; Vergara-Camus 2014). But social organization is threaten by a decreasing trend in community social relations (solidarity and reciprocity) experienced by a large part of rural communities (Martínez 2002; Martínez 2005) which consequently reduces peasant's participation in collective action processes (Bebbington and Perreault 1999; Devaux et al 2009).

Other key cultural change is linked to changes in **consumption habits by urban consumers**. Peasants highlighted an increased demand for horticultural products by urban consumers, but a limited demand for Andean products. Although horticultural production is important for the revival of the Ecuadorian peasant economy, the dependence on imported modern seeds (especially from the United States) is detrimental to seed autonomy at household level, and food sovereignty at the national level (Álvarez et al 2014). Additionally, as Espinosa (2004) noted the limited demand of Andean roots and tubers can affect the production of these products. Therefore, consumers' food habits and their purchase decisions could affect the agro-biodiversity managed by peasants at farm level.

Other key cultural change is linked to changes in **consumption habits at household level**. RAL's peasants perceived that these are linked to migration (the increase in consumption of

non-traditional and purchased foods low in micronutrients), the erosion in valuation of Andean agrobiodiversity (Chamorro et al 2009; Oyarzun et al 2013), and, mass media, favoring imbalanced diets with implications for health (e.g., overweight and obesity). The implications of these changes at global level, known as the "nutrition transition", have been widely described in the literature (Popkin 2006).

Additionally, during the workshop, the *Saraguro* peasants emphasized the cultural changes linked to **changes in valuation of *Saraguro* traditional festivals**. RAL's peasants from *Saraguro* culture perceived that their festivals and their connection with the agricultural knowledge are being lost. This has been shown by recent studies (INPC 2012) and could affect the indigenous culture and their knowledge linked to agricultural management practices (Denevan 2001; Velásquez-Milla et al 2011).

4.3.1.4. Environmental changes

The most important perceived environmental change was the change in **rain patterns**. Peasants perceived an increase in extreme rainfall events in recent years. This perception has been facilitated by recent events, such as the floods occurred during the months of April and May 2012 (MAE 2012: 25) that obliged the Ecuadorian government to declare a state of emergency in Loja and other provinces. But it is unclear whether this involves a real change in rainfall patterns. From the meteorological yearbooks available (1990 to 2012; INAMHI 2015b), we cannot establish conclusions regarding changes in rain pattern and/or other environmental climate changes also perceived by peasants (such as decrease of frost and increase of insolation).

Other direct environmental changes highlighted by the peasants were **deforestation and soil erosion**. RAL's peasants perceived that the loss of forest cover has resulted in increased soil erosion (worsened by water erosion) and a loss of soil fertility. As other studies have shown (Adams 2009; Wilkinson 2009; Pohle et al 2010), these changes threaten the sustainable use of tropical mountain rain forests in southern Ecuador. Additionally, RAL's peasants perceived that the loss of soil fertility is also linked to the use of agrochemicals, mainly in the cultivation of potato, a trend shown along the Ecuadorian Andean region (Coffey et al 2007: 82-84). They recognized that the use of agrochemicals affects the health status at the household level, which has been shown to have an effect by Cole et al. (2011). They also perceived that these

environmental changes can affect the levels of food production at farm level; and consequently, self-consumption and incomes (from marketing agri-food products) at household level.

In table 4.2 we systematize the effects of main drivers of change perceived by RAL actors on agri-food system components conceptualized as SES and their link with each vulnerability dimension, i.e., the answer to *Vulnerability to what?*.

Table 4.2 Effects of drivers of change on the components of agri-food system (conceptualized as SES) and correspondence with vulnerability dimension according to the perception of RAL's peasants belonging both to *Saraguro* indigenous and *mestizo* cultures

Drivers of change	**%**[a]	**Scale & level of driver**	**Components of SES** [b] (effect)					**Vulnerability dimension**
			RS	**RU**	**GS**	**A**	**I**	
AGRI-FOOD POLICIES								
Commercialization policies:	100							
prices		Jurisdictional: national	RS5.2 (-)			A2.3 (-) A8.5 (-) A8.6 (-)	D (-)	Individual sensitivity and ability to respond to change
access to local markets		Jurisdictional: cantonal			GS5.1 (+)	A2.3 (+) A8.5 (+) A8.6 (+)	D (+)	Individual sensitivity and ability to respond to change Collective capacity to mitigate and adapt
international agreements		Jurisdictional: international, national	RS5.2 (-) RS5.1 (-)			A2.3 (-) A8.5 (-) A8.6 (-)	D (-)	Individual sensitivity and ability to respond to change
Policies related to land	88	Jurisdictional: national, cantonal	RS3.1 (-)		GS4.1 (+)	A2.6 (+) A2.3 (+/-) A8.5 (+/-) A8.6 (+/-)	P (+/-)	Individual sensitivity and ability to respond to change
Food safety	80	Jurisdictional: national	RS5.1 (-)			A2.3 (-) A8.5 (-) A8.6 (-)	T (-) D (-)	Individual sensitivity and ability to respond to change
Access to assets:	44							
access to credit		Spatial: farm Jurisdictional: national	RS3.1 (+)	RU5.3 (+)		A2.6 (+)	P (+)	Individual sensitivity and ability to respond to change
access to training		Spatial: farm Jurisdictional: local			GS6.1 (+)	A6.1 (+) A8.1 (+) A8.2 (+) A8.3 (+) A8.4 (+) A9.1 (+) A9.3 (+)	P (+) C (+) I6 (+) I7 (+)	Agro-ecosystem resilience Individual sensitivity and ability to respond to change Collective capacity to mitigate and adapt
RURAL-URBAN MIGRATION								
Linked to off-farm work	88	Jurisdictional: local Network: family				A1.1 (-) A2.2 (-) A2.4 (+) A6.2 (-)	P (-) C (-)	Individual sensitivity and ability to respond to change

Drivers of change	%[a]	Scale & level of driver	Components of SES [b] (effect) RS	RU	GS	A	I	Vulnerability dimension
						A8.1 (-) A8.2 (-) A8.4 (+) A8.5 (+)		
CHANGES IN CULTURAL CONTEXT								
Changes in identity and local knowledge (including food sharing)	84	Jurisdictional: local Network: community				A6.1 (-) A6.2 (-) A6.3 (-)	D (-) I2 (-) I4 (+) I6 (-) I7 (-)	Individual sensitivity and ability to respond to change Collective capacity to mitigate and adapt
Changes in consumption habits by urban consumers	84	Spatial: farm Jurisdictional: local Network: society		RU5.1 (+/-)		A2.3 (+/-) A8.5 (+/-) A8.6 (+/-)	P (+/-) D(+/-)	Agro-ecosystem resilience Individual sensitivity and ability to respond to change Collective capacity to mitigate and adapt
Changes in consumption habits at household level	56	Spatial: farm Jurisdictional: local Network: family, community		RU5.1 (-) RU5.2 (-)		A8.3 (-) A8.4 (+)	P (-) C (-)	Individual sensitivity and ability to respond to change
Changes in valuation of *Saraguro* traditional festivals	[c]	Jurisdictional: local Network: community				A2.1 (-)	P (-) C (-)	Individual sensitivity and ability to respond to change Collective capacity to mitigate and adapt
ENVIRONMENTAL CHANGES								
Rain patterns	100	Jurisdictional: local Temporal: seasonal	RS5.1 (-) RS5.2 (-)			A2.3 (-) A8.1 (-) A8.2 (-) A8.5 (-)	P (-) D (-) C (-)	Agro-ecosystem resilience Individual sensitivity and ability to respond to change
Deforestation and soil erosion	40	Jurisdictional: local Temporal: annual	RS5.1 (-) RS5.2 (-)			A2.3 (-) A8.1 (-) A8.2 (-) A8.5 (-)	P (-) D (-) C (-)	Agro-ecosystem resilience Individual sensitivity and ability to respond to change

(a) Percentage of respondents (N=25)

(b) **RS**= Agro-ecosystem boundaries; RS3.1= Size of farm; RS5.1= Production of processed dairy; RS5.2= Crop yield; **RU**= Agro-ecosystem units; RU5.1= Crop richness; RU5.2= Small animal richness; RU5.3= Number of cattle; **GS**=Agri-food governance system; GS4.1= Land tenure; GS5.1= Access to retailing location; GS6.1= Member of agro-ecological network of Loja; **A**= Agri-food system actors; A1.1= Size of labor force; A2.1= Self-identification as Saraguro indigenous; A2.2= Gender equality in the distribution of labor responsibilities;

A2.3= Marketing of agri-food products; A2.4= Off-farm work; A2.6= Access to credit; A6.1= Participation in community-based working groups (*mingas*); A6.2= Participation in services exchanges; A6.3= Participation in seeds exchanges; A8.1= Importance of crops for self-consumption; A8.2= Importance of small animals for self-consumption; A8.3= Importance of traditional foods; A8.4= Dependence of non-traditional purchased foods low in micronutrients; A8.5= Income diversification; A8.6= Importance of on-farm incomes; A9.1= Use of organic inputs on crops; A9.3= Use of ethno-veterinary products; **I**= Agri-food activities and other interactions; P= Production; T= Process (or Transformation); D= Distribution; C= Consumption; I2= Information sharing; I4= Conflicts; I6= Lobbying activities; I7= Self-organizing activities.
(c) According to workshop with Saraguro peasants (n=16).

4.3.2. Future scenarios

Figure 4.1 shows the illustrations of the future scenarios drawn of the local agri-food system by 2030. The *mestizo* peasants decided to design two contrasting scenarios, one that represents an alarming future based on the continuity of actual trends (Scenario I), and other that represents the desired and plausible future based on the support and articulation with governmental institutions (Scenario IV). *Saraguro* indigenous peasants decided to design two desired and plausible futures, one with the influence of the indigenous collective rules from *comuna* (Scenario II), and other based more in strengthening the *Saraguro* indigenous culture identity (Scenario III). All the scenarios include strategies to face the drivers of change (Appendix 4.2).

Figure 4.1 Illustrations of future scenarios: **I:** "*Campo en riesgo, solo algunos resistimos*"; **II:** "*Comuna nueva vida*"; **III:** *"Sumak kawsay"*; **IV:** "*Nuevo amanecer*". Illustrations elaborated by Luis Lozano (a local *Saraguro* indigenous artist)

4.3.2.1. Scenario I: "Campo en riesgo, solo algunos resistimos" (Countryside at risk, only a few resist)

Marginalization of local agri-food systems

A business as usual scenario is perceived as a negative scenario by both groups, driven by land policies characterized by a lack of support to Andean peasants, and the persistent negative effects of local environmental changes on soil fertility and forest cover in the area. In the peri-urban area, the municipal Autonomous Decentralized Government (GAD in Spanish terms) does not prioritize local production and is changing land uses. As a result, the urbanization and industrial park expand, occupying the productive lands of periurban areas.

> "*The periurban agriculture does not exist. There is no land, everything turns into industrial city. Thus, RAL gets smaller and smaller*."

The deforestation rate and consequent increases in soil erosion have negative effects on livelihoods. Water bodies are not protected; thus there is shortage of drinking water. Natural resources are scarce. These trends increase rural-urban migration. In the most remote rural areas, few RAL's peasants remain as green islands within a treeless landscape and without generational renewal. This trend leads to progressive land abandonment and management practices and associated knowledge loss, with negative effects on agricultural biodiversity conservation and crop production. The number of small animals also decreases. Milk production drops dramatically due to the decrease of pastures and their productivity. These trends in productive activities in turn affect processing, distribution and consumption activities. As crop production is marginal, it is only used for intra-household consumption. Processing of dairy products, such as fresh cheese, just reaches for home consumption. Food production at marginal levels does not allow income diversification through agri-food marketing at the household level and threatens food access. Local markets lack local food production. Now local markets are supplied with products from other countries. The national government has signed free trade agreements that encourage food imports. There are more barriers for peasants to perform distribution activities. Sanitary register to sell dairy products and fresh vegetables are implemented. For most peasants, the compliance of this requirement does not allow selling agri-food products.

4.3.2.2. Scenario II: "Comuna nueva vida" (New life commune)
Local commons and global exchanges

The indigenous *Saraguro* peasants devised a scenario for 2030 based on the key role of the communal council for agri-food system management. The commoners participate actively during assemblies organized by the communal council. The assemblies are chaired by an indigenous woman as president of the *comuna*. The communal council is the institution responsible for managing the training, especially in issues of agro-ecology and the valorization of indigenous culture.

> "*Firstly is our culture's rescue. Apart from traditional clothes, it is about how our elders have lived, how they have handled the farm. They have lived feeding on their own crops. (…) Within the comuna we have chosen the communal council. (…) The president is a woman, she get along with everyone. She is the comuna's head and gives life witness. (…) [Through the communal council] the formal procedures are performed, to go to any institution, municipality or foundations; where necessary to meet our needs, especially for agroecology.*"

On the one hand keeping the local system based on self-sufficiency is defended, but at the same time, this scenario projects the *comuna* and its indigenous peasants in relation to global markets.

> "*We have more production of handicrafts for sale, for export to other countries. (…) We can also export not only the crafts but [agricultural] products from those having enough production.*"

Regarding production activities, terraces are built on hillsides to prevent soil erosion. Uphill in the mountains reforestation with native plants is performed, especially with alder (*Alnus acuminata*), that improves soil fertility.

> "*We have native trees. We do not plant pine and other plants coming from other countries, because they have harmed us.*"

Crops are located near the houses in the *huerta* (local term to refer to a garden mainly with vegetables, flowers and fruit trees) and *chacra* (local term to refer to a plot mainly with corn, beans and squash); as well as small animals (such as sheep, chickens, guinea pigs and pigs).
Animals are fed with their own fodders and house wastes; in turn, the animals produce food and organic fertilizers for the soil. Uphill in the mountains Andean tubers (like *oca* [*Oxalis tuberosa*], *mashua* [*Tropaeolum tuberosum*]) and cattle breeding occur. Forest is valued for its

role on soil protection, soil fertility (for crops and pastures), and obtaining food and firewood. Each family transmits knowledge of agricultural practices to their children. The communal council is the entity that manages irrigation for the entire *comuna*. All commoners work in *mingas* to build the irrigation system. The population is maintained, peasants go to city to sell their products, and then they return to farms because they like living in the countryside. Processing activities are maintained with the artisanal production of cheese. For distribution activities, the communal council helps to access local and global markets. For local markets, the communal council holds meetings in order to find strategies to increase consumer awareness and achieve fair prices. In Loja fairs, RAL's peasants (indigenous and *mestizo*) talk with consumers about the value of local products.

> "*We have to make them understand. To raise awareness among consumers, we have to talk to them, especially those who already trust us. Then, they talk with other consumers. They tell them that RAL's peasant women have good products*."

In addition, the communal council asks the support of parish-GAD, to manage a transportation service to bring agri-food products to local markets. For global markets, the communal council manages jointly with parish-GAD, municipal-GAD and the Ministry of Industry and Productivity (MIPRO) to facilitate exports to international markets (e.g., to United States of America). Firstly, handicrafts textiles made by the *comuna* are exported. Secondly, Andean agri-food products, in accordance with the increase of production supported by the Ministry of Agriculture (MAGAP) and RAL. Regarding consumption activities, each household prioritizes food production to meet the food needs at the household level. Maize is the staple food; it is saved within the households on the *guayungas* (bundles of pairs of corncobs).

4.3.2.3. Scenario III: "Sumak Kawsay" (Good living)

Good living linked to valuation of indigenous culture and food self-sufficiency

The indigenous *Saraguro* peasants devised a scenario for 2030 based on the key role that the bilingual education system and training from RAL should play to keep the indigenous culture and management of the agri-food system. Good living is based on strengthening the identity of the *Saraguro* people through the recovery of the traditional festivals, Andean food, Quechua language, traditional indigenous knowledge and empowerment of community tourism.

> "*First of all is the culture. As a whole, from our traditional clothes to the valorization of our Pachamama [nature in Quechua language]; our agriculture to feed us and live in*

our environment. (…) [So] we are motivated, all speak Quechua, we continue with bilingual schools".

Regarding the production activities, agroforestry systems with fruit trees and alder are handled because they improve soil fertility. Crops (in the *huerta* and *chacra*) and small animals are located near the houses while uphill in the mountains are located the plots of Andean tubers. There are more forests in all communities, and silvopastoral systems for cattle breeding are handled. RAL keeps the agroecological practices through training in communities, for example for the production of natural fertilizers. This encourages more peasants to follow these practices and join the peasant network. RAL grows and has more cultural diversity. There is less rural-urban migration. Bilingual schools are the training center of these generations who will appreciate the indigenous culture since the early childhood. Young people move to cities but then return with ideas and projects to contribute to local good living. The processing activities are diversified, the gastronomic knowledge associated with the preparation of traditional and local Andean foods is recovered. For distribution activities, policies support peasants to access local markets. RAL plays a key role to keep access to local markets based on the social organization of peasants (indigenous and *mestizos*). Women remain responsible of marketing. Indigenous peasants explain the nutritional and medicinal properties of the Andean agroecological products to urban consumers.

"*Quinoa is very favorable, for example, for women who are in menopause. I learned this from my grandmother, because she made tortillas of quinoa and achira. (…) With medicinal plants, also I also teach them [urban consumers] to prepare some medicinal teas. Thus, they also acquire our knowledge*."

Regarding the consumption activities, bilingual schools help to strengthen what is taught within the households. Children learn to value the culturally adequate foods. Community tourism is another strategy that is strengthened. This helps to give greater visibility and value to *Saraguro* indigenous culture. Additionally, it contributes to the diversification of the local economy. Community tourism includes the exhibition of artisanal processes to perform the traditional textiles, the sale of typical Andean meal and the accommodation. More families adhere to the community tourism, which is no longer run by external entities but by families from the community and RAL, with the active role of young people.

4.3.2.4. Scenario IV: "Nuevo amanecer" (New dawn)
RAL as a new drive for local governance

The *mestizos* peasants devised a scenario for 2030 based on the key role of RAL. RAL coordinates with government institutions and local public university to keep the agroecological production model, wild biodiversity, and the agri-food system management. Small farmers' associations are accredited by MAGAP so they can benefit from all governmental programs and services linked to agricultural issues.

> "*Now we do not give up, resign to agroecology is difficult because we have a vision of where we want to go. (…) The community together with local GADs and the institutions linked to rural sector (…) support peasants; we do not migrate to cities. Peasants keep the socialization within the communities about the importance of the countryside. (…) We have already spoken with MAGAP that we do not want that they come to impose conventional models. MAGAP must be committed to what we are doing, our mission, they must fit to our reality.*"

In the production activities, terraces with living fences and ditches have been made with support from MAGAP. These practices help to prevent wind and water erosion. Living fences have plants like agaves (*Agave americana*), grass (*Pennisetum purpureum* cv. king grass) and fruit trees (like trees of fig, pear and apple). These plants have a dual function, protect the soil and provide food (for animals and the household). Care is supported by the Ministry of environment, reforestation and watersheds care are performed. Leaves of *Guato* (*Erythrina* sp.) and alder trees are used as natural fertilizer. Emphasis is placed on the recovery and conservation of forests. Forests improve the habitat of wild animals such as *danta* (*Tapirus sp.*), *guanta* (*Cuniculus sp.*), *guatusa* (*Dasyprocta sp.*), *armadillo* (*Dasypus sp.*), *raposa* (*Didelphis sp.*), *guanchaca* (*Didelphis marsupialis*). On the banks of rivers, willow trees are planted. In addition, wells are built in water springs to grow trouts, through a water concession by the National Water Secretariat (SENAGUA) with the support of the MAGAP. Aquaculture helps to diversify income from marketing agri-food products. Income diversification is also favored by sport fishing service and other activities from local community tourism. Close to the houses *huertas* with agro-forestry systems (such as blackberries with *guato*) are maintained. Native trees and wild plants (e.g., *arrayán* [*Eugenia* sp.], blackberry [*Rubus* spp.], *capulí* [*Prunus serotina*], *guabillo* [*Inga marginata*], *guato, luma* [*Pouteria lucuma*], *guaviduca* [*Piper* sp.], *joyapa* [*Cavendishia* sp.], *salapa* [*Gaultheria* sp.], *toronche* [*Vasconcellea stipulata*]) as well as Andean commercial crops (e.g., *granadilla* [*Passiflora ligularis*], *chocho* [*Lupinus mutabilis*])

are kept. Within the *chacra* the associate corn is planted. Near home, small animals (sheep, guinea pig, chicken, pork) are bred; together with horses for transportation. Uphill there are pastures for cows. The local university continues to support agroecological production. College students do internships in the farms.

> *"The university is doing workshops in each community and helping for building agroecological design in the farms. (...) All neighbors perform agroecological production because we have worked with them gradually, with constant dialogue and motivation."*

The law of food sovereignty (LORSA) is fulfilled. The MAGAP supports us with subsidies for agroecological production and creates incentives for peasant small farming. In terms of population, rural migration has slowed, because the policies are focused on peasant's livelihoods. The houses abandoned are again occupied. Processing activities are enhanced in order to add value to agri-food products. Blackberry crops are used to produce jam and wine. For these activities the parish-GAD supports with training, the MIPRO and the Institute of Popular and Solidarity Economy (IEPS) support with materials for artisanal transformation. National policies recognize a manual of good peasant practices as a control tool for agri-food products from small producers, so the sanitary register is not required. Regarding the distribution activities, RAL lobbies with the municipal-GAD in order to improve infrastructure and access to local markets. There are no conflicts between peasants and middlemen to have a space in the local markets. The dialogue between producers and consumers results in the number increase of RAL's consumers. RAL lobbies with the municipal-GAD and MAGAP to get coolers for an adequate transportation of fresh meat (like chicken and trout) from the production site to the marketing place. Within local markets, refrigerators for the display and sale of meat are provided. As for consumption activities, each household prioritizes food production for self-sufficiency. RAL is supported by the Ecuadorian Coordinator of Agroecology (CEA) at national level, the Agroecological Movement of Latin America and the Caribbean (MAELA) at regional level, and other NGOs. The support is through workshops in issues such as agro ecological production and political advocacy.

All desirable scenarios (II, III, IV, see Appendix 4.2) share some common strategies, such as: rescue and keeping of agrobiodiversity, sensitization of urban consumers built by dialogue from peasants, sensitization of children built by women within household, keeping the agroecological vision built by RAL, and participation within policy making processes. In parallel, the process of participatory scenario development highlights the importance of adopting an intersectional

analysis to address gender issues (Carr and Thompson 2014). In our empirical case study, although most participants in the process were women, gender is not a stand-alone marker of social difference, gender interplays with other social markers of difference to produce differentiated and distinct vulnerabilities[30]. Differentiated vulnerabilities because RAL members envision to respond to the same sources of exposure differently; for example, regarding agri-food policies, particularly access to assets (as training), the *Saraguro* indigenous would opt mainly by the key role of their communal institutions and bilingual education system (scenario II and III respectively) while the *mestizos* would opt mainly by coordination with local university, governmental and non-governmental organizations (scenario IV). Distinct vulnerabilities because RAL members have a different prioritization of the sources of exposure, the *Saraguro* indigenous mainly prioritized cultural changes, while the *mestizo* mainly prioritized environmental changes. These examples suggest that the intersectionality is mainly linked to the interplay between gender and ethnicity. However, expectations about the role of social organization (and their political advocacy) are shared among all in order to foster the agroecological production model and access to markets; an intersectionality that could be linked to the interplay between gender and class (peasants).

4.3.3. Future vulnerability assessment of local agri-food systems in the Loja canton

Interviews showed similar perceptions between *Saraguro* indigenous and *mestizo* peasants for assessing the vulnerability dimensions of agri-food system. However, the choice of the outcomes-based indicators has some prioritizations related to each ethnic group (see table 4.3). Regarding the dimension of **agro-ecosystem resilience**, our results show that soil fertility is mainly prioritized among indigenous peasants. Considering the information from the interviews, and as suggested by other studies (Coffey et al 2007; Wilkinson 2009), this result could be related to decreased soil fertility (resulting from deforestation and the use of agrochemicals especially for growing potatoes). Subsequently, this raises the concern about the restoration and maintenance of soil fertility. While the pest control, an indicator prioritized by *mestizo* peasants, seems to have a higher priority due to the perception of the current baseline of this indicator[31]. Regarding the dimension of **individual (socio-economic) sensitivity and ability to respond to**

[30] Differentiated vulnerabilities occur when different members of a population experience and/or respond to the impacts of the same event or trend differently. Distinct vulnerabilities occur when different members of a population are exposed to different events and trends (Carr and Thompson 2014).

[31] We cannot establish this statement from the literature.

change, within the scope of nutritious food and health, our results confirm other studies that suggest the relevance of home gardens (*huertas*) and traditional knowledge within *Saraguro* households for keeping family health (Finerman and Sackett 2003). Within the economic scope, our results indicate that *mestizo* peasants exhibit a greater prioritization for obtaining revenue from the sale of surplus. This agrees with other studies indicating that *mestizo*, are generally more oriented to shopping (spend money on acquiring items) than indigenous *Saraguro* (Belote 2002: 116). Regarding the dimension of **collective capacity to mitigate and adapt**, our results are similar to studies that suggest that indigenous *Saraguro* show greater cohesion[32] as compared to *mestizo* (Gonzalez et al 2010). In our case this is expressed through the prioritization for sharing production surplus within the family. The priority given by *mestizos* for the valuation made by consumers (for their artisanal foods) could be related to their preference for diversification of products within processing activities. *Mestizo* peasants tend to diversify their sources of income by selling processed products at greater extent than indigenous[33]. Therefore, we can perceive that the prioritization of food sovereignty pillars is linked to culture. *Saraguro* indigenous peasants tend to prioritize indicators related to pillar of the right to food. While *mestizos* peasants tend to prioritize indicators related to the pillar of local markets.

[32] We refer to cohesion associated with social network (Gonzalez et al 2010). Because, in terms of land management, within the traditional *Saraguro* communities neither the community or their leaders control the rights over land (Belote 2002: 160-161). Within the participatory scenario development, the collective capacity from RAL (scenario IV) is strengthened by self-organization mediated by indigenous communal councils (scenario II), as well as, by the social organization linked to (re)valuation of indigenous culture (scenario III).

[33] Considering other processed products apart from artisanal cheese (a typical product for both cultures within the study area).

Table 4.3 Vulnerability dimensions and trends of the levels of indicators for the outcomes of the local agri-food system within the scenarios: I: "*Campo en riesgo, solo algunos resistimos*"; II: "*Comuna nueva vida*"; III: *"Sumak kawsay"*; IV: "*Nuevo amanecer*"

Dimension / Indicators	Correspondence to food sovereignty pillars	Baseline	Evidence from academic literature	Scenario I	Scenario II	Scenario III	Scenario IV
Agro-ecosystem resilience:							
Soil fertility (kept over time) [(a)]	Production model	Poorly	Soil erosion rates are 20 times faster in Ecuador than the rate considered environmentally sustainable by the U.S. Soil and Conservation Service (Mecham 2001, cited by Adams 2009: 868).	↓↓	↑↑	↑	↑↑
Agro-biodiversity (crops and animals)	Production model	Poorly	Many of the traditional and productive management practices were abandoned during colonization and as indigenous peoples were killed by diseases and war, or taken into slavery (Mecham 2001, cited by Wilkinson 2009: 849). While some of their traditions remain, many practices and species for traditional agricultural production have fallen into disuse and risk being lost (Wilkinson 2009; Oyarzun et al 2013).	↓	↑↑	↑↑	↑
Crops and animal's resistance to diseases (use of local varieties)	Production model	Good	Idem	↓	↑	↑	↔
Pest control level [(b)]	Production model	Good[(c)] Poorly[(d)]	With time, farm sites become exhausted of nutrients and biologically unbalanced soils are infested by pests that force farmers to increase their use of synthetic pesticides, artificial fertilizers, and manure (Sarmiento 2002).	↓↓	↔	↔	↑↑
Taste of organic food (organoleptic characteristic)	Right to food & Production model	Regular	-	↔	↑	↑	↑
Individual (socio-economic) sensitivity and ability to respond to change:							
Nutritious food production (quality) [(a)]	Right to food	Regular	There is an erosion of agrobiodiversity in Andean crops; there is a limited presence of the highly nutritious Andean grains (e.g., quinoa, amaranth, and *chocho*) (Oyarzun et al 2013).	↔	↑↑	↑↑	↑
Production for self-consumption (production level)	Right to food	Regular	The landscape is marginal, much production is subsistence. Peasants also orientate dairy production mostly for selling (Belote 1997; Wilkinson 2009; Pohle et al 2013).	↔	↑↑	↑	↑

Dimension / Indicators	Correspondence to food sovereignty pillars	Baseline	Evidence from academic literature	Scenario I	Scenario II	Scenario III	Scenario IV
Surplus production to sell (production level) [(b)]	Local markets & Production model	Poorly	Idem	↓↓	↑↑	↑↑	↑↑
Incomes from sales (sell more / fair prices) [(b)]	Local markets	Regular	Peasant families receive unstable prices which are insufficient to sustain their activities. An increasingly large proportion of the retail sales of agricultural products are carried out by supermarkets (Hidalgo 2013: 65).	↓↓	↑↑	↑↑	↑↑
Health within the family [(a)]	Right to food & Production model	Poorly	Families rarely consume nutritionally rich Andean grains (Oyarzun et al 2013). Intake of most micronutrients is low (Berti et al 2014).	↓	↑↑	↑	↑
Traditional knowledge (in gastronomy) [(a)]	Right to food & Production model	Regular	Although Andean crops are internationally recognized for their high nutritional quality, this valuation of Andean agrobiodiversity is eroded (Oyarzun et al 2013).	↓↓	↑↑	↑↑	↑
Collective capacity to mitigate and adapt:							
Surplus production to share with family [(a)]	Right to food & Social organization	Good[(c)] Poorly[(d)]	Studies suggest that indigenous *Saraguro* show greater cohesion compared to *mestizo* peasants (Gonzalez et al 2010).	↓	↔	↔	↑↑
Access to markets to sell	Local markets & Agri-food policies	Regular	Current opportunities for market access are limited. There is a need to create a link between rural and urban areas (Bond 2009). Here, peasant social organization plays a key role (Chiriboga 2004).	↓↓	↑↑	↑↑	↑↑
Consumers prefer healthy foods	Local markets & Right to food	Regular	Ecuadorian experiences show that the urban consumers groups (i.e., organized consumers) tend to prefer a quality food (Garcés and Kirwan 2009).	↓↓	↑↑	↑	↑
Consumers value artisanal foods [(b)]	Local markets & Right to food	Regular	-	↓↓	↑↑	↑↑	↑↑
Friendly atmosphere within fairs (cooperation / work together)	Social organization & Local markets	Good	In fairs, the community work brings new benefits, especially for women, such as friendly relations, opportunity to express themselves, claim and strengthen their self-esteem, recover their authority within economic space of their homes, and the opportunity to learn and engage in social and political activities (Garcés and Kirwan 2009).	↓↓	↔	↑	↑

Notes: (a) Indicators prioritized during the interviews mainly by RAL's peasants from *Saraguro* indigenous culture. (b) Indicators prioritized during the interviews mainly by RAL's peasants from *mestizo* culture. (c) Baseline established during the workshops for the *Saraguro* peasants communities. (d) Baseline established during the workshops for the *mestizo* peasants communities. Arrows show the direction of the indicator over time within the scenarios: ↑= increasing once; ↑↑= increasing twice; ↔ = it keeps; ↓= decreasing once; ↓↓= decreasing twice.

Workshops showed differences in the score given to the outcomes-based indicators under each scenario (table 4.3), according to context-specific agroecological, socio-economic and institutional components of local agri-food system. Overall, scenario I (undesirable) is characterized by a decreasing trend for all indicators, except for indicators of the nutritious food and self-consumption production, which remain in current baseline level. Scenarios II, III and IV (perceived as desirables), are characterized by increasing trends (regarding baseline) with some differences due to culture and collective rules from indigenous comunas. Indigenous peasants envisioned scenarios (II and III) where the future trajectories linked to agro-biodiversity maintenance (dimension of agroecosystem resilience) exhibit a greatest increase compared to perceptions from mestizo peasants (IV). In turn this could influence the trends of nutritious food and self-consumption production indicators. These results are consistent with studies showing the connection between agro-biodiversity at farm level and dietary diversity at household level (Herforth 2010; Jones et al 2014), relationship that we have also found in our study area (results from chapter 3 of this thesis). Traditional knowledge indicator also shows a greater increase in scenarios designed by indigenous peasants. In fact, narratives from indigenous scenarios emphasize the key role of traditional knowledge recovery and empowering (e.g., those related to gastronomy) to strengthen Andean indigenous culture. The recognition of the value of traditional knowledge could lead to future trajectories focused on agro-ecosystem conservation of the local agri-food system (Garay and Larrabure 2011).

Within the desirables scenarios designed by indigenous people (II and III) there are also some differences linked to collective rules from comunas. Maintenance of soil fertility, self-consumption production and health improvement within the peasants and consumers households (through their purchasing preferences linked to consumption of peasant and agroecological products) are indicators that show larger increases within the scenario under collective rules from comunas. This suggests that the role of collective rules from community-based organizations is a relevant institution for the future trajectories of agri-food system to facilitate the access to training (Bebbington and Perreault 1999). This is a relevant function to strengthen the agroecological production model in the Andean zone. A common feature to the three desirable scenarios (II, III and IV), is building a bridge between producers and consumers based on dialogue between the sides. This bridge results in future trajectories characterized by an increase in the valuation of agroecological, artisanal and local products by consumers (regarding baseline). These visualizations of future trajectories are associated to ideas discussed during RAL assemblies . RAL members have emphasized the need to have an organized group of consumers as part of its Participatory Guarantee System (PGS). In this sense, the dialogue

producer-consumer is the starting point to motivate to consumers to favor their inclusion as actors within the PGS.

Additionally, workshops showed the role of human agency in the active transformation of agri-food system. Here transformation is consider active when the transformation is introduced deliberately by the agency of the actors (Folke et al 2010; Berkes and Ross 2013). As suggested by Darnhofer (2014), resilience is clearly dependent on the farmers' perception of change and their creativity in the combination of resources (Darnhofer 2014) to perform agri-food systems active transformative adaptation (Folke et al 2010; Pelling 2011; Berkes and Ross 2013).

From the heuristic representation of the future trajectories of transformation of local agri-food system (Figure 4.2) two clusters of scenarios emerge, between desirable and undesirable states. Within the group of desirable scenarios, the differences in the levels of each vulnerability dimension are less pronounced and trade-offs are not so evident. This suggests that actors from different cultures grouped under same collective rules (in our case RAL) can follow similar trends (for each vulnerability dimension) but using different strategies to achieve them (see Appendix 4.2). Consequently, it suggests that the sub-groups designing each scenario have a shared vision about the future of their food systems. In this sense, perhaps a weakness/limitation of this study is related to the lack of inclusion of other actors; e.g., producers under other organizations, unorganized producers and/or farmers with main focus on export. That is, actors who may have other desirable visions about the future of agri-food systems, in order to analyze more evident trade-offs among their visions. However, it's interesting to observe that some scenario may show better performance in one dimension (example scenario II in the dimension of agroecosystem resilience and individual sensitivity and adaptive capacity), while other shows low performance in those dimension and high performance in other dimension (e.g. scenario IV shows very low performance in agroecosystem resilience but the best performance in collective capacity). This finding suggests that different dimensions of resilience and sustainability may be more favored/prioritized over others to obtain the same positive trends (Leslie et al 2015) in the future pathways of agri-food system.

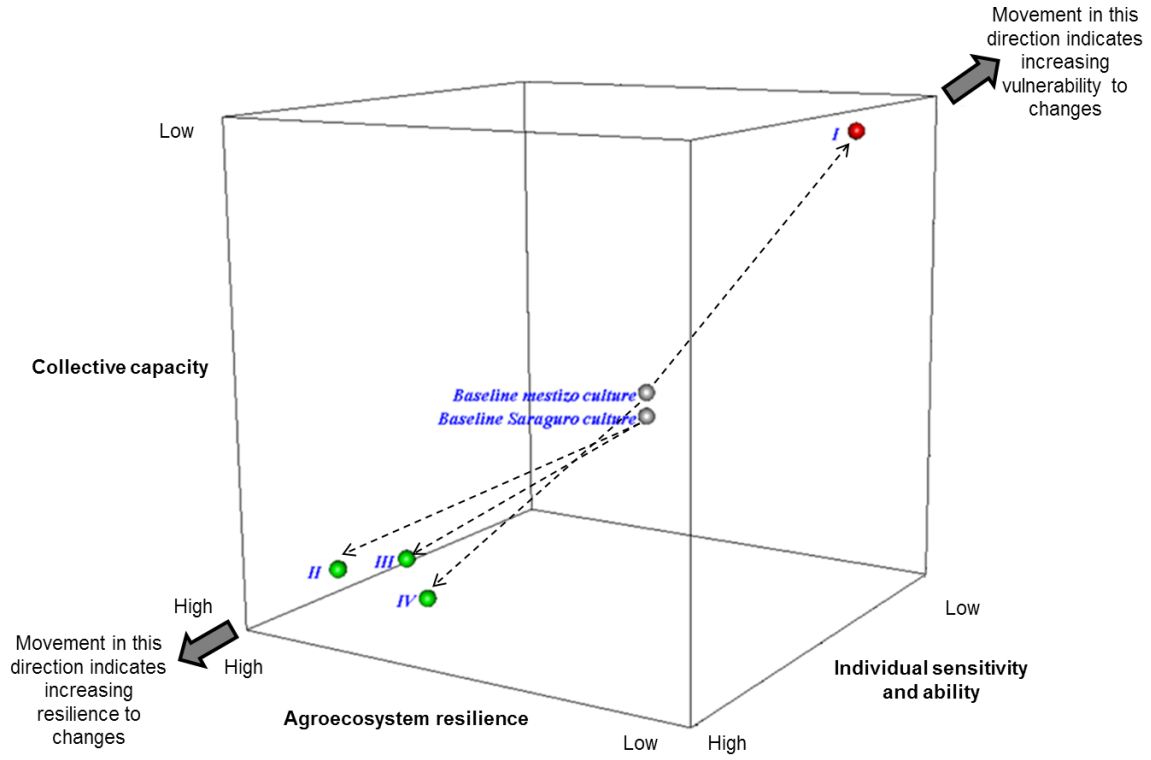

Figure 4.2 Heuristic representation of the future trajectories of transformation for the Andean Ecuadorian agri-food system using the three dimensions of the Fraser (2007; 2011) vulnerability framework: agro-ecosystem resilience (X), individual (socio-economic) sensitivity and ability to respond to change (Y), and collective capacity to mitigate and adapt (Z). The scheme shows the baselines (gray spheres) and the desired (II: "*Comuna nueva vida*"; III: *"Sumak kawsay"*; IV: "*Nuevo amanecer*"; green spheres) and non-desired (I: "*Campo en riesgo, solo algunos resistimos*"; red sphere) scenarios designed by indigenous *Saraguro* and *mestizo* cultures. Movement over time towards the top, back, right-hand corner indicates increased vulnerability to drivers of change. The scores in the three axes (X; Y; Z) are assigned taking into account the indicators prioritized by each culture within each dimension (except for Scenario I that constitutes a "business as usual" for the two cultures) and are calculated as average value from baselines +/- trends defined in Table 4.3. Final scores are: Scenario I = -1.6; -1.5; -1.8; Scenario II = 1.3; 1.8; 1.5; Scenario III = 1.0; 1.3; 1.5; Scenario IV = 0.8; 1.3; 1.8

4.3.4 Evaluation of learning process

Results from the evaluation suggest that the participatory scenario development has influenced the learning dimensions of the workshops' participants. Regarding the dimension of **awareness and understanding**, participatory scenario development has enabled collective reflections to increase awareness of the existence of different sources of exposure (drivers of change) and

threats. It has also enabled discussions of potential strategies to deal with current and future socio, economic, political and environmental changes in local agri-food system (Oteros-Rozas et al 2015). Participatory scenario development has also demonstrated to be a useful tool to encourage complex thinking (Ravera et al 2011a; Oteros-Rozas et al 2015; Waylen et al 2015), a key aspect of resilience (Biggs et al 2015). It did so by requiring participants to reflect upon, and characterize agri-food system dynamics, as well as how the social and ecological components of agri-food system interact with the drivers of change. As a result, the participatory scenario analysis has enhanced participants' socio-ecological understanding, and has integrated their qualitative, context-specific local knowledge of the local agri-food system. Addressing the complexity of agri-food system also has enabled to address the temporal dimension of social change and to embrace the potential surprises and unexpected changes (i.e. uncertainty) of agri-food system interactions and configurations (Mollinga 2010; Biggs et al 2015). For example, participants mentioned: "*We could analyze all of reality where we live. (…) It was useful for the valorization of natural resources*." Regarding the dimension of **attitudes and values**, given that the uncertainty of agri-food system interactions is linked to system responses to drivers of change generated from different levels and scales, the participatory scenario analysis enabled the participants to work with the uncertainty of the system through the consideration of different perceptions and reflections about the future trajectories of system transformation to co-create a new understanding of the present situation and shared visions of possible future developments (Oteros-Rozas et al 2015). For example, the participants mentioned: "*We agreed with the points discussed. (…) We thought about the common good*." Regarding the dimension of **social and cooperative skills**, through enabling collective reflections, discussions and the creation of shared understanding, participatory scenario development can facilitate mobilization of stakeholders to respond to newly identified threats or opportunities (Oteros-Rozas et al 2015). In this sense, it has enabled to envision opportunities for collaboration among multiple stakeholders (Butler et al 2015) in order to cope and adapt to drivers of change and achieve the desirable outcomes based on a consensual vision for local agri-food system. For example, the participants mentioned: "*The meeting was very useful to motivate consumers*". This emphasizes the need to include other agri-food system actors, such as consumers, within long-term planning to deal with the drivers of change (as mentioned in section 4.3.3).

4.4. Conclusions

The collective design of future scenarios allows participant to make linkages between the components of the vulnerability framework (exposure to multiple drivers, agro-ecosystem resilience, individual socio-economic sensitivity and ability to respond to change, and collective capacity to mitigate and adapt) with the ecological and social components of agri-food system. The use of participatory methods makes possible the inclusion of the agency and institutions during scenarios building processes. The participatory scenarios have allowed to understand (1) how drivers of change affect different components of the local agri-food system when it is conceptualized as SES; and, (2) how different perspectives (normative issues as: *whose goals for whom?*) contribute to build different future trajectories of active transformation (Folke et al 2010; Pelling 2011; Berkes and Ross 2013; Darnhofer 2014) for Andean agri-food systems. In our case, culture and institutions showed relevant roles. For example, Indigenous peasants emphasized the role of the identity of *Saraguro* people as core to achieve food sovereignty in their agri-food systems. Regarding institutions, indigenous peasants highlighted the importance of indigenous communal councils for promoting the agroecological production model and consumer awareness, as well as expand access to markets; while *mestizo* peasants emphasized the role of RAL and its coordination with academia, governmental and non-governmental organizations, as a way to manage the agri-food system and preserve wild biodiversity. Both *Saraguro* indigenous and *mestizo* peasants highlighted the role of collective rules from RAL for the implementation of an agroecological production model in the local agri-food system. Additionally, they emphasized the need to have an organized group of consumers as part of its Participatory Guarantee System (PGS). Framing the results for a feminist political ecology , our observations show the salient role of gender within policy and practice across a variety of scales, and within institutions central to natural resource governance (Resurreccion and Elmhirst 2008). In this sense, the adoption of an agroecological production model is due to the existence of a collective agency built by RAL, an organization created and mainly composed by peasant women. Women grouped in *RAL* jointed their efforts, independently on ethnic and class divisions, and through their rules (at collective level) have achieved the successful adoption of the agroecological production model (at farm level) and the access to local markets (at collective level) by performing lobbying activities with government and nongovernment organizations. Also, RAL women demonstrated an increase of self-esteem and economic independence (at individual level). These results confirm other studies focused on collective agency and women (Gabrielsson and Ramasar 2013). Within the process of scenario building the participation of *a priori* more vulnerable actors that already have governance arrangements

to influence on the management of the system has resulted in pragmatic benefits for stakeholders. Actors can use this information to model the future of their agri-food system and/or adapt to changes. Finally, the process of scenario design has fulfilled its function to communicate complex information about the changes that Andean agri-food systems could experience in the future. This information can be easily understood by a wide variety of stakeholders with different backgrounds.

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RAL producers participating in free fairs , Loja city (2013). Photo by Miguel Vallejo Rojas.

"*Esta organización nace por una necesidad de la gente.*
Estando organizados podemos asumir también responsabilidades y
asumiendo estas podemos conseguir algunos logros que
aún no hemos podido conseguir al no estar organizados. (…)
Esto de la venta ha sido igual una lucha nuestra,
de organizaciones, pensando en nuestra necesidad profunda
que por parte de las autoridades aún no se llega.
Ellos no visibilizan la necesidad del campo,
si el campesino produce debe tener un espacio digno para vender,
***y eso aún no les interesa*"**

(Peasant woman of RAL and local leader of the rural parish *Jimbilla*)

CHAPTER 5: Discussion

In this section I describe how the work developed in this research (Chapters 2, 3 and 4) has helped us to address the gaps identified at the beginning of the research process (Chapter 1) as well as other gaps we have not properly addressed that will object of future research. The discussion is organized into theoretical and methodological contributions to rethink agri-food systems' assessment (scientific side), and into empirical contributions to rethink agri-food systems' management (policy side). I will begin detailing the contributions of implementing system thinking approach through the SES framework, in order to perform descriptive analysis of agri-food systems. Then I will discuss the reasons for the integration of SES with other frameworks, as the vulnerability framework, emphasizing its central role as a mean to include within system analysis the agency of actors, to move from a descriptive to a prescriptive/normative approach. Within the theoretical and methodological contributions I include future lines of research that have emerged during the research process, which are also linked to the limitations found during the research process. Within the empirical contributions, I give special emphasis on proposals for policy making processes to support food sovereignty in the case study. Finally, I describe the conclusions reached from our research.

5.1. Theoretical and methodological contributions to agri-food system research

Our research has explicitly framed the agri-food system analysis within an alternative frame of agri-food research. Following Rivera-Ferre (2012) we believe that, given the connections among research (assessment) and policy-making (management), and the importance of agriculture in the livelihoods of millions and the environment, in agri-food research it is particularly necessary to make explicit the frame under which the research is performed. This gives coherence to the policies which are later developed following the results and suggestions made by such research. We place this research within the widest umbrella of critical agrarian studies and the policy proposal of food sovereignty. Within this umbrella we combine, conceptually and methodologically, different schools of thought, mainly sociology of agriculture and food (SAF), system thinking and development studies. The introduction of system thinking within critical agrarian studies is shown as a vital contribution for the comprehensiveness of the research process in agri-food systems and the relevance of measures in agri-food system management. Table 5.1 resumes the conceptual and theoretical differences and complementarities of the schools of thought used in this research and the contribution in responding to create a novel conceptual and theoretical framework in agri-food research.

The SAF research through its critical response to inadequacy of adoption/diffusion models (Buttel 2001; Constance 2008; Bonanno 2009; Constance et al 2014) has allowed us to introduce a new approach to explain the changes occurring in rural society and agriculture. One of the key contributions of linking SAF with system thinking and its resilience theory is highlighting the complex interdependencies of social-ecological systems as agri-food system (Ericksen 2008a; Rivera-Ferre et al 2013; Vallejo-Rojas et al 2015), and the recognition that they are constantly changing in ways that cannot be fully predicted or controlled (Chapin et al 2009). In fact, given the inherent uncertainties and discontinuities of agri-food systems (Ingram and Brklacich 2006; Ericksen 2008b; Ingram 2009), the system thinking and its resilience theory enable insights into the dynamic interplay of persistence, adaptability and transformability (Darnhofer 2014). However, although system thinking offers a way to conceptualize uncertainty and dynamics, it raises other conceptual and methodological challenges. Systemic thinking has mainly been used to address management of natural resources in which society is embedded and where ecological principles are used to analyze social dynamics, problematically assuming that social and ecological dynamics are essentially similar (Cote and Nightingale 2012). In this sense, resilience thinking requires the integration with actor-oriented approaches in order to adequately capture agency, intentionality, sense-making and learning (Miller et al 2010; Cote and Nightingale 2012; Berkes and Ross 2013; Darnhofer 2014). "These play an important role in understanding how farmers make sense of their current situation, how they balance exploitation with exploration, when they choose to adapt their processes in the face of emerging trends and how they take advantage of emerging opportunities to transform their farm" (Darnhofer 2014: 476-477). The inclusion of actor-oriented approaches also allow to address criticism from SAF research, particularly those linked with the movement from structuralist approaches to more reflexive and interpretive approaches (Constance et al 2014), a movement that emphasizes the role of social agency to understand the social dynamic within the boundaries of agri-food systems. In this sense, linking system thinking with development studies has allowed us to address conceptually the social constructivist perspectives of SAF research and its application within agri-food system assessments. Thus, the establishment of the link between SAF, system thinking and development studies has allowed us to address the interaction between social dynamics within an agri-food system (social-ecological system) and the role of these dynamics as important elements for resilience of the system. Here we understand resilience as a property of the system encompassing three capabilities: buffer capability (ability to absorb shock), adaptive capability (ability to adapt through implementing incremental changes) and transformative capability (ability to transform through implementing radical changes); thereby enabling the farm to address sudden shocks, unpredictable 'surprises' as well as slow-onset changes (Darnhofer 2014). In addition, in our

conceptual framework, we emphasize in the transformative capability as a mean to move from the Agrarian Question to the Emancipatory Question in SAF (see section 1.2 in Chapter 1) in order to address the role of human agency within the responses for the active transformation of agri-food system. Here transformation is considered active when it is deliberately introduced by the agency of the actors (Folke et al 2010; Berkes and Ross 2013). Thus, the agri-food research is linked to critical agrarian studies; the inclusion of agency implies to recognize the paradigms and structural constraints (the movement from structuralist to reflexible/interpretive approaches) that impede the transformation of agri-food system (Buttel 2001; Constance 2008; Bonanno 2009; Constance et al 2014), as well as, the incorporation of new rights claims and changes in political regimes to facilitate and give way to active transformation of the system (Pelling 2011).

Table 5.1 Main characteristics of different sociology of agriculture and food (SAF), system thinking, and development studies

	Sociology of Agriculture and Food (New Rural Sociology research)	**System thinking and systemic framework (Resilience research)**	**Development studies (Vulnerability research)**	**Insights for application to agri-food system study and management**
Theories	Social theory (Friedland 1982; Buttel 2001; Constance 2008)	New ecology theory (Holling 1973) Theory about the co-evolutionary nature of human and biophysical systems (Norgaard 1994; Berkes and Folke 1998)	Development theories (Chambers 1983) Post-development theories (Escobar 1995) Entitlement theory (Sen 1980) Disasters theory (Blaikie et al 1994) Adaptation theory (Rappaport 1977)	Integration of ecology and social theory
Main disciplines	Sociology of agriculture and food Environmental sociology	Common property Ecological economics New institutionalism	Sociology of development Human geography Human ecology (political ecology) Natural hazards research Livelihood research Psychological research	Complementing studies on rules and institutions and ecological system with research on social dynamics related to food and environment research
Domain	Axiological (values, linked to domain of policy; power)	Epistemic (knowledge, linked to domain of science and development)	Epistemic and axiological	Focused on knowledge creation and value inclusion in agri-food assessment process
Object	Society and societal processes, including	SES as epistemic object	Society and societal processes, including	Agri-food system as SES where

	Sociology of Agriculture and Food (New Rural Sociology research)	**System thinking and systemic framework (Resilience research)**	**Development studies (Vulnerability research)**	**Insights for application to agri-food system study and management**
	institutions; relations society - agriculture		institutions; vulnerability analysis	components are explained in terms of social (GS, A) and ecological (RS, RU) subunits which interact to produce outcomes
Epistemological approach	Constructivist Prescriptive (normative)	Realism Descriptive	Constructivist Prescriptive (normative)	Realist constructivist Both descriptive and normative
Dimensions explored	Socio, cultural, economic and political dimensions	Linked social and ecological dimensions	Socio, cultural, economic and political dimensions	Linked socio, cultural, economic, political dimensions and ecological dimensions
Perspective of change	Human rights centered, i.e. people-centered	System- centered	Human rights, economic-centered	Agri-food systems changes are claimed by human rights objectives
Source to address the changes	Actors /agency (including intersectionality)	Complex interactions/ feedback loops between system components; complex adaptive cycles	Actors /agency (including intersectionality)	Actors as participants of focal actions which are interactions (cross-scale) between components; active agents for shaping changes (not passive victims)
Type of research to support the change	Interdisciplinary (integration of academic knowledge mainly from social sciences)	Interdisciplinary (integration of academic knowledge mainly from ecological sciences)	Interdisciplinary (integration of academic knowledge mainly from social and economic sciences)	Co-production of knowledge from social and natural disciplines and from local knowledge (actors)
Research process	Both deductive and inductive	Mainly deductive	Both deductive and inductive	Both deductive and inductive
Methods/tools	Dialogic/dialectical	Mainly quantitative methods	Quantitative and qualitative methods	Integration of quantitative and qualitative methods including a dialogic approach
Implications for learning	Out-of-the-box thinking	Learning to live with change and uncertainty; unpredictability of change	Learning to live with change and uncertainty; unpredictability of change	Recognition of uncertainty and surprises; critical reasoning for transformational adaptation
Approach to address changes	Political	Apolitical	Depending on the school, political and apolitical	Political engagement with activism and policy making
Approach for adaptation and transformation	Adaptive capacity is constantly renegotiated; active	Adaptive capacity inherent to SES; resilience framework	Adaptive capacity is constantly renegotiated; active	Adaptation defined from systemic view but adding the

	Sociology of Agriculture and Food (New Rural Sociology research)	**System thinking and systemic framework (Resilience research)**	**Development studies (Vulnerability research)**	**Insights for application to agri-food system study and management**
responses	transformation (deliberative transformation, mainly from subaltern struggles)	for navigating transitions [34]; with capacity to transform (transformability) according to Folke et al (2010)	transformation	ability to transform actively and through processes of negotiation (mainly from the bottom) and based on a critical reasoning
Base of adaptation and transformation responses	Social justice and civil rights	Self-organization and social learning	Social inclusiveness and bottom-up processes	Bottom-up changes in the agri-food system are addressed/ envisioned based on social justice and diffused through social learning
Main focus of responses	Recognition that paradigms and structural constraints impede widespread and deep social reform. Questioning of established conditions (improve performance based on new rights claims and changes in political regimes)	Capacity to absorb changes without losing structure and functions of the system (improve performance based on sensitivity and capacity of response without changing guiding assumptions or questioning established routines)	Depending on the school, return to the previous state or incremental changes made through the assertion of pre-existing unclaimed rights or new rights claims	Looking at performances in sensitivity and adaptive capacity linked to transformability based on the questioning of established conditions and new right claims
Outcomes	Institutional and social changes	Socio-ecological outcomes	Institutional and social changes	Outcomes of agri-food system change and feedbacks on social impacts and institutional change
Engagement in policy making and management	Explicit	Implicit	Explicit	Explicit
Role of academy	Linking teaching, research and political action	Informer of decision makers, policy makers and change agents	Research as a mean to social transformation	Linking teaching, research and political action to transform the agri-food system, equity and justice is the end goal

From a theoretical standpoint, the conceptualization of agri-food system as a socio-ecological system (SES), based on the framework proposed by Ostrom (2007; 2009)(2007; 2009), has

[34] According to the Resilience Alliance (2002), resilience has three defining characteristics: (i) the amount of change the system can undergo and still retain the same controls on function and structure, or still be in the same state within the same domain of attraction; (ii) the degree to which the system is capable of self-organization; (iii) the ability to build and increase the capacity for learning and adaptation (Berkes et al 2003: 13) .

enabled addressing the cross-level and cross-scale interactions between the social (GS,A) and ecological (RU, RS) components of the system within the boundaries of agri-food system research. SES conceptualization has allowed to analyze the agri-food system taking into account a focal action where the interactions among components of the system are analyzed along the agri-food activities and which are linked to new forms of collective actions driven by marginalized actors, such as women or indigenous people, and social organizations (e.g. the RAL) as well as novel instruments and processes for networking people, monitoring and lobbying.

The conceptualization of agri-food system as SES is potentially useful for understanding systemically and systematically the potentialities of agroecological production models and social organization (as food sovereignty pillars) to face global environmental changes (Altieri and Toledo 2011; Rogé et al 2014) as well as to respond to agri-food policies (operating at different scales over time) which act as their major determinants for transformation. Thus, the application of SES framework (Ostrom et al 2007; McGinnis and Ostrom 2014) to evaluate alternative policies, such as food sovereignty (La Vía Campesina 2009), has allowed us to go beyond the analysis of food sovereignty indicators (Ortega-Cerdà and Rivera-Ferre 2010; Binimelis et al 2014), including the uncertain, non-linear and emergent interactions between components at different and between scales. In sum, the framework proposed enables the analysis of agri-food system outcomes as responses to drivers of change (e.g., climate change and agricultural policies) linking them with food sovereignty pillars, and taking into account the non-linear interactions between such outcomes and the components of the system (Rivera-Ferre et al 2013; Vallejo-Rojas et al 2015).

Methodologically, our integrated framework contributes to further develop the operationalization of Ostrom (2009) and McGinnis and Ostrom (2014) approach for agri-food system research. In this sense, we have defined the boundaries of agri-food system based on agri-food activities. We have complemented the interactions, previously defined by Ostrom, with those derived from the food chain (especially focusing on local production, processing/transformation, distribution, consumption). Similarly, we have linked the focal action situations, previously defined by Ostrom, with the food sovereignty pillars, in order to link the categories and indicators of food sovereignty with the third-tier of SES framework.

However, understanding methodologically the resilience with the three capacities (buffer, adaptive and transformative) implies integrating the role of agency (social dynamics) within the SES framework (Figure 5.1). Because these three capabilities are clearly built on an actor-oriented, a constructivist approach which puts actors agency (farmers and consumers) at the forefront is needed. Here, the feedback processes in social systems are not primarily defined by structural variables, but by agency, and agency needs to be emphasized and addressed within

SES framework. This implies, as suggested by Darnhofer (2014), that both resilience and active agri-food systems transformative adaptation (Folke et al 2010; Pelling 2011; Berkes and Ross 2013) is clearly dependent on the farmers' perception of change and their creativity in the combination of resources (Darnhofer 2014). In this sense, we have tried to address the SES weakness by addressing social and political processes, which are extremely important in agri-food systems research (Constance et al 2014). According to some scholars, there is frequently an apolitical understanding of SES analysis (Miller et al 2010), resulting in an heuristic appealing for thinking about human/environment dynamics, unable to unpack normative questions when applied to the social realm. In other words, the SES framework may be a potential policy tool for management under the notion of adaptive governance (Folke et al 2002; Olsson et al 2004), but it requires a shift in conceptualizing normative issues in order to include the dynamics of social change in definitions and analyses of resilience (Cote and Nightingale 2012). This implies to understand the role of agency, culture and power in transformation processes of linked social-ecological systems, a limitation to date in system centered approaches (Olsson et al 2004; Folke et al 2005; Chapin et al 2010) that need to be further explored (Westley et al 2013). Addressing these limitations is especially relevant within the alternative frame of agri-food research and management (McMichael 2000; Thompson and Scoones 2009; Patel 2012; Rivera-Ferre et al 2013). To do it, we combined the SES framework with the vulnerability framework. Resilience and vulnerability are two related approaches concerned with how systems respond to social, economic, political and environmental changes. However, each approach considers systems in quite different ways (see section 1.3 in Chapter 1). The vulnerability framework we have applied is based on an actor-oriented approach and constructivist perspective (Tansey and O'Riordan 1999; Adger 2006; O'Brien et al 2007) and thus it enables to understand within the local context the role of agency and institutional processes to respond to global drivers of change. This integration allowed us to introduce normative questions and collective action to analyse the adaptive and transformative capacities of social-ecological agri-food systems involving different sets of stakeholders at various scales, with multiple approaches to resource valuation and agency (Adger 2006; O'Brien et al 2007; McLaughlin and Dietz 2008).

The methodological framework also allow to put the focus on the analysis of the structures and 'functionality' of an institutional system, paying attention of political, historical and cultural meanings, i.e., an analysis of the process of negotiation, decision making and action that catalyze transformation (Miller et al 2010). Thus, this integrated framework allows us to analyze the ecological-biophysical and socio-political dimensions of agri-food system according to different values and worldviews of actors. To do this, methodologically, the analysis of perceptions and participatory scenario analysis have been key in our vulnerability assessment

(Ravera et al 2009; Ravera et al 2011b; Reed et al 2013). In the empirical case study, the analysis of perceptions has allowed us to prioritize the drivers of change to which the system is exposed, i.e., answer to normative questions such as *Vulnerability of what and to what*? Additionally, the introduction of actors and their values and perceptions to assess vulnerability gives emphasis to institutional changes and answers to the questions *Vulnerability for whom? At which scale?* In this sense our work contributes to operationalize the vulnerability conceptualization as a condition which includes characteristics of exposure, sensitivity and adaptive capacity (Adger 2006)[35] from a perceptive (actor-based) and context-specific perspective within the frame of agri-food research. This constructivist perspective points out that human agency and culture makes some people and places more vulnerable to, e.g. extreme events, than others even when they confront seemingly identical risks (Tansey and O'Riordan 1999; McLaughlin and Dietz 2008). And the contextual interpretation allows focusing on the institutional, social, economic, technological and biophysical conditions that affect the extent of exposure of the system to changes and the ways in which the system exposed can respond (O'Brien et al 2007). Thus, taking into account human agency, structure and environment, we have developed an integrated vulnerability approach (McLaughlin and Dietz 2008). Therefore, the vulnerability approach situates resilience in a context-specific and value-oriented frame, away from an inference resilience model where criteria are previously defined and tested. Our framework links the agri-food system components with the final outcomes of the system which are described through perceptive criteria defined within three vulnerability dimensions defined by Fraser (2007; 2011): agro-ecosystem resilience, individual socio-economic sensitivity and ability to respond to change, collective capacity to mitigate and adapt. Agro-ecosystem resilience allows to assess the extent to which the agroecosystem can tolerate climatic shocks and remain productive; individual (socio-economic) sensitivity and ability to respond to change allows to assess the extent to which households will have access to the assets needed to maintain livelihoods in the event of a variety of stresses and shocks acting on and within SESs; and collective capacity to mitigate effects of change and adapt allows to assess the extent to which institutions in society will provide effective crisis relief. Thus, the methodological link between SES and vulnerability framework for assessing agri-food system means that when an agri-food system is exposed to drivers of change (S & ECO), it reorganizes/reconfigures its components (RS, RU, GS, A), depending on both their sensitivity to exposure and adaptive

[35] Exposure is the nature and degree to which a system experiences environmental or socio-political stress. Sensitivity is the degree to which a system is modified or affected by perturbations. Adaptive capacity
is the ability of a system to evolve in order to accommodate environmental hazards or policy change and to expand the range of variability with which it can cope (Adger 2006: 270).

capacity to face the changes (figure 5.1); these reconfigurations, in turn, can be assessed using the three vulnerability dimensions proposed by Fraser (2007; 2011).

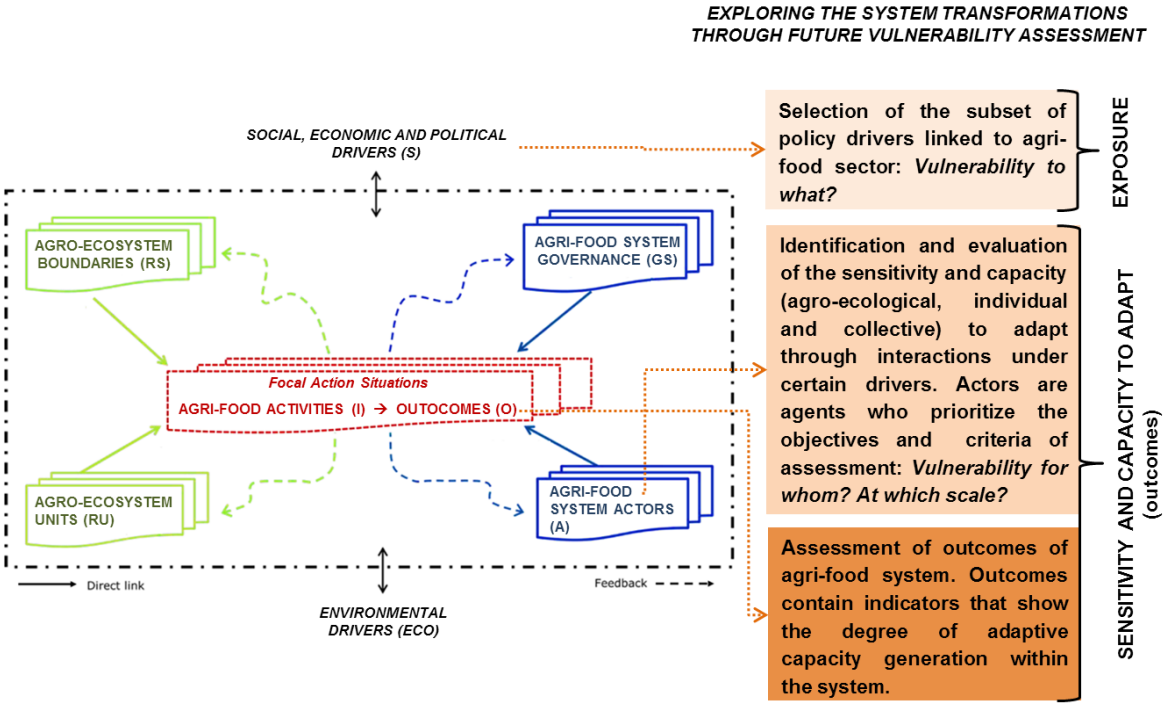

Figure 5.1 Integrated SES and vulnerability frameworks to analyze responses of agri-food systems to socio, economic, political and enviromental changes (the SES graphic is adapted from McGinnis and Ostrom 2014)

Additionally, the integrated framework of SES and vulnerability assessment (Figure 5.1) contributes to visibilize the role of collective rules for novel agri-food systems and the role of marginalized groups (in our case study: women, Andean indigenous and *mestizo* peasants) as vulnerable but also virtous actors that impulse such rules to achieve sustainable system's configurations and outcomes (Arora-Jonsson 2011). First, the SES analysis helps to clarify the mechanisms through which such groups reorganize the system through novel institutional architecture and process, challenging status quo in power dynamics. Second, giving voice to women collective agency through future vulnerability assessment process helps to catalyze processes of system self-reflection and of group learning through social networks (i.e. social learning according to Reed et al 2006 definition) as a base to develop transformative adaptation responses (Pahl-Wostl and Hare 2004; Pahl-Wostl 2009; Berkes and Ross 2013; Gabrielsson and Ramasar 2013). Additionally, the participatory scenario analysis applied to future vulnerability assessment has also demonstrated to be a useful tool that encourage complexity thinking (Ravera et al 2011a; Oteros-Rozas et al 2015; Waylen et al 2015) a key aspect of

resilience (Biggs et al 2015). By requiring participants to reflect upon and characterize agri-food system dynamics, as well as how the social and ecological components of agri-food system interact with the drivers of change, the participatory scenario analysis has enhanced participants' social-ecological understanding, and has integrated their qualitative, context-specific local knowledge of the agri-food system. Addressing the complexity of agri-food system also has enabled to address the temporal dimension of social change and to embrace the potential surprises and unexpected changes (i.e. uncertainty) of agri-food system interactions and configurations (Mollinga 2010; Biggs et al 2015). Thus, we have been able not only to study the cross-scales and cross-level interactions[36] of the agri-food system through movements across spatial, network, and institutional scales but also across temporal scales with the support of the vulnerability framework for evaluating alternative futures of agri-food systems when they are conceptualized as SES.

Given that the uncertainty of agri-food system interactions is linked to system responses to drivers of change generated from different levels and scales, the participatory scenario analysis has enabled us to work with the uncertainty of the system through the consideration of different perceptions and reflections about the future trajectories of system transformation. The participatory scenario analysis leads to a focus on plausible futures to discuss concrete actions, strategies, and policy options according to both scientific information, local knowledge, and stakeholders' perceptions of SES and its dynamics along temporal scale (Daw et al 2015).This has enabled to envision innovative strategies and opportunities for collaboration among multiple stakeholders (Butler et al 2015) in order to cope and adapt to drivers of change and achieve the desirable outcomes for local agri-food system. For example, in our case of study the *Saraguro comunas* envision the collaboration among communal council, RAL, local GADs, MIPRO and MAGAP mainly to promote the access to new markets. The *Saraguro* barrios envision the collaboration between bilingual education system and RAL mainly to strengthen the identity of the *Saraguro* people. The *mestizo* barrios envision the collaboration among diverse governmental institutions (such as GADs, MAGAP, MAE, SENAGUA, MIPRO, and IEPS), networks and community-based organizations (such as CEA and MAELA) and local public university (UNL) mainly to keep the agroecological production model and wild biodiversity.
Moreover, the participatory scenario analysis outputs, in our case study through storylines and painting, are also attractive and useful tools to engage wider sections of society (stakeholders

[36] The cross-scale and cross-level interactions include interactions between and within: temporal – spatial scales (mainly through indicators from the dimension of agro-ecosystem resilience), temporal – network scales (mainly through indicators from the dimension of individual socio-economic sensitivity and ability to respond to change), and temporal – institutional scales (mainly through indicators from the dimension of collective capacity to mitigate and adapt).

with different backgrounds), as well as to invite reflections about the future from the public (Sheppard et al 2011). Both pragmatism and creativity are fundamental to support adaptive governance and to promote resilience in complex SES as agri-food systems (Garmestani and Benson 2013).

As said above, we argue that an epistemological shift is necessary to start including issues around values, but also about power, equity and justice in system thinking, which allows us to formulate questions about which resilience and vulnerability outcomes are desirable for whom, and whether and how they are privileged more than others. Here the normative question is: "Does resilience of some dimensions may result in vulnerability of others?" and "how defining what states/thresholds are desirable, and for whom?" Agri-food systems are ideal to introduce such questions into system thinking frameworks, given the complex nature of power dynamics and equity issues they involve. For this reason, we advocate for an integration of SAF and development studies making explicit the political framework, i.e. in our case the food sovereignty framework (Windfuhr and Jonsén 2005).

From the management perspective, analyzing the active transformation within the food system, we observe that the crisis of development has generated a series of countermovements and policy proposals such as food sovereignty attempting to simultaneously reassert the value of local, agroecological foods, and challenge the attempt on the part of food corporations and national and global institutions to subject the food question to market solutions (McMichael 2000: 21). Focusing on the political paradigm of food sovereignty implies to analyze the diverse strategies to respond to drivers of change according to the social, cultural and environmental context for supporting the design of people-centered polices (Rivera-Ferre 2012; Rivera-Ferre et al 2013). Indeed, our integrated framework through its link with the food sovereignty paradigm conceives food from the narrative of human rights (UN 1948; De Schutter 2014). Food sovereignty policy proposal includes different claims such as those related to institutions and governance (McMichael 2000; McMichael 2011; Desmarais and Nicholson 2013; Holt-Giménez and Altieri 2013; McKay et al 2014), production models and knowledge (Gliessman 2002; Altieri et al 2012; Tittonell 2014) emphasizing the *diálogo de saberes* (wisdoms dialogue: traditional/ indigenous + formal knowledge; Martínez-Torres and Rosset 2014a). Therefore, the integrated framework developed can contribute to explore new ways to manage agri-food systems based on active transformation processes which include measures to increase the agroecological resilience (e.g., through the *diálogo de saberes*) and the individual and collective capacity (e.g., by considering new or alternative agri-food policies) to face drivers of change (sources of exposure) of agri-food systems.

Additionally, our integrated framework allows analyzing the agri-food system interactions linked to subaltern struggles (such as those starred by the peasant/indigenous women) around nature, human survival, health, culture and livelihood within the boundaries of the agri-food system (McMichael 2000) interested not in development alternatives but in alternatives to development (Escobar 1995). In these sense, the inclusion of place-based struggles is another main contribution of our case study in order to provide insights about the importance and impact of these movements on the management of agri-food systems under alternative policy frames. Particularly, on the basis of an active choice by the researcher, we have highlighted the role that women play in the management of agri-food system. This has been done through the analysis of intersectionality of gender (a complex interplay that cut across class, ethnic and age boundaries) and collective action of subaltern struggles (in our case study the RAL). Additionally, the results from participatory scenario analysis contribute to understand the strategies born from place-based struggles to perform a participatory policy making process to support food sovereignty. Recent research also put the attention on the link of food sovereignty, power, and resilience within development practice (Walsh-Dilley et al 2016). In this line, our results show that the pillars of food sovereignty and place-based struggles are essential to building resilience from the human and nature rights perspective within agri-food systems.

Despite the novelty and relevance of the integrated framework developed (Vallejo-Rojas et al 2015), we recognize that in its current form it still shows some important gaps which need to be addressed in the analysis of agri-food systems under the alternative frame of research and management. Next section will address some of the limitations and potential further researches.

5.1.1. Limitations and further research

A major limitation of our research is the effective lack of comprehensive inclusion of power dimensions and analysis within the integrated framework developed. Cote and Nightingale (2012) suggest that power operates in and through SESs in ways that link together the social and environmental components at conceptual and theoretical as well as empirical levels. In this sense, to perform an integration of power dimensions within the framework developed in future research we should include other theories, methods and actors.

First, in terms of theory, as mentioned by McMichael (2005) we need to address and include within the analysis of agri-food systems the dynamics of Corporate Food Regime, because it acts as a vector of the project of global development which is based on the "accumulation through dispossession". To do this is necessary to consider political economy frameworks which assume that the global agri-food system works for the benefit of the rich countries and

rich people over the poor countries and poor people (Constance et al 2014). Additionally, the inclusion of this approach implies a change in the level of analysis of agri-food systems assessments, from approaches mainly linked to farm level to approaches that also embrace the global level. Furthermore, in order to adequately capture adaptation limits, an epistemological shift in conceptualizing nature/society relations is required, in particular through a move away from attention to institutional configurations alone, and towards the processes and relations that support these structures (Cote and Nightingale 2012). In this sense, the political ecology and nature-society geographies (i.e., disciplines within development studies) provides tools for conceptualizing those dynamics (Elmhirst and Resurreccion 2008; Turner and Robbins 2008; Shove 2010). These approaches contrast with the kind of institutional economics and rational game theory that inform understandings of human action in social resilience research, which has been criticized for being too firmly rooted in a methodological individualistic approach to agency (Cleaver and Franks, 2005). In this sense, resilience scholars are mainly focused in determining ecological outcomes, paying attention to the variety of social institutional factors that give rise to the depletion or conservation of resources (e.g., Ostrom 1990; Basurto 2008; Basurto et al 2013).

Secondly, in terms of methods, in order to analyze the role of power is necessary to broaden the range of outcomes assessed. This means not only to focus on the impacts of certain institutional designs, but also on the nested political and social processes that give rise to the production and reproduction of these designs (Cote and Nightingale 2012). For example, investigate the role of corporate food regime (as SAF literature suggests) on agri-food system interactions in order to find the kind of political relations that underlie the persistence of certain policy framings and promote the accumulation through dispossession (McMichael 2005).

Thirdly, in empirical terms, our hypothesis is that the power of specific actors and institutions could determinate the configuration of agri-food system under analysis, i.e., situating it with respect to normative questions of the distribution of costs and benefits. Our study has mainly focused on the peasant/indigenous sector linked to production activities, while other powerful actors such as consumers (individual and collective forms), governmental institutions, large-scale agribusiness producers (individual and collective forms) should be included in a complex analysis of the power they exercise along the different agri-food activities. The analysis of the role of power requires the inclusion of the different set of stakeholders at various scales, each of which has multiple approaches to resource valuation and leadership), and the heterogeneous social networks of relations that underlie and shape management practices in agri-food systems (Cote and Nightingale 2012). In this same vein, the inclusion of other actors is very relevant in order to enable the analysis of more evident trade-offs among future trajectories of change (see section 4.3 in Chapter 4).

Similarly, challenging power dynamics in agri-food systems implies dealing with invisible and multilevel inequities. Carr and Thompson (2014) mention that the vulnerabilities experienced by people are shaped at the intersection of the responsibilities and expectations attached to a wide range of social differences. The homogenous categories of "men" and "women" can be problematic on multiple accounts, particularly in their failure to account for the complex interactions between gender and other forms of disadvantages based on class, age, "race"/ethnicity and sexuality (Demetriades and Esplen 2008). Therefore, the research based on binary gender categories could create situations which can potentially overlook the needs of significant portions of population more sensitive to changes and consequently it can result in maladaptive interventions that enhance, instead of ameliorate, the vulnerability of the most marginal and vulnerable in a given population (Carr and Thompson 2014). These limitations can be addressed in further research using an intersectional gender analyses within agri-food research (Nightingale 2011).

From a policy perspective it is necessary to better analyze which are the social processes that allow rethinking agri-food system management, i.e., the introduction of changes. In this sense, in future research we should focus on the social interactions taking place within the agri-food system (e.g., deliberation processes, conflicts, lobbying activities) and the underlying power relations (constraints and opportunities) involved in achieving changes in agri-food system governance. Understanding these processes could act as a context-specific guide for the articulation of different governmental levels (local to national) and diverse institutions (e.g., agricultural, environmental, industry, tourism) that support collective action initiatives (mainly from subaltern actors) to participatory policy making aiming to build food sovereignty within the territory (i.e., cross-scale and cross-level interactions between and within network, institutional and spatial scales, based on the linkage between place-based struggles and autonomous local governments). Here our hypothesis is that organized civil society initiatives (as local subaltern struggles from small producers and consumers) supported by the autonomous local governments are key to rethink local agri-food systems management.

Finally, as part of the methodological limitations associated with the empirical case study, we want to highlight that this work has not explicitly addressed other alternative approaches based on Andean perspectives and focused on the social dynamics of SES. Two main approaches should be further explored connected to our results, the *Sumak Kawsay*[37], an approach emerging from the worldview of indigenous peoples and nationalities (Gudynas and Acosta 2011; Macas

[37] In the Andean cosmovision the *Sumak Kawsay* is conceptualized as a form of community organization result from a process of millenarian social experiences of the human community in harmony with the Pachamama (mother Nature) (Macas 2014).

2014) and the *Rights of Nature*[38] an approach proposed from the sphere of politics to address the nature as a subject with intrinsic values (Gudynas 2011). Future research needs to conceptually articulate these concepts within agri-food system research under the political paradigm of food sovereignty, particularly because they are part of the constitutional level governance arrangements of Andean countries, such as Ecuador (Gudynas 2009; Acosta 2010) and Bolivia[39] (Fernandez 2009).

5.2 Empirical contributions from the case study research to Andean research

Regarding the role of **indigenous *Saraguro* culture and its institutions**, our findings contribute to *Andean* studies that show that indigenous communities and their social capital facilitate the access to other forms of capital, both directly and through engaging with State, market, and other civil society actors (Bebbington and Perreault 1999; Perreault 2003). In this sense, our empirical results show that indigenous culture facilitates the access to credit in order to mainly support livelihood strategies related to livestock. This result is corroborated by other studies on *Saraguro* culture showing that livestock ownership is (jointly with land) an indicator linked to success of local livelihoods (Belote 2002) which are mainly based on the income from selling cheese (Belote 2002; Pohle et al 2010). Also, our empirical results corroborates other findings showing that access to road infrastructure system improves the connectivity and thus, access to markets (Bernardi De León 2009); facilitating income diversification. A better connection to markets leads to the development of multiple activities because the opportunities to diversify are greater (Castaing et al 2015). Therefore the road network seems to have mixed effects (i.e., for access to markets and income diversification).

Additionally, we found no difference associated with membership to *comuna* between the *Saraguro* people. As noted by Belote (2002), *Saraguro* communities do not act as regulatory units. This can explain why this institutional factor was not significant as factor used to describe the current local agri-food system. But regarding the results about the future trajectories of transformation of agri-food systems, our empirical results from participatory scenario analysis suggest that there are differences between indigenous *comunas* and barrios (within members belonging to RAL) and their strategies to face the drivers of change. For example, regarding the commercialization policies, *comunas* scenario envisions adaptive strategies based on the role of communal council in order to achieve the access to international markets as well as to achieve a transport service to bring agri-food products to local market. In contrast, the scenario from the

[38] Provide rights to nature means that nature should be valued in itself, in independent forms of any profits or benefits to humans (Gudynas 2011); Art 71 of Ecuadorian National Constitution.

[39] At rules of constitutional level, in Bolivia has only been incorporated the Sumak Kawsay, Ecuador has incorporated both the Sumak Kawsay and Rights of Nature.

barrio people envisions adaptive strategies linked to diversification of incomes through community tourism activities. Regarding the land policies, *comunas* envision adaptive strategies based on collective decisions made in common assembly; while barrios envision adaptive strategies based on individual decisions about land titling. Regarding access to assets as agroecological training and access/rescue/revalue/maintain over time the indigenous knowledge and practices, *comunas* envision adaptive strategies based on the role of communal council and its lobbing activities with external institutions; while barrios envision adaptive strategies based on the role of bilingual education system. Additionally, regarding access to assets as credit, *comunas* envision the creation and strengthening of alternative sources of credit (e.g., "cajas solidarias"). These empirical results show the differentiated institutional role in developing strategies to address future changes of the agri-food system.

Furthermore, from a food sovereignty framework our results suggest that in the agri-food system configuration, indigenous *Saraguro* culture has a central feature in the interaction between the pillars of social organization and access to resources. This interaction could be considered as a starting point to visualize the influence of this socio-cultural factor on the other components and interactions of the agri-food system and consequently its links with other pillars of food sovereignty.

Regarding the role of **income generation**, our findings also suggest that it plays an important role on agri-food system configuration and is related with ecological, nutritional and economic components of the agri-food activities. Regarding the on-farm strategies, we confirm that the strategy of market-orientation influences on farm levels of agro-biodiversity (Trinh et al 2003; Major et al 2005). In fact, households that perform the marketing of agri-food products had higher levels of diversity in terms of total number of species (richness); and, as noted by other studies (Herforth 2010; Jones et al 2014), the high levels of crops and animal richness at the farm level was associated with high levels of dietary diversity produced. Therefore, marketing of agri-food products, through farm production diversity, has the potential to influence the diversity of household diets, an important nutrition outcome associated with the nutrient adequacy of diets and the nutritional status of individuals (Jones et al 2014). However, our results also show that households that perform the marketing of agri-food products have low scores for auto-consumption of small animals, an undesirable outcome related to consumption of nutritional foods within the pillar of right to food. This is consistent with recent studies performed in the Ecuadorian Andes (Oyarzun et al 2013; Berti et al 2014) as well as studies found elsewhere in the Andean region (Berti et al 2010). Additionally, the results also illustrate that such households have low levels of dependence of non-traditional purchased foods low in micronutrients. Since in Ecuador food consumption of low nutritional quality, especially in areas with fewer economic resources, is a public health problem (Freire et al 2013), these results

are important for understanding the potential capacity of agri-food system to meet human nutritional needs in fragile and marginal areas, i.e., contribute to right to food at household level. Finally, as mentioned in the literature (von Braun 1995; Minot et al 2006), our results support that marketing of agri-food products contributes to income diversification within the household.

Regarding the influence of off-farm work on agri-food system configurations, we find that this type of strategy supports income diversification (Ellis 1999; Ellis 2000), helping to increase farm income of rural households living at subsistence level and thus, to diversify against risk (Lanjouw 1999; Reardon et al 2001). However, it leads to a minor importance of revenue obtained from the marketing of farm products and a less dietary diversity produced which can influence food consumption at the household level (as explained above). Given that in the area the production model is intensive in labor, this lower diversification may be related with the reduction of available labor within households (Rozelle et al 1999; Pfeiffer et al 2009). Regarding the economic characteristics of the household, our results suggest that livelihood decisions are strongly affected by family land. Households with small farms are more likely to have off-farm works in order to diversify their income sources (Lanjouw 1999; Escobal 2001). In fact, land is a relevant factor for maintaining livestock, the main activity linked to on-farm income generation within the study area (Belote 2002; Pohle et al 2010).

From a food sovereignty framework our results suggest that income generation plays a central role in the interaction between the pillars of production model and right to food. This interaction could be considered as a starting point to visualize the influence of these socio-economic factors on the other components and interactions of the agri-food system and consequently its links with other pillars of food sovereignty in the agri-food system.

Regarding the role of **novel institutional architectures as RAL**, our findings contribute to studies based on the SAF research that show that the collective organization under the agro-ecological paradigm is the core on which the food sovereignty components are built (Sage 2003; Pretty and Smith 2004; Cuéllar-Padilla and Calle-Collado 2011; Rosset et al 2011; Gyau et al 2014; Simoncini 2015). In our case *RAL* facilitates access to training (through lobbying activities with the local public university) and exchange of seeds which in turn positively influences the adoption of agro-ecological production model. Previous studies, as well as our key informants, point out the key role of social organization for the adoption of agro-ecological models through the dialogue of wisdoms (*diálogo de saberes*) (Martínez-Torres and Rosset 2014b), e.g., in agroecology or farmers schools (McCune et al 2014) and/or in meetings organized by these networks as seed exchange fairs (Dusen et al 2005; Hermann et al 2009). *RAL*, under its system of collective rules, whose core is the PGS, strengthen and monitor the implementation of agro-ecological practices within farms of producers. Previous studies also

highlight the key role of PSGs to strengthen agro-ecological practices (Cuéllar-Padilla and Calle-Collado 2009; MAGAP 2012).

RAL also increase the importance on-farm incomes; the access to markets may explain the diversification of income due to on-farm activities within *RAL* households. In fact, it is one of the pillars more strengthened by *RAL* through performing lobbying activities with the municipality (Vallejo-Rojas et al 2015). Other Ecuadorian agro-ecological networks (Chauveau et al 2010; MAGAP 2012; Proaño and Lacroix 2013) also have achieved these desirable outcomes within distribution activities. Regarding eating habits at the household level, our results show the importance of access to training by *RAL* through performing lobbying activities with the NGOs. But our key informants also highlight the roles played by the collective rules and social ties built by *RAL*. Collective rules from *RAL* influence on decision making within households, these rules establish that the food production must be focused firstly to meet household nutritional needs; therefore, marketing of agri-food products goes to second place. The latter is relevant because it would involve avoid the undesirable levels of indicators linked to the strategy of marketing agri-food products within pillar of right to food as those related to low levels of self-consumption (explained above). Additionally, social ties strengthen the exchange of knowledge in the gastronomic and nutritious fields. Previous studies also highlight the role of social networks as determinants of consumer habits (Fonte 2013; Williams et al 2015). Moreover, the relation of *RAL* with services exchange is an important aspect within the Ecuadorian Andean communities, where these forms of exchange become increasingly scarce (Martínez 2002). Reciprocity contributes to the development of long-term obligations between people, which is an important part of achieving positive environmental outcomes in agri-food systems (Pretty and Smith 2004). Previous studies, as well as our key informants, indicate that these exchanges are mainly related to activities within the farm (e.g., planting, harvesting) (Martínez 1996; Gray 2009).

Additionally, regarding the results about the future trajectories of transformation of agri-food systems, our empirical results from participatory scenario analysis suggest that RAL explicitly plays a central role for some adaptive strategies. For example, within strategies linked to commercialization policies, RAL envisions the participation within the policy making processes linked to small farmer policies. Within strategies linked to food safety, RAL envisions the coordination with the Ecuadorian Coordinator of Agroecology (CEA), in order to develop and achieve the approval (i.e., legitimation by the state) of a manual of good farming practices. Within strategies linked to access to assets, RAL envisions the maintaining the coordination with the local university for training in the agroecological production models; an adaptive strategy that also helps to face the environmental changes, through the implementation/strengthening/ maintenance over time of agricultural practices such as

performing ditches, planting in terraces, planting live fences, the implementation of agroforestry and silvopastoral systems, and reforestation with native trees. Additionally, regarding the access to financial sources, RAL envisions the creation/strengthening of alternative sources of credit (e.g., "fondo al compartir" to give microcredits within the RAL). Within strategies linked to changes in identity and local knowledge, RAL envisions the support the organizational process and keep the agro-ecological vision in order to encourage the RAL grow (through the incorporation of new members). Within strategies linked to changes in consumption habits by urban consumers, RAL envisions the sensitization of urban consumer through agro-ecological events and sharing information about the nutritional properties of agro-ecological and Andean products; a relevant adaptive strategy to link agri-food system actors (in this case producers with consumers).

From a food sovereignty framework these results suggest that RAL's collective rules play a central role in the interaction between the pillars of social organization and agri-food policy (mainly to mediate the access to markets and training). This interaction could be considered as a starting point to visualize the influence of this institutional factor on the other components and interactions of the agri-food system and consequently its links with other pillars of food sovereignty.

Although it was not possible to establish a quantitative relationship between **women** involvement in decision making and main tasks of agriculture with the adoption of agro-ecological practices and other components of agri-food activities as shown in the literature (e.g., Quisumbing et al 1995; Quisumbing et al 2015; Dinis et al 2015), we have to remark that the majority of *RAL* members are women. Thus, our observations can be reframed within the feminist political ecology research that see gender as salient within policy and practice across a variety of scales, and within institutions central to natural resource governance (Resurreccion and Elmhirst 2008). In this sense, the adoption of an agro-ecological production model is due to the existence of a collective agency built by RAL. Women grouped by *RAL* jointed their efforts, independently on ethnic and class divisions, and through their rules (at collective level) have achieved the successful adoption of the agro-ecological production model (at farm level) and the access to local markets (at collective level) by performing lobbying activities with government and nongovernment organizations. Also, they demonstrated an increase of self-esteem and economic independence (at individual level). These results confirm other studies focused on collective agency and women (Gabrielsson and Ramasar 2013). Recent Ecuadorian Andean studies (Cole et al 2011) also suggest that greater understanding among women of crop management options and more equal household gender relations are associated with less use of conventional practices. Additionally, regarding the results about the future trajectories of transformation of agri-food systems, our empirical results from participatory scenario analysis

suggest that a relevant adaptive strategy linked to changes in consumption habits at household level is starring by women, sensitization of children about the importance of healthy and culturally appropriate food.

In sum, our empirical contributions suggest that there are some food sovereignty pillars comparatively weakest and therefore need to be strengthened during the policy making process, particularly within the Andean context, as also suggested by other Andean studies (Berti et al 2010; Freire et al 2013; Oyarzun et al 2013; Berti et al 2014), such as the pillar of right to food. In parallel, the pillar of right to food is interrelated to other pillars as access to resources (such as land, training) and social organization, as we described previously. In this context, our results suggest that in order to strengthen the pillar of right to food (and consequently its interrelated pillars) the policy makers should focus on the novel institutional architectures as RAL. If the government decide to put resources to generally improve the nutrition and health levels of population investing in programs in collaboration with agroecological networks is likely to have the broadest and greatest impact on consumer habits at household level within the rural sector. Therefore, interventions need to include programs to enhance the role of formal and informal organizations, both from peasants and indigenous communities. Trough strengthening the social organization, as our results suggest, not only the pillar of the right to food will be enhanced but also the pillars of agro-ecological production model, local markets and agri-food policies (e.g., by strengthening current processes based on lobbying with government organizations to address marketing issues). Therefore, our results suggest that local social organization is perhaps the best way to achieve the active transformation (i.e., introduced deliberately by the agri-food system actors) of agri-food system to manage the future trajectories of agri- food system within the local territories. In fact, our results suggest that having a national favorable policy environment does not guarantee the food sovereignty of people at the local level. We argue that food sovereignty policy requires a close link between social organization (place-based subaltern struggles) and its participation in decision making process (a link that can be encouraged through the implementation and exercise of public policies that strengthen citizen participation)
Previous Andean studies also addressed the role of institutions in the analysis of agri-food activities. For example, Thiele et al (2011) highlight the role of multi-stakeholder platforms to link small farmers to urban markets and agro-industry at local level. Gómez-Vargas and Giraldo Calderón (2014) describe the analysis of networks of actors as a mean to address food security at local level. From the food sovereignty lens, Marti and Pimbert (2006) highlight the role of barter markets as community-based institutions to ensure food supply (taking into account the quantity, quality and nutritional level) at family level. Ecuadorian studies have been focused in the role of peasants, indigenous and other social movements on food sovereignty

institutionalization at national level (Peña 2013; Giunta 2014). A recent research describes the aspects linked to food sovereignty principles that have contributed to success within a group of cacao producers at local level (Cevallos 2013). However, until now there is not a tool to analyze food sovereignty and its dimensions (social, political, environmental) of agri-food systems as socio-ecological systems. The application of complex system thinking is necessary and relevant in order to describe and assess the cross-scale and cross-level interactions among social and ecological components, and to identify and understand the food sovereignty pillars within the agri-food systems. It also enables to analyze the role of traditional and new forms of organizations in agri-food system interactions. As our empirical results shown, this type of assessment allows to determine starting points to visualize the influence of social and/or institutional factors on the other components and interactions of the agri-food system and thus its links with other pillars of food sovereignty. Consequently, these starting points help to link the assessment with management of agri-food systems, and thus, again, management influences the practices taking place on the farm. Thus, our integrated framework and its results have the capacity to link the assessment, management and practices of agri-food systems (Rivera-Ferre 2012).

5.3. Suggestions for policy making of the local Andean agri-food system

Within the scope of Ecuadorian public policies is necessary to strive for strengthening the pillars of food sovereignty. Regarding the historical process of building agri-food policies, the role of the State has traditionally been focused on the agro-export model, in detriment of peasant and small-farmers agriculture (Rosero et al 2011 & Table 1.4),. As a response to this, local peasant and subaltern movements (starred mainly by women) for agroecology and food sovereignty are moving in this direction (e.g., Heifer 2008; Chauveau et al 2010; CAN 2011; Galarza et al 2012; Borja et al 2013; Proaño and Lacroix 2013; Soliz et al 2013; Heifer 2014; Solís and Casarín 2015). The implications of such directions for policy and other forms of action are evident, for example through the linkage between local movements and local administrations. This is particularly important in those governmental institutions that have competences linked to the food sovereignty policy proposal (Art. 281 of National Constitution, Asamblea Nacional 2008; LORSA[40], Asamblea Nacional 2009), especially since the enactment of the Organic Code of Territorial Organization, Autonomy and Decentralization (COOTAD; Asamblea Nacional 2010a). This law has granted new powers to the currently called GADs: Decentralized Autonomous Governments, governments located at *parroquial* (parish), municipal, provincial and regional levels. These institutions through the enactment of

[40] Acronym (in Spanish) of Organic Law of Food Sovereignty.

ordinances, agreements and resolutions (developed with the participation of civil society) can achieve the materialization of this linkage (local movements – local administrations) to support the food sovereignty within Ecuadorian territory. Additionally, it is important to create spaces for the continued emergence of collective action movements, such as peasants, indigenous, women, small-farmer and/or consumer movements. Within the scope of the food sovereignty this is a strategy to promote equity between rural and urban areas (Art. 281.10 of National Constitution). In this sense, the recent Organic Law of Citizen Participation (LOPC; Asamblea Nacional 2010b) offers the legal framework to support citizen participation in decision-making processes within all levels of government established in the Constitution in order to facilitate citizen empowerment, as mentioned by the Art. 95 of National Constitution (Asamblea Nacional 2008).

In the following paragraphs we discuss how different components of SES, categorized through the pillars of food sovereignty, interact in our empirical case study along the different agri-food system activities with policy environment.

Regarding **production activities**, the adoption of the agroecological production model is favored by training showing the linkages between the pillars agroecological production model, social organization and agri-food policies. In this sense, our results show the importance of developing public policies focused in supporting programs for training in agroecology; these strategies could act as incentives for adoption of agroecological production models (supported by Arts. 281.3 & 281.7 of National Constitution; and, Arts. 13.d & 14 of LORSA). Additionally, the future trajectories of agri-food system transformation suggested that training in agroecology has a key role in developing strategies to face environmental changes (supported by Arts. 14, 409 & 410 of National Constitution). However, our results also show that training should be extended to other areas beyond the production subject, to embrace issues such as gender-related dynamics (supported by Arts. 11.2, 57.10, 66.3, 70, 324, 331, 333, 334.2, 363.6 of National Constitution; and, Art. 3.f & 4 of LORSA), e.g., gender violence[41], self-esteem, in order to achieve desirables outcomes within the local agri-food system. Within this scope, our results suggest that the spaces of social organization, in our case those generated by RAL, promote positive outcomes related to self-esteem and development of communication skills among women. The relationship found between the production model and health status of RAL households (linkage between pillars agroecological production model – right to food), a key nexus to future trajectories of local agri-food system transformation[42], shows that the implementation of public policies encouraging agroecological production is relevant. These

[41] This issue is especially relevant in Ecuador given that 6 of 10 women have been victims of gender violence (psychological, physical, patrimonial and / or sexual) at some point in their lives (SENPLADES 2013: 116).

[42] Nexus shown during the analysis of indicators of participatory scenarios (see Chapter 4).

policies can support food sovereignty and generate quality jobs[43] (SENPLADES 2013: 69). Moreover, taking into account the relationship between access to credit and access to other production factors (e.g., cattle[44]) (pillar of access to resources), the implementation of public policies focused on the democratization of the access to financial services (supported by Arts. 281.5, 330 & 334.5 of National Constitution; and, Arts. 12 – 20 of LORSA) is also relevant. Regarding the access to production factors, it is also important that public policies take into account the gender perspective. For example, in Ecuador, women are generally linked to subsistence small-scale production systems (production for home consumption) and domestic consumption (within national territory). From the total of Agricultural Production Units (APU) handled by women, 46.6% has an extension lower that 1 ha and 16.1% has an extension lower that 2 ha, i.e., that 62.8% of women produce in UPAs lower that 2 ha (SENPLADES 2014: 118). These data reflect the need to address the discrimination structures against women within the productive sector. Additionally, taking into account the future trajectories of agri-food system toward desirable outcomes, our results suggest that is necessary to strength the initiatives and strategies pertaining to the social and solidarity economy (supported by Arts. 283, 311 & 319 of National Constitution; and, the LOEPS[45]), e.g., strategies such as the "fondo al compartir" to give microcredits within the RAL, or the "cajas solidarias" as alternative financial sources within indigenous comunas (linkages between pillars social organization – access to resources). These mechanisms could offer the access to financial services to peasants, especially rural women, in order to support their autonomy and economic independence. Finally, taking into account the relationship between the number of seed exchanges and the crop richness (linkage among pillars social organization – agroecological production model – access to resources), the implementation of public polices focused on strengthening these exchange spaces to keep the agrobiodiversity and associated ancestral knowledge (supported by Arts. 57.12, 71, 281.6, 385.2 & 400 of National Constitution; and, Art. 7 & 8 of LORSA) is relevant.

Regarding the **transformation activities**, our results suggest that future trajectories of agri-food system towards desirable outcomes involve training related to food handling processes for artisanal processing as well as to diversify the production of artisanal agri-food products (linkage among pillars agri-food policies – agroecological production model – right to food) (supported by Art. 281.1 of National Constitution; and, Art. 3.c, 13.h & 25 of LORSA).

Regarding the **distribution activities**, our results suggest that the access to local markets is related to the importance of on-farm incomes (linkage among pillars agri-food policies –local markets – access to resources – agroecological production model), shows the relevance of

[43] Especially due to the reduction of occupational hazards related to the use of harmful agrochemicals.
[44] Variable "Number of cattle" (see Chapter 3).
[45] Acronym (in Spanish) of Law of Popular and Solidarity Economy.

implementation of public policies focused on access to local markets and fair trade (supported by Arts. 281.10, 281.11, 304, 335, 336 and 337 of National Constitution; and, Arts. 21 – 23 of LORSA). Furthermore, future trajectories of agri-food system transformation toward desirable outcomes involve deploying strategies based on participatory processes (taking into account the peasant and indigenous people and their diverse forms of collective organization), especially for these policies related to rural and agri-food systems aiming to support food sovereignty. In this sense, our results suggest that the access to local market and fair trade are linked to positive outcomes connected to economic independence mainly by women. This example emphasizes, once again, the importance of gender mainstreaming in agri-food policies.

Regarding the **consumption activities**, our results suggest that training is linked to consumption habits[46] (linkage between pillars agri-food policies – right to food). This shows the importance of the implementation of agri-food polices focused to incentive the consumption of agroecological nutritious foods by conducting promotional and educational programs on consumption habits linked to nutritious and healthy eating (supported by Arts. 13 & 281.13 of National Constitution; and, Arts. 3.d, 27, 28 & 30 of LORSA). These policies, which are complementary to those supporting agroecological commercialization, can strengthen the strategies built by peasant organizations (e.g., agro-ecological events, sharing information about the nutritional and medicinal properties of Andean products) in order to sensitize urban consumers (linkage between pillars agri-food policies – social organization) to achieve an active transformation that link all agri-food activities. Future trajectories of agri-food system show that in the private domain, women have some related activities. This linkage (right to food – gender) highlights the need for public policies that recognize care activities, unpaid work and rural subsistence activities (supported by Art. 34 & 333of National Constitution) in order to achieve desirable outcomes within the consumption activities. These policies are particularly relevant given the problem of chronic malnutrition affecting nearly one of four children under five years; a problem that causes an irreversible reduction in their school performance and future job; a problem that within indigenous Andean households has a greatest intensity (SENPLADES 2013: 65).

In this way, the analysis of the empirical case study has allowed us to move from the theoretical and conceptual vision of agri-food system analysis towards the praxis (through the analysis of agri-food system interactions) for policy making process under the political paradigm of food sovereignty. The materialization within the territory of the suggestions derived from our results

[46] In our case it expressed through proxy variable "Dependence of non-traditional/ non-nutritional foods" (see Chapter 3).

(outlined above) can be performed using the mechanisms of citizen participation[47]. For example, occupying the space of the "silla vacía" (empty chair) during the GAD sessions (Art. 77 of the LOPS) in order to exercise the right to participate in the discussion and decision-making related to management policies for the agri-food systems within local territories (also supported by Art. 31 of LORSA). Recently, this mechanism has been used by the Saraguro people to participate in the approval of an ordinance that supports agroecological commercialization within the Saraguro canton. In the Loja province this is the first ordinance closely related to food sovereignty that has been approved with active citizen participation (Koldo Etxarri, personal communication, February 02, 2016). In our empirical case study, taking into account the existing linkages (through interactions of lobbying activities) between the RAL with the municipal GAD of Loja and the local public university, the mechanisms of citizen participation could be used by local movements to promote the implementation of ordinances, focusing initially on those related to support the agroecological commercialization and fair trade, the public procurement (supported by Arts. 281.14 & 288 of National Constitution; and, Arts. 14 and 30 of LORSA), and the participatory scientific research and technological innovation[48] (based on *Diálogo de saberes*) for food sovereignty (supported by Arts. 15 & 281.8 of National Constitution; and, Arts. 9, 10 & 11 of LORSA).

[47] Citizen participation mechanisms are instruments, by which the citizens can participate, individually or collectively, for the management of public affairs at all levels of government established within the Constitution and the Law. For example, they include: public hearings, popular councils, the empty chair, citizen oversight, advisory councils, prior consultation, the referendum, mandate revocation, among others (Asamblea Nacional 2010b).

[48] For example, research and discussion about the benefits of developing agroecological crops to increase crop yields (SENPLADES 2013: 77).

CONCLUSIONS

Regarding the study of agri-food system:

- Situating the study of agri-food systems within the alternative frame implies recognizing the interaction between the epistemic (the way knowledge is created, linked to the domain of science) and normative (values, linked to domain of policy) aspects of agri-food assessments. This bridge is necessary to move from descriptive to prescriptive approaches.
- Socio-ecological system (SES) framework allows conceptualizing the agri-food system as SES. Vulnerability framework complements this analysis through the introduction of perceptive (actor-based) and context-specific perspective within the agri-food assessments
- The integration of SES and vulnerability frameworks allows addressing systematically the study (domain of science) and management (domain of policy) of agri-food system. This theoretical and methodological integration allows addressing the agri-food system assessment under the food sovereignty definition and framework (explicitly political) within the local territories
- Addressing the uncertainty of agri-food system implies recognizing the complexity of interactions that take place between the system components and drivers of change within the boundaries of agri-food system. These interactions lead to outcomes which can be desirables or not according the perceptions of agri-food system actors
- Using participatory scenario analysis allows actors to advance surprises and unexpected changes through the reflection about the future trajectories of the system and the design of differentiated strategies to cope and adapt to changes according to context-specific agro-ecological, socio-economic and institutional components of the target area/sector of research
- The inclusion of collective action from subaltern struggles (representing the vulnerable actors) within the study of agri-food systems allows establishing a link between agri-food research and political ecology. Their inclusion leads to expand the scope of the agri-food research to embrace the role of power of actors and institutions to determine the agri-food system configuration

Regarding agri-food system management:

- The food sovereignty pillars and gender are transversal elements within the agri-food system. This point shows that the management of the agri-food system requires strategies, projects and policies based on the articulation among diverse government institutions at different government levels taking into account gender mainstreaming
- The food sovereignty pillars together with the agri-food system interactions link the different spatial and temporal scales that characterize the agri-food system. This point shows that the management of the agri-food system requires strategies, projects and policies to medium and long terms
- Food sovereignty mainly stems from social organization within local territories (place-based struggles). This point shows that agri-food system management requires strategies, projects and policies that favor the social organization and citizen participation within decision making process
- In order to avoid that food sovereignty institutionalization turns into a coopted process (which decrease its transformative potential) or an instrument for forced transformations (i.e., imposed transformation); it is necessary that the strategies, projects and policies tend to maintain (give leeway) the autonomy of social organization
- In order to design public policies and legal frameworks our results suggest that there are others issues that national public policy should support to foster the food sovereignty to future agri-food system management at local levels, such as the policy decision making from the local agroecological farmer organizations, the indigenous communal councils, and the education policy sector like the bilingual education system
- Our results suggest that having a national favorable policy environment does not guarantee the food sovereignty of people at the local level. The case study suggests that in this specific context, collective action (pillar of social organization) has been important to lobby at the local level and change municipal normative that have favored the access to local markets (pillar of local markets) and access to training (pillar access to resources). This way of management could become a tool for active transformation (i.e., introduced deliberately by the agri-food system actors) of agri-food system to manage the future trajectories of agri- food system within the local territories

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Celebration with Andean foods, Saraguro indigenous commune "Pueblo viejo" (2015). Photo by author.

"*La soberanía alimentaria tenemos que entender que son productos sanos, saludables, de la vida para la vida*"

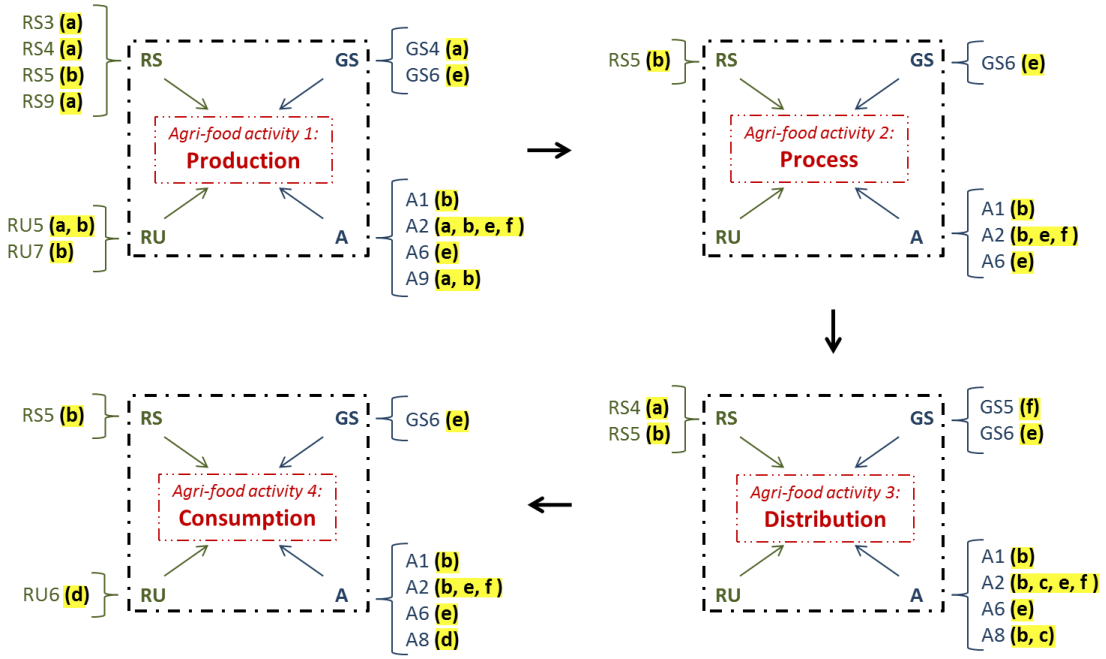
(*Saraguro* indigenous man, local leader of the rural parish *San Lucas*)

List of Acronyms

Acronym	Description
AAM	Alternative Agrifood Movements
ACOSL	Corporación Andina de Organizaciones Sociales de Loja
APU	Agricultural Production Units
CAFOLIS	Centro Andino para la Formación de Líderes Sociales
CEA	Coordinadora Ecuatoriana de Agroecología
CEPAL	Comisión Económica para América Latina y el Caribe
CLADES	Consorcio Latinoamericano de Agroecología
CLOC	Coordinadora Latinoamericana de Organizaciones del Campo
CNC-EA	Coordinadora Nacional Campesina Eloy Alfaro
CODENPE	Consejo de Desarrollo de las Nacionalidades y Pueblos Indígenas del Ecuador
CONAIE	Confederación de Nacionalidades Indígenas del Ecuador
CONFEUNASSC-CNC	Confederación Nacional del Seguro Social Campesino- Coordinadora Nacional Campesina
COOTAD	Código Orgánico de Organización Territorial, Autonomía y Descentralización
COPISA	Conferencia Plurinacional e Intercultural de Soberanía Alimentaria
CORPUKIS	Coordinadora del Pueblo Kichwa Saraguro
CTE	Confederación de Trabajadores del Ecuador
ECUARUNARI	Ecuador Runacunapac Riccharimui
EU	European Union
FAO	Food and Agricultural Organization
FEI	Federación Ecuatoriana de Indios
FEINE	Consejo de Pueblos y Organizaciones Indígenas Evangélicas del Ecuador
FENACLE	Federación Nacional de Trabajadores Agroindustriales, Campesinos e Indígenas Libres del Ecuador
FENOCIN	Confederación Nacional de Organizaciones Campesinas Indígenas y Negras (Formerly known as FENOC: Federación Nacional de Organizaciones Campesinas)
FEPROCOL	Federación Provincial de Comunas de los pueblos Paltas
FIAN	FoodFirst Information and Action Network
FIIS	Federación Interprovincial de Indígenas Saraguro
FUPOCS	Federación Unitaria Provincial de Organizaciones Campesinas y Populares de Sur
GAD	Gobierno Autónomo Descentralizado
GMO	Genetically Modified Organisms
HEIFER	Fundación Heifer - Ecuador
IAASTD	International Assessment of Agricultural Knowledge, Science and Technology for Development
IDB/BID	Inter-American Development Bank
IEE	Instituto de Estudios Ecuatorianos
IEPS	Instituto Nacional de Economía Popular y Solidaria
IERAC	Instituto Ecuatoriano de Reforma Agraria y Colonización
INAMHI	Instituto Nacional de Meteorología e Hidrologí
INDA	Instituto de Desarrollo Agrario
INEC	Instituto Nacional de Estadística y Censos
INPC	Instituto Nacional de Patrimonio Cultural
LOEPS	Ley Orgánica de Economía Popular y Solidaria
LOPC	Ley Orgánica de Participación Ciudadana

Acronym	Description
LORSA	Ley Orgánica del Régimen de Soberanía Alimentaria
MAE	Ministerio del Ambiente
MAELA	Movimiento Agroecológico Latinoamericano y del Caribe
MAGAP	Ministerio de Agricultura, Ganadería, Acuacultura y Pesca
MESSE	Movimiento de Economía Social y Solidaria del Ecuador
MIPRO	Ministerio de Industrias y Productividad
MPD	Movimiento Popular Democrático
NGO	Non-Governmental Organizations
PCE	Partido Comunista del Ecuador
PGS	Participatory Guarantee System
PRAT	Programa de Regularización y Administración de Tierras Rurales
PRONACA	Procesadora Nacional de Alimentos
PSE	Partido Socialista Ecuatorian
RAA	Red Agroecológica del Austro
RAL	Red Agroecológica de Loja
RDA	Redundancy analysis
SAF	Sociology of Agriculture and Food
SENAGUA	Secretaría del Agua
SENPLADES	Secretaría Nacional de Planificación y Desarrollo
SES	Socio-Ecological System
SINAGAP	Sistema de Información Nacional de Agricultura, Ganadería, Acuacultura y Pesca
SIPAE	Sistema de Investigación sobre la Problemática Agraria del Ecuador
U.S.	United States of America
UCOCP	Unión Cantonal de Organizaciones Campesinas de Paltas
UN	United Nations
UNL	Universidad Nacional de Loja
UPML	Unión Popular de Mujeres de Loja
VECO	VECO - Andino
WTO	World Trade Organization

Appendixes



Appendix 2.1 Illustration of agri-food activities and their relations with food sovereignty pillars using Ostrom's framework.

The scheme shows that the pillar (a) access to resources is related to production and distribution activities; the pillar (c) local markets is related to distribution activities; the pillar (d) right to food is related to consumption activities; while, the pillars (b) production model, (e) social organization and (f) agri-food policies are related to all agri-food activities.

Notes: **RS**=Agro-ecosystem boundaries; RS3=Size of resource system; RS4=Human-constructed facilities; RS5=Productivity of system; RS9=Location. **RU**=Agro-ecosystem units; RU5=Number of units; RU6= Distinctive characteristics; RU7=Spatial and temporal distribution. **GS**=Agri-food governance system; GS4=Property-rights systems; GS5=Operational-choice rules; GS6=Collective-choice rules. **A**=Agri-food system actors; A1=Number of relevant actors; A2=Socioeconomic attributes; A6=Social capital; A8=Importance of resource; A9=Technology used. Food sovereignty pillars: (a) Access to resources. (b) Production model. (c) Local markets. (d) Right to food. (e) Social organization. (f) Agri-food policies.

Appendix 2.2 Selected indicators for the description of the food sovereignty pillars within agri-food system using the SES framework

Food sovereignty pillars	Categories	Indicators of food sovereignty	Correspondence with the second-tier of SES framework
(a) Access to resources	*a.1 Infrastructure and basic services*	Access to main roads paved (yes/no)	RS4; I= P, D
	a.2 Land	Size of farm (ha)	RS3; I= P
		Land titling (yes/no)	GS4; I= P
		Way of land access (inheritance/ purchase/ landless)	GS4; I= P
	a.3 Animals	Number of cattle (number)	RU5; I= P
	a.4 Water and irrigation	Rainfall pattern (mm)	RS9; I= P
		Access to irrigation systems (yes/no)	RS4; I= P
	a.5 Seeds	Native seed crops (%); Modern seed crops (%)	A9; I= P
	a.6 Credit	Access to credit (yes/no)	A2; I= P
(b) Production model	*b.1 Population and occupation*	Household size (number)	A1; I= C
		Labor force HH size (number people in working age)	A1; I= P, T, D, C
		Off-farm works (yes/no)	A2; I= P, D
		Gender of who performs the work activities (female/male)	A2; I= P, T, D, C
	b.2 Land use	Cropped area (%); Pasture area (%); Forests (%)	RU7; I= P
	b.3 Production	Crop yield(t); Milk yield(l) & Processed dairy(kg)	RS5; I= P, T, D, C
	b.4 Agricultural inputs	Use of chemical inputs (yes/no); Use of ethno-veterinary practices(yes/no)	A9; I= P
	b.5 Economic characteristics	Income diversification (number)	A8; I= D
		Importance of on-farm incomes (% from income diversification)	A8; I= D
	b.6 Production diversification	Richness of farmed species (number); Type of small bred animals (number)	RU5; I= P
	b.7 Agroecology	Use of organic control (yes/no)	A9; I= P
(c) Local markets	-	Marketing of agri-food products (yes/no)	A2; I= D
		Dependence on middleman to marketing (yes/no); Frequency of selling (times per week)	A8; I= D, I4
(d) Right to food	*d.1 Dietary composition*	Dietary diversity produced (number)	RU6; I= C
	d.2 Culturally appropriate foods	Importance of traditional foods (frequency of consuming: times per week); Dependence of non-traditional foods (frequency of consuming: times per week)	A8; I= C
	d.3 Self-consumption	Importance of agri-food products for HH consumption (proportion of food for: consumption/ selling/both)	A8; I= C
(e) Social organization	-	Participation in community works: *mingas* (yes/no) Participation in exchanges of: services and/or goods (e.g., seeds, food) (yes/no)	A6; I= P, T, D, C
		Member of peasant (and/or agroecological) associations (yes/no)	GS6; I= P, T, D, C, I2, I6, I9
		Member of indigenous culture (indigenous self-identification: yes/no)	A2; ; I= P, T, D, C, I2, I5, I6
(f) Agri-food policies	-	Access to retailing location in local markets (yes/no)	GS5; I= D, I4, I6
		Training (yes/no)	A2; I= P, T, D, C, I6

Notes: **RS**=Agro-ecosystem boundaries; RS3=Size of resource system; RS4=Human-constructed facilities; RS5=Productivity of system; RS9=Location. **RU**=Agro-ecosystem units; RU5=Number of units; RU6= Distinctive characteristics; RU7=Spatial and temporal distribution. **GS**=Agri-food governance system; GS4=Property-rights systems; GS5=Operational-choice rules; GS6=Collective-choice rules. **A**=Agri-food system actors; A1=Number of relevant actors; A2=Socioeconomic attributes; A6=Social capital; A8=Importance of resource; A9=Technology used. **I**=Agri-food activities and other interactions; P=Production; T=Process (or transformation); D=Distribution; C=Consumption; I2=Information sharing; I4=Conflicts; I5=Investment activities; I6=Lobbying activities; I9=Monitoring activities.

Appendix 2.3 List of key informants

Code	Name of organization	Type of organization	Jurisdictional Level
I-MA-1	Movimiento Agroecológico de América Latina y Caribe (MAELA) & Red Agroecológica Loja (RAL)	GS2: Peasant organization	Regional & provincial
I-FEN-1	Federación Nacional de Organizaciones Campesinas e Indígenas (FENOCIN)	GS2: Peasant organization	National
I-RAL-1	Red Agroecológica Loja (RAL)	GS2: Peasant organization	Provincial
I-ASON-1	"Amigos de la Naturaleza" association	GS2: Peasant organization	Local
I-ASOR-1	"San Antonio" association & Red Agroecológica Loja (RAL)	GS2: Peasant organization	Local
I-COM-1	Comuna "Pueblo Viejo"	GS2: Indigenous organization	Local
I-COM-2	Comuna "Ramos"	GS2: Indigenous organization	Local
I- GADM-1	Autonomous decentralized government (GAD) of canton of "Loja"	GS1: Government organization	Cantonal
I-GADP-1	Autonomous decentralized government (GAD) of rural parish of "San Lucas"	GS1: Government organization	Local
I- GADP-2	Autonomous decentralized government (GAD) of rural parish of "San Lucas"	GS1: Government organization	Local
I-UNL-1	National university of Loja (UNL)	GS1: Academy	Provincial
I-NGO-1	Heifer	GS2: Non-government organization	International
I-NGO-2	Intercooperation	GS2: Non-government organization	International
I-NGO-3	Movimiento de Economía Solidaria, MESSE	GS2: Non-government organization	National

Notes: GS=Agri-food governance system; GS1 = Government organizations; GS2 = Non-government organizations

Appendix 2.4 Initial information about current drivers of change identified by the key informants that influence the agri-food system of the empirical case of study

Drivers of change prioritized				Linking impacts on food sovereignty & vulnerability	
Perceptions	**Effect**	**Scale & level of driver**	**Key informants**	**SES variables & food sovereignty indicators**	**Vulnerability linkage**
Agri-food policies					
#1: Current international policies as the trade agreement with the European-Union will affect peasant producers, mainly those involved in livestock production. Additionally, current implementation of national policies related to good manufacturing practices threatens the artisanal process used by local peasants to produce dairy.	(-)	Jurisdictional: international, national	I-MA-1 I-RAL-1	RS5- Milk yield & Processed dairy A8- Income diversification A8- Importance of on-farm incomes	The incomes from livestock activities can be diminished (Individual capacity dimension)
#2: Current governmental projects have a favorable vision to training in conventional agriculture (using chemical inputs). Therefore, there is a contradiction between the agricultural national projects and the policy model proposed by the National Constitution (based in the *sumak kawsay* and food sovereignty).	(-)	Jurisdictional: national	I-MA-1 I-FEN-1 I-RAL-1 I-ASOR-1 I-GADM-1 I-GADP-1 I-UNL-1 I-NGO-1 I-NGO-2 I-NGO-3	A2- Access to training A9- Use of chemical inputs in crops	The traditional agro-ecological practices can be lost The income diversity from productive activities on-farm can be diminished (Agro-ecosystem resilience & Individual capacity dimensions)
#3: Current governmental policies have a favorable vision to future introduction of GMO.	(-)	Jurisdictional: national	I-MA-1 I-RAL-1	A9- Use of native seed in crops A9- Use of modern seed in crops	The seed autonomy can be diminished (Individual capacity dimension)
#4: Current constitutional laws and programs from MAGAP support the legalization of land. However it is also a control mechanism for the collection of taxes.	(+/-)	Jurisdictional: national	I-COM-1 I-COM-2 I-ASOR-1 I-ASON-1	GS4-Land title A8- Income diversification A8- Importance of on-farm incomes	The access to public credit can be increased The incomes can be diminished (Individual capacity dimension)
#5: Policies from private financial entities condition the access to credit to the	(-)	Jurisdictional: national - provincial	I-RAL-1 I-ASOR-1 I-GADP-1 I-NGO-2	A2- Access to credit A9- Use of agro-ecological	The traditional agro-ecological practices can be lost The access to

Drivers of change prioritized				Linking impacts on food sovereignty & vulnerability	
Perceptions	**Effect**	**Scale & level of driver**	**Key informants**	**SES variables & food sovereignty indicators**	**Vulnerability linkage**
use of technology packages. Additionally, national policies from state financial entities do not assign the public budget to production issues related to peasant agriculture. In turn the public budget is focused to the agro-export model.				practices (organic control, ethno-veterinary)	financial resources can be limited (Agro-ecosystem resilience & Individual capacity dimensions)
#6: Current municipal policies related to access to markets do not consider the strengthening of free fairs. Now, there are few free fairs. Additionally, there are many conflicts to access markets. This encourages selling through middlemen.	(-)	Jurisdictional: cantonal	I-GADP-1 I-ASOR-1 I-ASON-1 I-COM-1	GS5- Access to a retail location in local markets A8- Income diversification A8- Importance of on-farm incomes	The incomes from selling agri-food products can be diminished (Individual capacity dimension)
#7: Regarding the production strategies there is increased use of agrochemicals in the canton of Loja. This may be strengthened by current policies based on technological packages.	(-)	Jurisdictional: local	I- GADM-1	A9- Use of chemical inputs in crops	The agro-ecosystem resilience can be diminished The dependence of chemical inputs can be increased (Agro-ecosystem resilience dimension)
#8: Current local policies do not address the deficit of paved roads. This makes hard the access to city markets.	(-)	Jurisdictional: local	I-ASOR-1 I-ASON-1	RS4- Access to main roads paved A8- Income diversification A8- Importance of on-farm incomes	The frequency of selling can be diminished The incomes from selling agri-food products can be diminished (Individual capacity dimension)
Migration (rural to urban areas and/or to foreign countries)					
#9: The actual bad economic situation leads to migration to seek jobs. In turn, rural migration affects social organization and culture. Additionally, rural migration compromises the food provision to the city.	(-)	Jurisdictional: national - local	I-MA-1 I-FEN-1 I-COM-1 I-ASON-1 I-GADM-1	A2- Indigenous culture A6- Participation in *mingas* A6- Participation in exchanges of services	The peasant and indigenous social organization can be diminished (Collective capacity dimension)
Social and cultural changes					
#10:	(+)	Jurisdictional:	I-MA-1	GS5- Access to a	The political

Drivers of change prioritized				Linking impacts on food sovereignty & vulnerability	
Perceptions	**Effect**	**Scale & level of driver**	**Key informants**	**SES variables & food sovereignty indicators**	**Vulnerability linkage**
Self-organization favors the analysis and solutions of common problems. This consolidates a vision and policies supported by local peasants to face the authorities. Currently, the agro-ecological production and stability to access to local markets is linked to the struggle from the social organization of local peasants.		local	I-RAL-1 I-ASOR-1	retail location in local markets GS6- Member of RAL A9- Use of agro-ecological practices (organic control, ethno-veterinary)	advocacy from peasants on agri-food policies can be increased (Collective capacity dimension)
#11: There are advances in the policies from community organizations to include women in the field of leadership.	(+)	Jurisdictional: national	I-FEN-1 I-MA-1	GS6- Member of RAL	The equity in peasant leadership can be increased (Collective capacity dimension)
#12: Political conflicts within the indigenous organizations and communities hinder collective actions.	(-)	Jurisdictional: local	I-COM-1 I-COM-2 I- GADP-2	GS6- Member of *comuna* A2- Indigenous culture	The investment activities within indigenous communities can be diminished (Collective capacity dimension)
#13: Regarding the consumption strategies, consumers have a tendency not to value the local food. This could be strengthened by policies focused in the food imports. Now, in local markets there is an increase of conventional and imported products (e.g., fruits).	(-)	Jurisdictional: national - local	I-RAL-1 I-FEN-1 I-ASOR-1 I-COM-1 I-COM-2 I-GADP-1	A8- Importance of traditional foods A8- Dependence of non-traditional foods	The incomes from farming activities can be diminished Consumers can be dependent of non-local foods (Individual capacity dimension)
Environmental changes					
#14: Rainfall patterns are changing. Additionally, soil fertility is decreasing.	(-)	Spatial: regions	I-MA-1 I-ASON-1	RS5- Crop yield RS9- Mean annual precipitation RU6- Dietary produced diversity	The food production and diversity produced can be diminished (Agro-ecosystem resilience & Individual capacity dimensions)

Notes: GMO=Genetically modified organisms. MAGAP=Acronym of Ministry of agriculture, livestock, aquaculture and fisheries. RAL=Acronym of Agro-ecological network Loja. **RS**=Agro-ecosystem boundaries; RS4=Human-constructed facilities; RS5=Productivity of system; RS9=Location. **RU**=Agro-ecosystem units; **GS**=Agri-food governance system; GS4=Property-rights systems; GS5=Operational-choice rules;

Drivers of change prioritized				Linking impacts on food sovereignty & vulnerability	
Perceptions	**Effect**	**Scale & level of driver**	**Key informants**	**SES variables & food sovereignty indicators**	**Vulnerability linkage**

GS6=Collective-choice rules. **A**=Agri-food system actors; A2=Socioeconomic attributes; A8=Importance of resource; A9=Technology used.

Appendix 2.5 Script of questionnaire

CUESTIONARIO PARA HOGARES PRODUCTORES

Nº de PREGUNTA

Buenos días, en la universidad estamos haciendo una investigación relacionada con la soberanía alimentaria. Para esto ahora estamos realizando unas encuestas a hogares productores de Jimbilla y San Lucas.
Por favor, ¿nos puede ayudar respondiendo algunas preguntas?

La información será usada solo para la investigación. Si hay alguna pregunta que usted no quiera responder, me lo dice, y yo respetaré su derecho a no responder.

Número de cuestionario	#		COD_ID
Fecha de entrevista	día	mes	201_ año
Nombre de la persona que entrevista:			
Ubicación de vivienda del hogar productor			
Parroquia:		Barrio:	
Comuna:		**Recursos comunales:**	
Nombre de asociación productores:			
Mercado más cercano:	Nombre	Distancia	

INFORMACIÓN PRELIMINAR (por observación directa)

S0.1. ACCESO A LOS TERRENOS PRODUCTIVOS Y VIVIENDA (chacras, potreros)

A.	Vía de acceso principal a los terrenos productivos		1_Calle de tierra, lastrado 2_Sendero		3_Otra (indique):
B.	Vía de acceso principal a la vivienda		1_Calle de tierra, lastrado 2_Sendero		3_Otra (indique):
C.	Material predominante del techo de la vivienda		1_Teja 2_Losa, cemento 3_Planchas de zinc		4_Asbesto (Eternit) 5_Otra (indique):
D.	Material predominante de las paredes de la vivienda		1_Adobe, tapial 2_ Ladrillo, bloque 3 Madera		4_Otra (indique):
E.	Material predominante del piso de la vivienda		1_Tierra 2_Tabla no tratada		3_Otra (indique):

SECCCIÓN 1: DATOS INFORMATIVOS DEL HOGAR

1.	**¿Cuál es su nombre?**	Nombre y Apellidos de la persona entrevistada		1_Hombre 2_Mujer
1a.	**¿En qué año nació?**			
1b.	**¿Usted tuvo la oportunidad de estudiar?**		0_No Si →	**Recibió al menos un año de:** 1_Primaria 2_Secundaria 3_Universidad
2.	**¿Con cuál cultura se identifica su hogar?**		1_Mestizo 2_Indígena "Saraguro"	3_Otra (indique):

3. **¿Cuántas personas integran su hogar?** → *Llene datos de la tabla:*

TOTAL del hogar	¿De éstos cuántos son hombres y cuántas mujeres?	¿Mayores a 65 años?	¿Entre 16 a 65 años?	¿Entre 5 a 15 años?	¿Menores de 5 años?
	Hombres	Hombres	Hombres	Hombres	
	Mujeres	Mujeres	Mujeres	Mujeres	

4. **¿Desde que se formó su hogar ha vivido en este lugar?** 1_Si; 2_No → *4a.* **¿Desde qué año vive aquí?** → *4b.* **¿Dónde vivía antes?** →

S1.2. NIÑOS DEL HOGAR

5. **En relación con la alimentación ¿para usted qué significa la desnutrición?** (o aniquilación)
   - 0_No sabe
   - 1 Falta de alimentación, de nutrientes, y/o vitaminas.
   - 2_ Mala alimentación (no balanceada)
   - 3_Otras (indique):

   → *5a.* **¿Existe desnutrición en los niños de su hogar?** 1_Si; 2_No

PÁGINA: 1

SECCCIÓN 2: PRODUCCIÓN

S2.1: PROPIEDAD Y ACCESO DE LA TIERRA

6. **En total ¿Cuántos terrenos son de propiedad de este hogar?... ... ¿y sumando todos cuánto medirán?** *(Total en hectáreas)*

Número de terrenos: | TOTAL EN HECTÁREAS:

6a. **¿Los terrenos tienen cercas?** ☐ 1_Si ☐ 2_No

7.		☐ 1_Propia →	*7a.* **¿Cómo adquirió los terrenos?**		*7b.* **¿Tienen escrituras?**		*7c.* **¿Quién es titular?**					
	Tipo de propiedad		☐ 1_Compra ☐ 2_Herencia ☐ 3_Otra forma:		☐ 0_No ☐ 0_No ☐ 0_No	☐ 1_Si→ ☐ 1_Si→ ☐ 1_Si→		☐ 1 Hombre	☐ 2_Mujer	☐ 3 Los dos		
		☐ 2_Comunal →	☐ 1_Con uso individual ☐ 2_Con uso colectivo									

S2.2: USOS DEL SUELO

8. **De todos los terrenos propios ¿para pastos qué porcentaje ocupan?**
☐ 0_No tienen pastos
☐ 1_Un poco: 25% o menos
☐ 2_La mitad: 50%
☐ 3_La mayoría: 75% o más

8a. **¿Comparten y/o arriendan estos pastos** (propios)**?** ☐ 0_No ☐ 1_Si → | *8b.* **¿Con quién?**
☐ 1_COMPARTE con Familiares y/o vecinos
☐ 2_Los ARRIENDA
☐ 3_Otra forma (indique):→

9. **¿Alquilan pastos de otras personas?** ☐ 0_No ☐ 1_Si→ | *9a.* **¿Cuántas hectáreas? →** Hectáreas

10. **De todos los terrenos propios ¿para sembrar qué porcentaje ocupan?** (usado para huertas, chacras, etc.)
Si da valor en metros cuadrados colocar aquí: →.....
☐ 0_No tienen sembríos
☐ 1_Un poco: 25% o menos
☐ 2_La mitad: 50%
☐ 3_La mayoría: 75% o más

10a. **¿En total cuantas parcelas de sembríos tienen?** (SUMA de: huertas, chacras, cultivos solos, etc) Número

10b. **¿Todos los sembríos están unidos?** (en un mismo sector de un mismo terreno)
☐ 0_No (están en diferentes lugares)
☐ 1_Si

10c. **¿Comparten y/o arriendan estos terrenos** (propios) **dónde siembran?** ☐ 0_No ☐ 1_Si → | *10d.* **¿Con quién?**
☐ 1_COMPARTE con Familiares y/o vecinos
☐ 2_Los ARRIENDA
☐ 3_Otra forma (indique):→

11. **¿Alquilan terrenos de otras personas para sembrar?** ☐ 0_No ☐ 1_Si→ | *11a.* **¿Cuántas hectáreas? →** Hectáreas

12. **De todos los terrenos propios ¿Qué porcentaje de bosque natural tienen?** Total en hectáreas:
☐ 0_No tienen bosque
☐ 1_Un poco: 25% o menos
☐ 2_La mitad: 50%
☐ 3_La mayoría: 75% o más

12a. **¿Comparten y/o arriendan estos terrenos** (propios) **de bosque?** ☐ 0_No ☐ 1_Si → | *12b.* **¿Con quién?**
☐ 1_ COMPARTE con Familiares y/o vecinos
☐ 2_Los ARRIENDA
☐ 3_Otra forma (indique):→

13. **¿Tienen acceso libre a otros bosques?** ☐ 0_No ☐ 1_Si→ | *13a.* **¿A cuántas hectáreas? →** Hectáreas | Nombre del bosque

S2.3: ACCESO AL AGUA

14. **Principalmente ¿De dónde proviene el agua que utilizan para el riego de sus cultivos?**
☐ 1_Agua lluvia sin canales
☐ 2_Agua entubada desde quebradas, manantiales, etc.
☐ 3_Sistema de riego
☐ 4_Otra forma (indique):

S2.4: ACCESO A CRÉDITO Y OTRAS AYUDAS FINANCIERAS DEL ÚLTIMO AÑO (2013)

15. **¿Han pedido dinero para las necesidades de su casa y/o para la producción?** (1 o más opciones)
☐ 0_No
☐ 1_Si →

15a. **¿A quién (es)?**
☐ 1_Familiares o conocidos, sin intereses
☐ 2_Conocidos con intereses (prestamistas, chulqueros)
☐ 3_Banco de Fomento
☐ 6_Cooperativas de ahorro
☐ 5_Otros (indique):→

15b. **Principalmente ¿Quién pidió?**
☐ 1_Hombre
☐ 2_Mujer
☐ 3_Los dos por igual

15c. **Principalmente ¿Para que usaron estas ayudas y/o**
☐ 1_CULTIVOS: compra de semillas, fertilizantes, cercas, etc.
☐ 2_GANADERÍA: compra de vacas, alambre de púas, cerramiento, etc.

PÁGINA: 2

	créditos? (1 o más opciones)	☐	3_Materiales para comercialización: compra de balanzas, bolsas, etc.
		☐	4_Compra de terrenos para sembrar y/o para ganadería
		☐	5_ Construcción de vivienda
		☐	6_Otros (indique):→

S2.5: ACCESO A CAPACITACIONES DEL ÚLTIMO AÑO (2013)

16.	**¿Han recibido capacitaciones para la producción?**	☐	0_No	*16a.* **El tema más importante estuvo relacionado con:**			
		☐	1_Sí →	☐ 1_Cultivos	☐ 3_Comercialización		
				☐ 2_Ganadería	☐ 4_Otro:→		
				16b. **¿Quién les dio esta capacitación?**			
				☐ 1_Gobierno: Junta Parroquial, Municipio de Loja, Ministerio de Agricultura			
				☐ 2_Asociaciones de productores y/o campesinas			
				☐ 3_Otros (indique): →			
				16c. **Principalmente ¿quién asiste a estas capacitaciones?**			
				☐ 1_Hombre	☐ 2_Mujer	☐ 3_Los dos por igual	

S2.6: ACCESO A BOSQUE, ANIMALES Y FLORA SILVESTRES DEL ÚLTIMO AÑO (2013)

17.	**¿En el bosque que encuentra para su hogar?** (1 o más opciones)	☐	0_No va al bosque		
		☐	1_Leña para cocinar	☐	4_Animales para comer
		☐	2_Plantas medicinales	☐	5_Otros (indique):→
		☐	3_Frutos/plantas para comer (E.g.: nogal, mora del campo)	☐	

S2.8: MODELO DE PRODUCCIÓN DEL ÚLTIMO AÑO (2013)

18.	**Principalmente ¿Cómo realizan el arado de la tierra?**	☐	1_Manual, solo personas	☐	3_Otras formas (indique):→				
		☐	2_Con la "yunta" y manual						
		18a. **Principalmente ¿Quién lo hace?**							
		☐	1_Hombre	☐	3_Los dos por igual	☐	5_Ranti-ranti	☐	7_Con vueltos: prestándose los días
		☐	2_Mujer	☐	4_En mingas	☐	6_Paga jornales	☐	8_Otras (indique): →

19.	**Principalmente ¿Cómo realizan la siembra?**	☐	1_Con la tola (herramienta de madera)
		☐	2_Hacen hoyos con barreta u otras herramientas metálicas (pico, pala, etc.)
		☐	3_Esparcen las semillas al azar: a voleo (E.g. para trigo, cebada)
		☐	4_Otras formas (indique):→

	PRINCIPALMENTE ¿QUIÉN…						
19a.	**..decide qué se va a sembrar en los terrenos?**	☐	1_Hombre	☐	3_Los dos por igual		
		☐	2_Mujer				
19b.	**..se encarga de seleccionar las semillas?**	☐	1_Hombre	☐	3_Los dos por igual		
		☐	2_Mujer				
19c.	**..se encarga de hacer la siembra?**	☐	1_Hombre	☐	3_Los dos por igual	☐	5_Paga jornales
		☐	2_Mujer	☐	4_En mingas	☐	6_Otro:
19d.	**..se encarga de poner los abonos (fertilización)?**	☐	1_Hombre	☐	3_Los dos por igual		
		☐	2_Mujer				
19e.	**..se encarga de arrancar y limpiar las malezas?**	☐	1_Hombre	☐	3_Los dos por igual	☐	5_Paga jornales
		☐	2_Mujer	☐	4_En mingas	☐	6_Otro:
19f.	**..se encarga de las cosechas?**	☐	1_Hombre	☐	3_Los dos por igual	☐	5_Paga jornales
		☐	2_Mujer	☐	4_En mingas	☐	6_Otro:
20.	**..se encarga del cuidado de las huertas?**	☐	1_Hombre	☐	3_Los dos por igual		
		☐	2_Mujer				
21.	**..se encarga del cuidado de las chacras de maíz?**	☐	1_Hombre	☐	3_Los dos por igual		
		☐	2_Mujer				

22.	**¿Cómo deciden en qué lugares del terreno tener los sembríos?** De acuerdo a:	☐	1_Mejor suelo, apto para cultivos
		☐	2 Cerca de dónde están los animales (corrales) para tener cerca el abono (estiércol)
		☐	3_Porque no hay otro lugar dónde más sembrar (tiene poco terreno)
		☐	4_Otras formas (indique):→
23.	**¿Hicieron actividades de rozar, tumbar y quemar algún árbol que molestaba para las actividades de producción?**	☐	0_No
		☐	1_Si para ampliar los potreros
		☐	2_Si para ampliar las huertas/chacras

SECCCIÓN 3: CULTIVOS Y FRUTALES

24. **En relación a todo lo que cultiva ¿Cómo estuvo este último año de producción?**
☐ 1_Pérdida ☐ 2_Normal/regular ☐ 3_Bueno ☐ 4_Muy bueno

25. EN EL ÚLTIMO AÑO, ¿Qué cultivos sembró y/o tiene en sus huertas y chacras?

Nº DE FILA	Nombre de cada cultivo	Indique con una "X"	Núm. de cosechas al año	Producción por CADA COSECHA 1 Cantidad Sembrada	1 Unidad de medida	2 Cantidad Cosechada	2 Unidad de medida	Forma de cultivo 1 Asociado: En huertas	2 Asociado: En chacras maíz con...	3 Cultivos solos	Variedades de cultivos sembradas 1 Nº total de variedades	2 Nº var. Criollas	3 Nº var. Mejoradas	Fuente de las semillas 1 Guardadas de cosechas, estacas	2 Compradas	3 Donadas: municipio, etc	4 Regaladas: familiares/vecinos	5 Trueque	Abonos/ fertilizantes 1 Principal o solo: Orgánicos	2 Principal o solo: Urea y químicos	3 Orgánico y químico (por igual)	4 No necesita	Control de plagas/ Enfermedades (e.g. lancha) 1 Principal o solo: Remedios naturales	2 Principal o solo: Fumigación químicos	3 Natural y químico (por igual)	4 No necesita	Destino de producción 1 Principal o solo: Consumo	2 Principal o solo: Venta	3 Consumo y Venta (partes iguales)	Nº DE FILA
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	
1	CAMOTE				Planta		Libra																							1
2	MAÍZ				Libra		Quintal																							2
3	PEPINO				Planta		Unidad																							3
4	POROTO				Libra		Quintal																							4
5	SAMBO				Planta		Unidad																							5
6	ZAPALLO				Planta		Unidad																							6
7	ARVEJA				Libra		Quintal																							7
8	CEBADA				Libra		Quintal																							8
9	HABA				Libra		Quintal																							9
10	PAPA				Libra		Quintal																							10
11	TRIGO				Libra		Quintal																							11
12	YUCA				Planta /mata		Quintal																							12
13	ACELGA				Onza		Libra																							13
14	ACHOJCHAS				Planta		Libra																							14
15	AJO				Libra		Libra																							15
16	CEBOLLA DE HOJA				Onza		Libra																							16
17	COL				Onza		Unidad																							17
18	COLIFLOR				Onza		Unidad																							18
19	CULANTRO Y PEREJIL				Onza		Libra				total																			19
20	JÍCAMA				Planta		Libra																							20
21	LECHUGA				Onza		Unidad																							21
22	MASHUA				Planta		Libra																							22
23	MELLOCO				Planta		Libra																							23
24	NABO				Planta		Libra																							24
25	OCA				Planta		Libra																							25

Nº DE FILA	Nombre de cada cultivo	Indique con una "X"	Núm. de cosechas al año	Producción por CADA COSECHA 1 Cantidad Sembrada	1 Unidad de medida	2 Cantidad Cosechada	2 Unidad de medida	Forma de cultivo 1 Asociado: En huertas	2 Asociado: En chacras maíz con...	3 Cultivos solos	Variedades de cultivos sembradas 1 Nº total de variedades	2 Nº var. Criollas	3 Nº var. Mejoradas	Fuente de las semillas 1 Guardadas de cosechas, estacas	2 Compradas	3 Donadas: municipio, etc	4 Regaladas: familiares/vecinos	5 Trueque	Abonos/ fertilizantes 1 Principal o solo: Orgánicos	2 Principal o solo: Urea y químicos	3 Orgánico y químico (por igual).	4 No necesita	Control de plagas/ Enfermedades (e.g. lancha) 1 Principal o solo Remedios naturales	2 Principal o solo Fumigación químicos	3 Natural y químico (por igual)	4 No necesita	Destino de producción 1 Principal o solo: Consumo	2 Principal o solo: Venta	3 Consumo y Venta (partes iguales)	Nº DE FILA
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	
26	OREGANO				Planta		Libra																							26
27	PAPA CHINA				Planta		Libra																							27
28	RÁBANO				Onza		Libra																							28
29	REMOLACHA				Onza		Libra																							29
30	TOMATE DE RIÑÓN				Onza		Libra																							30
31	ZANAHORIA AMARILLA				Onza		Libra																							31
32	ZANAHORIA BLANCA				Planta		Libra																							32
33	HIERBAS AROMÁTICAS:				Planta		Libra				total																			33
34	BABACO				Planta		Unidad																							34
35	CAÑA DE AZÚCAR				Planta		Planta																							35
36	CAPULÍES				Planta		Unidad																							36
37	DURAZNO				Planta		Unidad																							37
38	GRANADILLA				Planta		Unidad																							38
39	GUINEO COMÚN				Planta		Cabeza																							39
40	LIMÓN DULCE				Planta		Unidad																							40
41	LUMA				Planta		Unidad																							41
42	MANDARINA				Planta		Unidad																							42
43	MANZANA				Planta		Unidad																							43
44	MORA DE...				Planta		Libra/ semana				total																			44
45	NARANJA				Planta		Unidad																							45
46	NÍSPERO				Planta		Unidad																							46
47	PEPINO DULCE				Planta		Unidad																							47
48	PERAS				Planta		Unidad																							48
49	PLÁTANO				Planta		Cabeza																							49
50	REINA CLAUDIA				Planta		Unidad																							50
51	TOMATE DE ÁRBOL				Planta		Unidad																							51

Nº DE FILA	Nombre de cada cultivo	Indique con una "X"	Núm. de cosechas al año	Producción por CADA COSECHA 1		Producción por CADA COSECHA 2		Forma de cultivo 1	Forma de cultivo 2	Forma de cultivo 3	Variedades de cultivos sembradas 1	Variedades de cultivos sembradas 2	Variedades de cultivos sembradas 3	Fuente de las semillas 1	Fuente de las semillas 2	Fuente de las semillas 3	Fuente de las semillas 4	Fuente de las semillas 5	Abonos/ fertilizantes 1	Abonos/ fertilizantes 2	Abonos/ fertilizantes 3	Abonos/ fertilizantes 4	Control de plagas/ Enfermedades (e.g. lancha) 1	Control de plagas/ Enfermedades (e.g. lancha) 2	Control de plagas/ Enfermedades (e.g. lancha) 3	Control de plagas/ Enfermedades (e.g. lancha) 4	Destino de producción 1	Destino de producción 2	Destino de producción 3	Nº DE FILA
				Cantidad Sembrada	Unidad de medida	Cantidad Cosechada	Unidad de medida	Asociado: En huertas	Asociado: En chacras maíz con...	Cultivos solos	Nº total de variedades	Nº var. Criollas	Nº var. Mejoradas	Guardadas de cosechas, estacas	Compradas	Donadas: municipio, etc	Regaladas: familiares/vecinos	Trueque	Principal o solo: Orgánicos	Urea y químicos	Orgánico y químico (por igual).	No necesita	Principal o solo: Remedios naturales	Fumigación químicos	Natural y químico (por igual)	No necesita	Principal o solo: Consumo	Venta	Consumo y Venta (partes iguales)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	
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SECCCIÓN 4: GANADO Y OTROS ANIMALES MENORES

26. En relación al ganado y demás animales (gallinas, cuyes, etc.) ¿Cómo estuvo este último año de producción?

1_Pérdida	2_Normal/regular	3_Bueno	4_Muy bueno

27. ESTE ÚLTIMO AÑO, ¿Qué ganado y otros animales (gallinas, cuyes, etc..) ha tenido?

Nº DE FILA	Tipo de animales	Animales por tipo de razas: 1 Nº total de animales	2 Nº animales Criollos	3 Nº animales Mestizos	Procedencia de los animales: 1 Principal o solo: Crías propias	2 Comprados	3 Propios y comprados (por igual)	Forma de alimentación: 1 Principal o solo: Propios: pastos, hierba, residuos, etc.	2 Compra: maíz, balanceado, etc.	3 Propia y comprada (por igual)	Persona encargada del cuidado: 1 Principal o solo: Hombre	2 Mujer	3 Los dos por igual	Control de enfermedades: 0 Ninguna	1 Principal o solo: Remedios Naturales	2 Químicos	3 Natural y química (por igual)	Lugar de crianza: 1 Principal o solo: Libres en el terreno	2 Amarrados	3 En potreros, corrales	Destino de producción: 1 Principal o solo: Consumo, trabajo, o producción en hogar	2 Venta	3 Consumo (o producción en hogar) y Venta (por igual)	Nº DE FILA
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	
1	Vacas, toros, terneros																							1
2	Ovejas																							2
3	Chanchos																							3
4	Cuyes																							4
5	Aves: gallinas, pollos, patos, etc																							5
6	Caballos, burros, etc (para carga)																				X			6
7	Abejas	Nº colmenas:																			Destino de la miel:			
8	Truchas																							8
9	OTROS																							9
10																								10

28.	Desde la casa dónde usted vive, ¿Cuánto se demora en llegar a los potreros del ganado?	Tiempo:	Tiempo EN MINUTOS:	TOTAL DE HECTÁREAS DE PASTOS:	Sector dónde quedan los potreros:

SECCCIÓN 5: PROCESAMIENTO Y VENTA DEL ÚLTIMO AÑO

29. Venta de cultivos

☐ 0_No

Si → ☐

29a. **Principalmente ¿A quién?**
☐ 1_Directo al consumidor ☐ 3_Otro (indique):
☐ 2_A negociantes (intermediarios)

29b. **Principalmente ¿En dónde?**
☐ 1_Ciudad de Loja (mercados y ferias) ☐ 3_Dentro de este barrio/comuna
☐ 2_En "Las Juntas" ☐ 4_Otro lugar (indique):

29c. **Principalmente ¿Quién los vende?**
☐ 1_Hombre ☐ 3_Los dos por igual
☐ 2_Mujer ☐ 4_Los hijos menores a 15 años

29d. **¿Son importantes estos ingresos para las necesidades de la casa?**
☐ 1_Poco importantes ☐ 2_Importantes ☐ 3_Muy importantes

30. Venta de ganado vacuno en pie

☐ 0_No

Si → ☐

30a. **¿Cuántas cabezas vende al año? →** AL AÑO:

30b. **Principalmente ¿A quién?**
☐ 1_Directo al consumidor ☐ 3_Otro (indique):
☐ 2_A negociantes (intermediarios)

30c. **Principalmente ¿En dónde?**
☐ 1_Ciudad de Loja (mercados y ferias) ☐ 3_Dentro de este barrio/comuna
☐ 2_En "Las Juntas" ☐ 4_Otro lugar (indique):

30d. **Principalmente ¿Quién lo saca a vender?**
☐ 1_Hombre ☐ 2_Mujer ☐ 3_Los dos por igual

31. Producción de leche

☐ 0_No hubo producción

Si → ☐

31a. **En un día normal, ¿cuántos litros se producen?→** AL DÍA: SEMANAL:

31b. **Principal destino de la producción**
☐ 1_Hacer quesillo, queso
☐ 2_Consumir en líquido en la casa
☐ 3_Venta en líquido_→ ☐ 1_Directo al consumidor ☐ 2_A negociantes (intermediarios)
☐ 4_Otro destino (indique):→

31c. **Elaboración de quesillo, queso**

☐ 0_No

Si → ☐

31d. **En una semana normal ¿cuántas libras se producen?→** SEMANAL:

31e. **Principalmente ¿Quién lo hace?**
☐ 1_Hombre ☐ 2_Mujer ☐ 3_Los dos por igual

31f. **Principal destino de la producción**
☐ 1_Consumo en el hogar
☐ 2_Venta ☐ 4_Otro (indique):
☐ 3_Partes iguales: consumo y venta

31g. **Venta de quesillo, queso**

☐ 0_No

Si → ☐

31h. **Principalmente ¿A quién?**
☐ 1_Directo al consumidor ☐ 3_Otros (indique):
☐ 2_ A negociantes (intermediarios)

31i. **Principalmente ¿En dónde?**
☐ 1_Ciudad de Loja (mercados y ferias) ☐ 3_ Dentro de este barrio/comuna
☐ 2_En "Las Juntas" ☐ 4_Otro lugar (indique):

31j. **Principalmente ¿Quién lo vende?**
☐ 1_Hombre ☐ 3_Los dos por igual
☐ 2_Mujer ☐ 4_Los hijos menores a 15 años

32. **¿Son importantes los ingresos de la venta del ganado y/o sus productos para las necesidades de la casa? →** ☐ 1_Poco importantes ☐ 2_Importantes ☐ 3_Muy importantes

33. **¿Hicieron algo para conservar y guardar los alimentos por más tiempo?** E.g.: secado de maíz, harinas, panelas, etc. ☐ 0_No ☐ 1_Si→ *33a.* **Principalmente ¿Qué hicieron?** ☐ 1_Secado de maíz ☐ 2_Otros:

33b. **Principalmente ¿Quién se encargó de estas actividades?** ☐ 1_Hombre ☐ 2_Mujer ☐ 3_Los dos por igual ☐ 4_Todo el hogar ☐ 5_Otros:

34.	**¿Hicieron productos para vender?** E.g.: tortillas "de gualo", tamales, aliños, horchatas, etc.	☐ 0_No ☐ 1_Si →	*34a.* **Principalmente ¿Qué hicieron?**	☐ 1_A base de maíz	☐ 2_Otros:
34b.	**Principalmente ¿Quién los elaboró?**	☐ 1_Hombre ☐ 2_Mujer	☐ 3_Los dos por igual ☐ 4_Todo el hogar	☐ 5_Otros:	
35.	**En una semana normal ¿cuántos días salen a vender?** (todas las formas: al consumidor, a negociantes, a vecinos, etc.)				#días/ semana
35a.	**¿Tienen un puesto fijo para vender en el mercado?**	☐ 0_No ☐ 1_Si →	*35b.* **¿En qué mercado?**	Nombre del mercado	Sector
35c.	**Principalmente ¿De qué forma le pagaron?**	☐ 1_Dinero ☐ 2_Trueque	☐ 3_Otra forma (indique):→		

S5.2: OTRAS FUENTES DE INGRESOS DEL ÚLTIMO AÑO (2013)

36.	**¿Alguien salió a trabajar fuera de la casa?**	☐ 0_No ☐ Si →	*36a.* **Principalmente ¿Quién (es)?**	☐ 1_Hombre ☐ 2_Mujer	☐ 3 Los Hijos menores a 15 años ☐ 4_Otros (indique):
			36b. **Tipo de trabajo**	☐ 1_Construcción ☐ 2_Trabajos agrícolas por jornales	☐ 3_Comercio de:→ ☐ 4_Servidor público ☐ 5_Otros (indique):→
			36c. **Principalmente ¿En dónde?**	☐ 1_Ciudad de Loja	☐ 2_En esta parroquia ☐ 3_Otro lugar: →
			36d. **¿Son importantes estos ingresos para las necesidades de la casa?**	☐ 1_Poco importantes	☐ 2_Importantes ☐ 3_Muy importantes
37.	**¿Reciben el bono de desarrollo humano?**	☐ 0_No ☐ Si →	*37a.* **¿Son importantes estos ingresos para las necesidades de la casa?**	☐ 1_Poco importantes	☐ 2_Importantes ☐ 3_Muy importantes
38.	**¿Reciben dinero del extranjero? (remesas)**	☐ 0_No ☐ Si →	*38a.* **¿Son importantes estos ingresos para las necesidades de la casa?**	☐ 1_Poco importantes	☐ 2_Importantes ☐ 3_Muy importantes
39.	**¿Tienen otras fuentes de ingresos?**	☐ 0_No ☐ Si →	*39a.* **¿Cuáles?** (indique:)		Cód.
			39b. **¿Son importantes estos ingresos para las necesidades de la casa?**	☐ 1_Poco importantes	☐ 2_Importantes ☐ 3_Muy importantes

SECCCIÓN 6: CONSUMO

S6.1: DISPONIBILIDAD DE ALIMENTOS

40. **En un año normal principalmente ¿cómo obtienen los alimentos (como: maíz, poroto y papa) para el consumo de su hogar?**

	Indique con una "X" la opción por CADA mes	ENERO	FEBRERO	MARZO	ABRIL	MAYO	JUNIO	JULIO	AGOSTO	SEPTIEMBRE	OCTUBRE	NOVIEMBRE	DICIEMBRE	**¿Qué pasa en esos meses?** (e.g. se acaban las reservas guardadas, sequías, plagas, etc)	TOTAL (meses)
40a.	**¿Produce en sus terrenos?**														
40b.	**¿Le prestan familiares/ vecinos?**														
40c.	**¿Los compra?**														
40d.	**¿otra forma? (indique):**														

41. **En años de pérdida de cosechas ¿han tenido escasez de alimentos (como: maíz, poroto y papa) para el consumo de su hogar?**

	Indique con una "X" la opción por CADA mes	ENERO	FEBRERO	MARZO	ABRIL	MAYO	JUNIO	JULIO	AGOSTO	SEPTIEMBRE	OCTUBRE	NOVIEMBRE	DICIEMBRE	**¿Qué pasa en esos meses?** (e.g. plagas, etc)	TOTAL (meses)
41a.	Escasez de maíz, poroto y papa														

42.	**En momentos difíciles, cuándo no tienen comida suficiente. Principalmente ¿Qué hacen en su hogar?**	☐ 0_No han pasado por estas dificultades ☐ _Comen menos (no piden ayuda) →	*42a.* **Generalmente, ¿quién come menos?**	☐ 1_La mujer ☐ 2_L@s nin@s	☐ 3_Todo el hogar por igual

		☐ 4_Se comen las semillas ☐ 5_Piden ayuda a los familiares y/o vecinos de la comunidad ☐ 6_Salen a trabajar fuera de la casa ☐ 7_Otras formas (indique): →	
	S6.2: ALIMENTACIÓN CULTURALMENTE ADECUADA		
43.	**En su hogar, ¿Cocinan platos tradicionales?** (E.g. mote)	☐ 1_Pocas veces (solo en fiestas o fechas especiales) ☐ 2_Algunas veces (2-3 veces/ semana) ☐ 3_Muchas veces (4-5 o más veces/semana)	*43a.* **Principalmente, ¿Qué preparan?** ☐ 1_mote, u otros platos con maíz ☐ 2_Otros (indique):
44.	**En su hogar, ¿Cuántas veces a la semana consumen: arroz?**	☐ 1_Pocas veces (1 vez/semana o menos) ☐ 2_Algunas veces (2-3 veces/ semana) ☐ 3_Muchas veces (4-5 o más veces/semana)	*44a.* **¿Cómo obtienen el arroz?** ☐ 1_Compran ☐ 3_Otra forma: ☐ 2_Trueques
45.	**En su hogar, ¿Cuántas veces a la semana consumen: fideos?**	☐ 1_Pocas veces (1 vez/semana o menos) ☐ 2_Algunas veces (2-3 veces/ semana) ☐ 3_Muchas veces (4-5 o más veces/semana)	*45a.* **¿Cómo obtienen los fideos?** ☐ 1_Compran ☐ 3_Otra forma: ☐ 2_Trueques
	SECCCIÓN 7: CAPITAL SOCIAL/ Instituciones		
46.	**¿Algún miembro de su hogar o usted pertenecen a alguna organiza-ción?** *(separar organiza-ciones diferentes)*	☐ 0_No	**Tipo de organización:** 1_de productores o campesina 2_Otra:
		46a. **Nombre de la organización (A) →**	
		46b. **¿Quién es miembro?** ☐ 1_Hombre ☐ 2_Mujer ☐ 3_Los dos	
		46c. **¿Ocupa algún cargo dentro de la organización?** Si → ☐ 0_No ☐ 1_Si → **cargo de:** →	
		46d. **Principalmente ¿Ustedes en qué actividades participan?** *(1 o más opciones)* ☐ 1_Relacionadas con los cultivos ☐ 2_Relacionadas con la ganadería ☐ 3_ Relacionadas con comercialización ☐ 4_Relacionadas con el bosque	**Defensa de derechos comunes, luchas sociales →¿Cuáles? (indique):** ☐ 5_ Acceso a vialidad ☐ 8_Acceso a mercados ☐ 6_ Acceso a agua ☐ 9_Servicios públicos: Agua potable, luz, etc ☐ 7_ Acceso a tierra ☐ 10_Otras (indique):→
			Tipo de organización: 1_de productores o campesina 2_Otra:
		46e. **Nombre de la organización (B) →**	
		46f. **¿Quién es miembro?** ☐ 1_Hombre ☐ 2_Mujer ☐ 3_Los dos	
		46g. **¿Ocupa algún cargo dentro de la organización?** Si → ☐ 0_No ☐ 1_Si → **cargo de:** →	
		46h. **Principalmente ¿Ustedes en qué actividades participan?** *(1 o más opciones)* ☐ 1_Relacionadas con los cultivos ☐ 2_Relacionadas con la ganadería ☐ 3_ Relacionadas con comercialización ☐ 4_Relacionadas con el bosque	**Defensa de derechos comunes, luchas sociales →¿Cuáles? (indique):** ☐ 5_ Acceso a vialidad ☐ 8_Acceso a mercados ☐ 6_ Acceso a agua ☐ 9_Servicios públicos: Agua potable, luz, etc ☐ 7_ Acceso a tierra ☐ 10_Otras (indique):→
	S7.2: ACTIVIDADES REALIZADAS EN GRUPOS O MINGAS RECIENTEMENTE (2011 AL 2013)		
47.	**En los últimos 3 años, ¿Han participado en grupos organizados por las instituciones?** (municipio, junta parroquial, etc)	☐ 0_No	
		Si → *47a.* **Principalmente ¿Quién participa?** ☐ 1_Hombre ☐ 2_Mujer ☐ 3_Los dos ☐ 4_Todo el hogar	
		47b. **Principalmente ¿Qué actividades han hecho en estos grupos?** *(1 o más opciones)* ☐ 1_Plantación de árboles (reforestación) ☐ 2_Limpieza de quebradas y ríos ☐ 3_Comercializaión: ferias, etc.	☐ 4_Capacitaciones, etc. ☐ 5_Otras (indique):→

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48.	**En los últimos 3 años, ¿Han participado en mingas organizadas por los vecinos?**	☐ 0_No ☐ Si →	*48a.* **Principalmente ¿Quién participa?** ☐ 1_Hombre ☐ 2_Mujer ☐ 3_Los dos ☐ 4_Todo el hogar *48b.* **Principalmente ¿Qué actividades han hecho en las mingas?** *(puede seleccionar varias opciones)* ☐ 1_Relacionadas con los cultivos ☐ 4_Construcción de viviendas ☐ 2_Relacionadas con la ganadería ☐ 5_Otras (indique): ☐ 3_ Mantenimiento de senderos
49.	**En los últimos 3 años, han pagado con alimentos o hierba algún trabajo**, como el desmonte (intercambia bienes por servicios)	☐ 0_No ☐ Si →	*49a.* **Principalmente ¿Quién hace estos intercambios?** ☐ 1_Hombre ☐ 2_Mujer ☐ 3_Los dos por igual *49b.* **¿Con qué frecuencia hacen estos intercambios?** ☐ 1_Pocas veces (1 vez al año o menos) ☐ 2_Algunas veces (2 veces al año) ☐ 3_ Muchas veces (3 veces o más al año)
50.	**En los últimos 3 años, han intercambiado alimentos u otros bienes?** (e.g. maíz por quesillo, etc)	☐ 0_No ☐ Si →	*50a.* **Principalmente ¿Quién hace estos intercambios?** ☐ 1_Hombre ☐ 2_Mujer ☐ 3_Los dos por igual *50b.* **¿Con qué frecuencia hacen estos intercambios?** ☐ 1_Pocas veces (1 vez al año o menos) ☐ 2_Algunas veces (2 veces al año) ☐ 3_ Muchas veces (3 veces o más al año)
51.	**En los últimos 3 años, ¿Han intercambiado semillas?** (e.g. semillas de maíz por semillas de poroto)	☐ 0_No ☐ Si →	*51a.* **Principalmente ¿Quién hace estos intercambios?** ☐ 1_Hombre ☐ 2_Mujer ☐ 3_Los dos por igual *51b.* **¿Con qué frecuencia hacen estos intercambios?** ☐ 1_Pocas veces (1 vez al año o menos) ☐ 2_Algunas veces (2 veces al año) ☐ 3_ Muchas veces (3 veces o más al año) *51c.* **¿A cuántas personas han dado las semillas? →** *51d.* **¿De cuántas personas han recibido las semillas? →**
52.	**En los últimos 3 años, Han intercambiado horas de trabajo: vueltos, prestamanos, ranti -ranti.** (u otros servicios)	☐ 0_No ☐ Si →	*52a.* **Principalmente ¿Quién hace estos intercambios?** ☐ 1_Hombre ☐ 2_Mujer ☐ 3_Los dos por igual *52b.* **¿Con qué frecuencia hacen estos intercambios?** ☐ 1_Pocas veces (1 vez al año o menos) ☐ 2_Algunas veces (2 veces al año) ☐ 3_ Muchas veces (3 veces o más al año)
53.	**Normalmente ¿Qué hacen cuando necesitan <u>más</u> ayuda para algunas labores?** Por ejemplo para la siembra, la cosecha, etc.	☐ 0_No piden ayuda (se incrementa el trabajo en el hogar) ☐ 1_Hacen mingas→ Observaciones: ☐ 2_Hacen vueltos, prestamanos, ranti-ranti. Intercambian horas de trabajo. ☐ 3_Contratan a trabajadores y les pagan un jornal ☐ 4_ Otras formas (especifique):→	
54.	**¿Usted quisiera que sus hijos sigan dedicándose a las labores de agricultura y ganadería?**	☐ 0_No ☐ 1_Si	
55.	**Si pudiera elegir, ¿dónde preferiría vivir con su hogar?**	☐ 1_Campo ☐ 2_Ciudad	
Gracias por su colaboración, que tenga un buen día. ***Por favor, me puede ayudar con algún teléfono de contacto.***		Número de teléfono y/o correo electrónico	

Appendix 2.6 Script of interviews

ENTREVISTA PARA ORGANIZACIONES-INSTITUCIONES-COMUNAS

Fecha: __ de _____ de 2014

Nombre del entrevistado:	Ocupación dentro de la institución:	Nombre de la institución:

PARTE I: ESTRUCTURA Y COORDINACIÓN DE LA ORGANIZACIÓN-INSTITUCIÓN-COMUNA

1. ¿Me podría decir *cuándo y por qué nació esta organización*/institución/comuna?

2. ¿Cuáles son temas de *conflicto* en relación al sistema agro- alimentario que hay o han habido dentro de esta organización/institución/comuna o con otras organizaciones/instituciones? → ¿Cómo los han superado? → ¿Eso que ha traído como consecuencias?

3. Al día de hoy, ¿cuántos integrantes son? ¿Y el último integrante hace qué tiempo ingresó?

4. ¿Cuál es la *estructura organizativa*? →¿Cómo eligen a sus representantes?

5. ¿Las *asambleas* cada que tiempo se realizan?: semanalmente, mensualmente, anualmente..

5.1. ¿Y el nivel de asistencia es diferente si se trata de una asamblea ordinaria, que una asamblea convocada por un tema en especial? →¿Por qué?

5.2. ¿A la última asamblea cuántas personas asistieron?

6. ¿Los integrantes qué *derechos y obligaciones* tienen?

6.1. ¿Y cómo controlan qué se cumplan estas obligaciones? ¿Hay sanciones? (si hay reglamentos, solicitar)

6.2. ¿Hay actividades/funciones que solo realicen/sean responsabilidad de las mujeres? → ¿Cuáles?

7. En cuanto al funcionamiento de la organización/institución/comuna, *¿actúa sólo localmente* o también a otras escalas? E.g.: Parroquial, Cantonal, Provincial, Nacional…

8. ¿Y principalmente qué *actividades realizan* en la organización/institución/comuna?

8.1. ¿Y para realizar estas actividades con *cuáles organizaciones/instituciones han coordinado/trabajado* y en qué temas? Valore además si el resultado de la colaboración fue positivo o negativo → ¿Y cómo fue el nivel de colaboración con cada una de ellas?

Nombre de la organización/institución	**Temas en que trabajan** (Producción, procesamiento, comercialización-venta, consumo, capacitación, ambiental, género,.)	**Nivel de colaboración** (alta= muy frecuente, regular= alguna vez, baja= muy pocas veces)	**Efecto** (+ o -)
1….			

8.2. ¿Usted cree que es necesario trabajar también con *otras organizaciones/instituciones, con las que hasta ahora no tienen contacto*? → ¿Con cuáles y para qué temas?

Nombre de la organización/institución	**Temas para trabajar** (producción, procesamiento, comercialización-venta, consumo, ambiental, social, género,.)
1….	

8.3. Entre las actividades a las que se dedican qué grado de importancia ocupan las siguientes que le voy a decir:

Proyectos/Actividades de:	**Muy importante**	**Importante**	**Poco importante**	**Nada importante**	**No hacen esta actividad**
a. Agricultura					
b. Ganadería (vacas)					
c. Producción de animales menores (gallinas, cuyes)					
d. Capacitación para la producción orgánica / agroecológica					
e. Elaboración de productos artesanales (quesillo, horchatas, etc)					
f. Comercialización -venta (mercados, ferias, ..)					
g. Comedores escolares					
h. Legalización de la propiedad de la tierra					
i. Gestión de necesidades comunes (como: vialidad, educación, agua potable, …)					
j. Desarrollo rural (socio-económico)					
k. Conservación de la naturaleza					
l. Resolución de conflictos (uso de normas consuetudinarias, como: *justicia indígena*)					
m. Fomento de la solidaridad y ayuda mutua entre los habitantes (mingas, economía solidaria,..)					
n. Alianzas/convenios con otras instituciones/ organizaciones					

8.4. ¿Y cómo *financian* sus actividades?: quizá con cuotas de los integrantes, fondos públicos/privados

PARTE II: PERCEPCIONES

9. Actualmente ¿Cuáles cree que son los principales cambios que pueden afectar las actividades de producción, comercialización y la alimentación de esta organización/institución/comuna y de qué manera?

Principales cambios (políticos, económicos, sociales, culturales, ambientales)	**Efecto** (+ o -)	**Componente afectado:** social, ecológico
1....		

10. ¿Y cuáles cree que son las mayores debilidades que no les permitirían superar los problemas que se den por estos cambios?

11. ¿Y cuáles cree que son las fortalezas que les pueden ayudar para responder a los cambios negativos?

12. ¿Usted ha escuchado sobre el término "buen vivir"? → ¿Para usted qué significa? → ¿Esta organización/institución/comuna trabaja para contribuir con el "buen vivir"?

13. ¿Usted ha escuchado sobre el término "soberanía alimentaria"? → ¿Para usted qué significa? → ¿Esta organización/institución/comuna trabaja para contribuir con la "soberanía alimentaria"?

14. Usted cree que es posible *satisfacer las necesidades* de esta organización/institución/comuna, realizar actividades agropecuarias, y al mismo tiempo *cuidar los bosques y otros recursos* naturales como el agua? → ¿Ustedes han propuesto alternativas dentro de este tema?

15. ¿Ha escuchado de proyectos para la conservación como el programa "Socio-Bosque"?→ ¿Cuál es su opinión respecto a estos proyectos?

PARTE III: RELACIONES SOCIALES

16. Esta organización/institución/comuna se ha *unido o forma parte de otras organizaciones*/instituciones? →¿De cuáles y cómo es su vinculación? (filial, fraterna, etc.)

16.1. ¿Qué *ventajas* se tiene al estar unida con otras organizaciones/instituciones?

17. ¿Dentro de esta organización/institución/comuna es importante el consumo de comidas tradicionales? → ¿Por qué?

PARTE IV: SÓLO PARA ORGANIZACIONES/ASOCIACIONES

18. Específicamente en relación con las actividades de: producción, procesamiento, comercialización-venta, consumo (alimentación), capacitación (temas y frecuencia) y ambientales, cuáles son los *principales proyectos/inversiones* que han realizado en los últimos 5 años (o si hay alguno más importante realizado antes, por favor indicar)?

18.1. ¿Y en éstos proyectos *cómo participa la mujer*?

19. En cuanto a las actividades de producción ¿Qué *dificultades se presentan durante la transición* de un sistema de agricultura convencional a un agroecológico/ orgánico?

19.1. En el caso de tener o formar parte de *sistemas participativos de garantía*, ¿cómo funcionan?

19.2. Y en cuanto a la *elaboración de productos* para la venta ¿Por qué cree que la mayoría solo elabora quesillo y queso, y no otros productos? → ¿Hay que cumplir requisitos adicionales (emitidos por el municipio) para poder venderlos?

20. *Al momento de vender* ¿Cómo asociación tienen alguna credencial o puesto fijo en mercados/ferias? → ¿Cómo se maneja el tema de la venta ambulante? → ¿Han llegado a acuerdos con el municipio?

21. ¿Usted por qué cree que algunos agricultores continúan vendiendo mediante negociantes? →¿Qué productos son los que generalmente se venden a los negociantes?

Estimado/a muchas gracias por su tiempo y atender a esta entrevista. ¿Quizás me podría recomendar algún nombre de otro actor clave al que usted crea conveniente que deba realizarle esta entrevista?

ENTREVISTA PARA INSTITUCIONES FORMALES

Fecha: __ de _____ de 2014

Nombre del entrevistado:	Ocupación dentro de la institución:	Nombre de la institución:

PARTE I: ESTRUCTURA Y COORDINACIÓN DE LA INSTITUCIÓN

1. Principalmente ¿cuál es el *tema clave de trabajo y cuáles son las responsabilidades/competencias* de esta institución?

1.1. ¿Estas competencias/temas clave se trabajan solo a nivel local o a más niveles…?

1.2. ¿Qué instituciones trabajan sobre las mismas competencias?

2. Específicamente en relación con las *actividades de:* producción, procesamiento, comercialización-venta, consumo (alimentación), capacitación y ambientales (biodiversidad..), cuáles son los *principales proyectos/inversiones* que han realizado en los últimos 5 años (o si hay alguno más importante realizado antes, por favor indicar)?

Proyectos/inversiones en:	Descripción
1. Producción	
2. Procesamiento	
3. Comercialización-venta	
4. Consumo-alimentación	
5. Capacitación	¿Qué cursos y con qué frecuencia?
6. Ambiental/ recursos naturales (agua, biodiversidad, tierra…)	

2.1. ¿Y para realizar estas actividades/proyectos con *cuáles instituciones/organizaciones han coordinado/trabajado* y en qué temas? Valore además si el resultado de la colaboración fue positivo o negativo → ¿Y cómo fue el nivel de colaboración con cada una de ellas?

Nombre de la institución/organización	Temas en que trabajan (producción, procesamiento, comercialización-venta, consumo, capacitación, ambiental, género,.)	Nivel de colaboración (alta= muy frecuente, regular= alguna vez, baja= muy pocas veces)	Efecto (+ o -)
1….			

2.2. ¿Usted cree que es necesario trabajar también con otras *instituciones/organizaciones, con las que hasta ahora no tienen contacto* para cumplir con estos proyectos? → ¿Con cuáles y para qué temas?

Nombre de la institución/organización	Temas para trabajar (producción, procesamiento, comercialización-venta, consumo, ambiental, social, género,.)
1….	

2.3. Y durante su relación con otras instituciones/organizaciones ¿Tienen o han tenido *conflictos* relacionados con el sistema agroalimentario?→ ¿Cómo los han manejado?→ ¿Eso que ha traído como consecuencias?

2.4. Entre los proyectos/actividades a las que se dedican qué grado de importancia ocupan las siguientes que le voy a decir:

Proyectos/Actividades de:	Muy importante	Importante	Poco importante	Nada importante	No hacen esta actividad
a. Agricultura					
b. Ganadería (vacas)					
c. Producción de animales menores (gallinas, cuyes)					
d. Capacitación para la producción orgánica / agroecológica					
e. Elaboración de productos artesanales (quesillo, horchatas, etc)					
f. Comercialización -venta (mercados, ferias, ..)					
g. Comedores escolares					
h. Legalización de la propiedad de la tierra					
i. Gestión de necesidades comunes (como: vialidad, educación, agua potable, …)					
j. Desarrollo rural (socio-económico)					
k. Conservación de la naturaleza					

Proyectos/Actividades de:	Muy importante	Importante	Poco importante	Nada importante	No hacen esta actividad
l. Resolución de conflictos (uso de normas consuetudinarias, como: *justicia indígena*)					
m. Fomento de la solidaridad y ayuda mutua entre los habitantes (mingas, economía solidaria,..)					
n. Alianzas/convenios con otras instituciones/ organizaciones					

3. En cuanto a las *regulaciones y control* que ejerce esta institución ¿hay algunas que estén relacionadas con la producción, elaboración y/o venta en mercados/ferias de los productos agropecuarios? → ¿Qué se regula/controla y de qué forma?

3.1. ¿Cómo se trata el tema de la *venta ambulante*?

PARTE II: PERCEPCIONES

4. Actualmente en esta localidad ¿Cuáles cree que son los principales cambios que pueden afectar las actividades de producción, comercialización y la alimentación? ¿Y de qué manera?

Principales cambios (políticos, económicos, sociales, culturales, ambientales)	**Efecto** (+ o -)	**Componente afectado:** social, ecológico
1....		

5. ¿Y cuáles cree que son las mayores debilidades de la institución que no les permitirían superar los problemas que se den por estos cambios?

6. ¿Y cuáles cree que son las fortalezas de la institución que les pueden ayudar para responder a los cambios negativos?

7. ¿Usted ha escuchado sobre el término "buen vivir"? → ¿Para usted qué significa? → ¿Esta institución trabaja para contribuir con el "buen vivir?

8. ¿Usted ha escuchado sobre el término "soberanía alimentaria"? → ¿Para usted qué significa? → ¿Esta institución trabaja para contribuir con la "soberanía alimentaria"?

9. ¿Usted cree que es posible *satisfacer las necesidades* de la localidad, realizar actividades agropecuarias, y al mismo tiempo *cuidar los bosques y otros recursos* naturales como el agua? → ¿Han propuesto alternativas dentro de este tema?

10. ¿Ha escuchado de proyectos para la conservación como el programa "Socio-Bosque"? → ¿Desde esta institución que opinión se maneja en relación con estos proyectos?

11. Por último, ¿Dentro de esta institución se promociona el consumo de comidas tradicionales? → ¿Cómo?

Estimado/a, muchas gracias por su tiempo y atender a esta entrevista. ¿Quizás me podría recomendar algún nombre de otro actor clave al que usted crea conveniente que deba realizarle esta entrevista?

Appendix 3.1 Working definitions for each second-tier SES variables used to describe the agri-food system as SES using the Ostrom's framework

Second-tier		Working definition	Reference
RS3	Size of resource system	Agroecosystem spatial boundaries, equivalent to a farm, farmland, plot, etc., or, to a set of these units.	Gliessman (2002); McGinnis (2011)
RS4	Human-constructed facilities	Technological infrastructure for the design and management of the agri-food production systems (e.g., irrigation systems, silos, road systems).	Gliessman (2002)
RS5	Productivity of system	Biomass production from the agro-ecosystem.	Gliessman (2002)
RS9	Location	Geographical space where the resource system is located. It can be characterized by a set of environmental factors (e.g., altitudinal variations, precipitation regime) and/or be a clearly defined geographical space with protection to achieve the long-term conservation of nature with associated ecosystem services and cultural values.	Gliessman (2002); Dudley (2008); McGinnis (2011)
RU5	Number of units	Biotic factors that form part of the agro-ecosystem.	Gliessman (2002)
RU6	Distinctive characteristics	Characteristics of living entities. For example, the micronutrient richness that have the crops and animals.	Kennedy et al. (2013); McGinnis and Ostrom (2014)
GS4	Property-rights systems	Defines the relations among people with respect to things, and specifies both duties and obligations.	McGinnis and Ostrom (2014)
GS5	Operational rules	Implementation of practical decisions by those individuals who have been authorized (or allowed) to take these actions as a consequence of collective choice processes.	McGinnis and Ostrom (2014)
GS6	Collective-choice rules	The processes through which institutions are constructed and policy decisions made, by those actors authorized to participate in the collective decisions as a consequence of constitutional choice processes.	McGinnis and Ostrom (2014)
A1	Number of actors	It comprises the labor force defined as the number of people in working age (> 15 years) (they may or may not have employment).	INEC (2014)
A2	Socioeconomic attributes	Characteristics of actors related to social (e.g., ethnic background, education, skills, gender, values, etc.) and economic dimensions.	Ostrom and Cox (2010); Anderies and Janssen (2013)
A6	Social capital	Social capital comprises the range of relationships, networks and institutions that allow people to build trust and cooperation. In these sense, it includes: the reciprocity, a norm of behavior that encourages members of a group to cooperate with others who have cooperated with them in previous encounters. The trust, a measure of the extent to which members of this community feel confident that other members will come to their assistance when needed. The networks, ties, not bounded by organized groups that facilitate the informal exchange of information or materials, such as seeds.	McGinnis (2011); Meinzen-Dick et al. (2014)
A8	Importance of	Actors are dependent on the resource system for a	(Ostrom 2009)

Second-tier		Working definition	Reference
	resource	substantial portion of their livelihoods. It includes different types of importance such as: food, cultural and economic importance.	
A9	Technologies available	Practices used by actors for the design and management of the agri-food production systems. Actors can use agro-ecological practices (based on the application of ecological concepts and principles) or modern/conventional practices (based on maximizing short-term production).	Gliessman (2002)

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Appendix 3.2 Summary of the third-tier SES variables (food sovereignty indicators) obtained from the households' questionnaires responses (N=116) used for the different analysis performed in the study

First-tier [(a)]	Second-tier [(a)]	Third-tier: indicators	Description	Type	Attributes	Food sovereignty pillar
RS	RS3	RS3.1 – Size of farm	Land area by household: hectares	Numeric	Number	Access to resources
	RS4	RS4.1 – Access to roads paved	If the rural town have access to main roads paved	Dummy	1: yes; 0: no	Access to resources
	RS5	RS5.1 – Production of processed dairy	Production of processed dairy: fresh cheeses, kg per week (1kg = 7.7 l of milk)	Numeric	Number	Production model
	RS9	RS9.1 – Location in altitudinal zones	Low zone: 1800-2200 m.a.s.l. Middle zone: 2200-2600 m.a.s.l. High zone: 2600-3000 m.a.s.l. [(b)]	Nominal	LowZone MiddleZone HighZone	Production model
		RS9.2 – Location in protected area	If the community is located within protected area	Dummy	1: yes; 0: no	-
RU	RU5	RU5.1 – Crop richness	Specific richness of farmed species (except medicinal and ornamental)	Numeric	Number	Production model
		RU5.2 – Small animal richness	Number of types of small bred animals. Types considered include: sheep, pig, poultry, guinea pigs, beekeeping and aquaculture	Numeric	Number	Production model
		RU5.3 – Number of cattle	Number of cattle	Numeric	Number	Access to resources
	RU6	RU6.1 – Dietary diversity produced	Dietary produced diversity (in the last year) regarding the food micronutrients: WDDS index[(c)]. It constitutes the potential of the farm as source of highly nutritious food.	Numeric	Number	Right to food
GS	GS4	GS4.1 – Land tenure	Legal status of land	Nominal	Properties: Without titles Only with titles Both (with & without titles)	Access to resources

First-tier [a]	Second-tier [a]	Third-tier: indicators	Description	Type	Attributes	Food sovereignty pillar
	GS5	GS5.1 – Access to retailing location	If at least one household member has a retail location in local markets	Dummy	1: yes; 0: no	Agri-food policies & Local markets
	GS6	GS6.1 – Member of agro-ecological network of Loja (RAL)	If at least one household member belongs to community based organization called *Red Agroecológica Loja* (RAL)	Dummy	1: yes; 0: no	Social organization
		GS6.2 – Member of community- based organizations (*Comunas*)	If at least one household member belongs to community based organization called *Comuna*	Dummy	1: yes; 0: no	Social organization
A	A1	A1.1 – Size of labor force	Number of people in household with >15 years	Numeric	Number	Production model
		A1.2 – Gender of respondent	-	Dummy	1: female; 0: male	-
	A2	A2.1 – Self-identification as *Saraguro* indigenous	Regarding the culture, if the household is self-identified as *Saraguro* indigenous	Dummy	1: yes; 0: no	Social organization
		A2.2 – Gender equality in the distribution of labor responsibilities	If 50% or more of activities are performed by both (female and male). Activities considered are: eight to agricultural production and animal production according to animal types in the household, three to processing (food preservation to self-consumption, dairy and non-dairy products to sell), three to distribution (crops, livestock, dairy products), and one to off-farm works.	Dummy	1: yes; 0: no	Production model
		A2.3 – Marketing of agri-food products	If household has as strategy of income generation the marketing of some agri-food product (crops, cattle, small animals and/or their products)	Dummy	1: yes; 0: no	Local markets
		A2.4 – Off-farm work	If household has as strategy of income generation the off-farm work	Dummy	1: yes; 0: no	Production model
		A2.5 – Access to training	If at least one household member during the last year received a training	Dummy	1: yes; 0: no	Agri-food policies & Access to resources

First-tier [a]	Second-tier [a]	Third-tier: indicators	Description	Type	Attributes	Food sovereignty pillar
		A2.6 – Access to credit	If at least one household member during the last year had access to credit	Dummy	1: yes; 0: no	Access to resources
	A6	A6.1 – Participation in community-based working groups	If at least one household member during the last three years participated in working groups convened by the community (*mingas*)	Dummy	1: yes; 0: no	Social organization
		A6.2 – Participation in services exchanges	If at least one household member participated during the last three years in exchanges of services-services	Dummy	1: yes; 0: no	Social organization
		A6.3 – Participation in seeds exchanges	If at least one household member during the last three years participated in exchanges of seeds	Dummy	1: yes; 0: no	Social organization
	A8	A8.1 – Importance of crops for self-consumption	Proportion of crops for HH consumption (from total of species farmed)	Numeric	Number	Right to food
		A8.2 – Importance of small animals for self - consumption	Proportion of small animals for HH consumption (from total of types of small bred animals)	Numeric	Number	Right to food
		A8.3 – Importance of traditional foods	Frequency of consuming corn - traditional food (times per week) [d]	Ordinal	1: low 2: medium 3: high	Right to food
		A8.4 – Dependence of non-traditional purchased foods low in micronutrients	Frequency of consuming noodles - purchased food (times per week) [d]	Ordinal	1: low 2: medium 3: high	Right to food
		A8.5 – Income diversification	Diversification of incomes within the household. The types considered are: five on-farm incomes (sell of crops, dairy and non-dairy products, small animals, and cattle), one off-farm incomes (works), and three non-farm incomes (government subsidies *Bono de Desarrollo Humano*, remittances, land lease).	Numeric	Number	Production model
		A8.6 – Importance of on-farm incomes	Proportion of income diversification due to on-farm incomes	Numeric	Number	Production model

First-tier [a]	Second-tier [a]	Third-tier: indicators	Description	Type	Attributes	Food sovereignty pillar
		A8.7 – Dependence on middlemen	Selling (crops & dairy) to middlemen	Dummy	1: yes; 0: no	Local markets
		A8.8 – Weekly frequency of sell	Frequency of selling (times per week)	Ordinal	0: no sold 1: sells, but less than once 2: once 3: more than once	Local markets
	A9	A9.1 – Use of organic inputs on crops	If they use organic inputs to control pests. Including the *bioles* [e]	Dummy	1: yes; 0: no	Production model
		A9.2 – Use of chemical inputs on crops	If they use chemical inputs to control pests	Dummy	1: yes; 0: no	Production model
		A9.3 – Use of ethno-veterinary products	If they use ethno-veterinary products to control diseases on small animals	Dummy	1: yes; 0: no	Production model

(a) **RS**=Agro-ecosystem boundaries; RS3=Size of resource system; RS4=Human-constructed facilities; RS5=Productivity of system; RS9=Location. **RU**=Agro-ecosystem units; RU5=Number of units; RU6=Distinctive characteristics. **GS**=Agri-food governance system; GS4=Property-rights systems; GS5=Operational-choice rules; GS6=Collective-choice rules. **A**=Agri-food system actors; A1= Number of actors; A2=Socioeconomic attributes; A6=Social capital; A8=Importance of resource; A9=Technology available.

(b) Zoning based on direct observation and cartographic information about the classification of vegetation units (Cueva 2010). The altitudinal range, from about 1800 to 3000m.a.s.l., corresponds to a temperate climate (Cepeda et al 2007: 46).

(c) WDDS index, based on *Women's Dietary Diversity* Project designed by FAO (Kennedy et al 2013).

(d)Frequency: low = sells, but 1 time or less/week; medium = 2-3 time; high = 4 times or more.

(e) *Bioles* are solutions prepared on-farm based on a fermentation of natural herbs which have a double function: pest control and crop nutrition.

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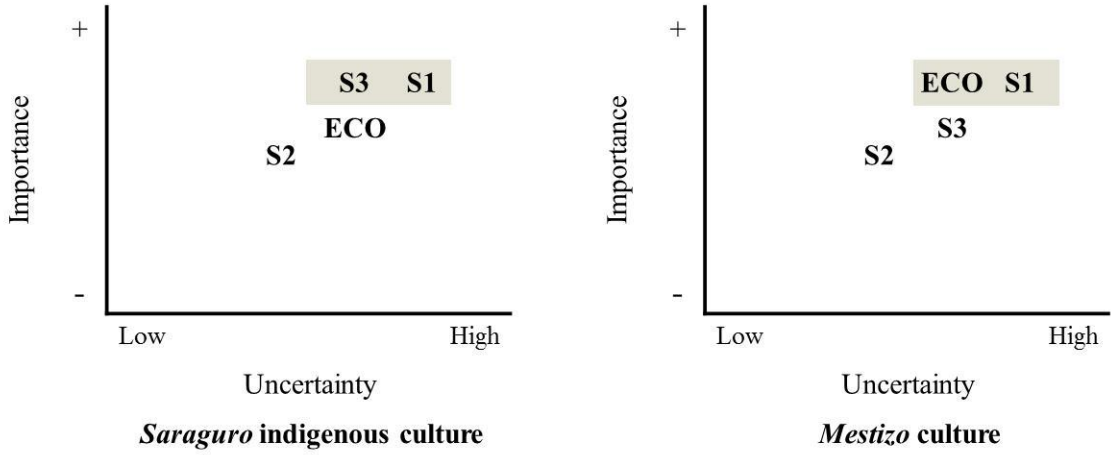
Cueva J (2010) Elaboración y análisis del estado de la cobertura vegetal de la provincia de Loja - Ecuador. Universidad Internacional de Andalucía, España.

Kennedy G, Ballard T, Dop M (2013) Guidelines for measuring household and individual dietary diversity. FAO, Roma

Appendix 4.1 Prioritization of drivers of change by RAL producers.

The scheme shows the prioritization through the uncertainty and importance assigned to each driver of change. At the left side the prioritization performed by producers from *Saraguro* indigenous communities and at the right side the prioritization performed by producers from *Mestizo* communities. The drivers highlighted in gray are the baseline for the scenario analysis within each workshop.



Notes: S= Social, economic and political drivers; S1= Agri-food policies; S2= Rural-urban migration; S3= Changes in cultural context. **ECO**= Environmental changes such as changes in fertility, soil erosion and deforestation.

Appendix 4.2 Adaptive strategies and coping mechanisms within each designed future scenario: I: "*Campo en riesgo, solo algunos resistimos*"; II: "*Comuna nueva vida*"; III: *"Sumak kawsay"*; IV: "*Nuevo amanecer*"

Drivers of change	Strategies in Scenario I	Strategies in Scenario II	Strategies in Scenario III	Strategies in Scenario IV
AGRI-FOOD POLICIES				
Commercialization policies	Increase income diversification by off-farm works [(b)] Increase work for women within their households [(b)] Continue lowering the prices of products (from peasant agriculture) to sell in local markets [(b)] Decrease planted area and crop diversity [(b)]	Participate within the policy making processes linked to small farmer policies [(a)] Joining in the communities and organize protest marches to demand the marketing rights [(b)] Diversify the incomes through making and selling crafts [(a)] Lobbying (through the communal council) in order to achieve a transport service to bring agri-food products to local markets [(a)] Lobbying (through the communal council) in order to achieve the access to international markets [(a)]	Participate within the policy making processes linked to small farmer policies [(a)] Joining in the communities and organize protest marches to demand the marketing rights [(b)] Diversify the incomes through community tourism activities [(a)]	Participate within the policy making processes linked to small farmer policies [(a)] Organizing within the RAL to plant different types of vegetable (supply management) [(a)] Diversify the incomes through the sale of add value products [(a)] Growing Andean crops that currently have a good price within the market, as the legume *Lupinus mutabilis* [(a)] Continue using their own seeds (seed autonomy) [(a)] Manage the improvement of local road system [(a)]
Policies related to land	The decisions about land titling are taken individually [(a)]	The decisions will be made in common assembly and will be supported by all commoners [(a)]	The decisions about land titling are taken individually [(a)]	Idem
Food safety	Decrease milk production and cheese making [(b)]	Training within the hygiene subject regarding the food handling processes for artisanal processing [(a)] Diversify the production. Instead of selling raw meat, make artisanal products for selling, e.g., roasted meats [(a)]	Training hygiene practices regarding food handling processes for artisanal processing [(a)]	At national level, in coordination with the Ecuadorian Coordinator of Agroecology (CEA), developing a manual of good farming practices. Additionally, lobbying (through the RAL and other agroecological networks) to achieve the approval of this manual by the State [(a)]
Access to assets	Increase income diversification by off-farm works [(b)]	The communal council lobbies and manages the training for agro-ecological production [(a)] Women have access to and participate more of training in diverse issues (e.g., gender violence, self-esteem) [(a)] Creation and strengthening of alternative sources of credit (e.g.,	Women have access to and participate more of training in diverse issues (e.g., gender violence, self-esteem) [(a)] Children have access to indigenous knowledge through bilingual education system [(a)]	Continue the coordination with the local university for training in the agroecological production subject through workshops [(a)] Creation and strengthening of alternative sources of credit (e.g., "*fondo al compartir"* to give microcredits within the RAL) [(a)]

Drivers of change	Strategies in Scenario I	Strategies in Scenario II	Strategies in Scenario III	Strategies in Scenario IV
		"*cajas solidarias"* within *comunas*) [(a)]		
RURAL-URBAN MIGRATION				
Linked to off-farm work	Increase migration of young people [(b)] Increase work for women within their households [(b)]	Rescue the traditional ways of working within the community (e.g., *mingas*) and the reciprocity [(a)]	Idem	-
CHANGES IN CULTURAL CONTEXT				
Changes in identity and local knowledge	Keeping RAL members (but there are a decrease of generational renewal and entry of new members) [(b)]	Support the organizational process and keep the agro-ecological vision which is led by RAL (the network grows) [(a)] Keeping the generational transmission of agricultural practices associated with indigenous knowledge [(a)] Rescue the traditional knowledge associated with Andean agriculture [(a)] The communal council lobbies and manages the training for the revalue of culture [(a)]	Support the organizational process and keep the agro-ecological vision which is led by RAL (the network grows) [(a)] Keeping the generational transmission of agricultural practices associated with indigenous knowledge [(a)] Rescue the indigenous knowledge through bilingual education system [(a)]	Support the organizational process and keep the agro-ecological vision which is led by RAL (the network grows) [(a)] Motivating rural communities through workshops and dialogue about the value of rural life [(a)]
Changes in consumption habits by urban consumers	Decrease planted area and crop diversity [(b)]	Sensitize the urban consumer through agro-ecological events focused on the value of the agro-ecological and artisanal products [(a)]	Sensitize the urban consumer sharing information about the nutritional and medicinal properties of Andean products [(a)]	Sensitize the urban consumer though agro-ecological events focused on the value of the agro-ecological and artisanal products [(a)]
Changes in consumption habits at household level	Keep home gardens diversity [(a)] Introduce cheap food low in micronutrients [(b)] Lower consumption of traditional foods[(b)]	Women sensitize children about the importance of healthy and culturally appropriate food [(a)] Rescue and keep the diversity of home gardens [(a)] At the household level, buy less rice and bread, and increase the consumption of Andean foods and local products [(a)] Diversify the food sources through the exchanges of food between the partners of the RAL [(a)] Continue planting Andean crops to keep the diversity of home gardens and pest control [(a)]	Women sensitize to children about the importance of healthy and culturally appropriate food [(a)] Rescue and keep the diversity of home gardens [(a)] At the household level, buy less rice and bread, and increase the consumption of Andean foods and local products [(a)] Diversify the food sources through the exchanges of food between the partners of the RAL [(a)] Continue planting Andean crops to keep the diversity of home gardens and pest control [(a)]	Women sensitize children about the importance of healthy and culturally appropriate food [(a)] Rescue and keep home gardens diversity [(a)]

Drivers of change	Strategies in Scenario I	Strategies in Scenario II	Strategies in Scenario III	Strategies in Scenario IV
			Rescue the culturally appropriate eating habits [a]	
Changes in valuation of *Saraguro* traditional festivals	-	Rescue the culture and traditional festivals that highlight the connection of the indigenous people with Andean agriculture [a]	Idem	-
ENVIRONMENTAL CHANGES				
Rain patterns and deforestation and soil erosion	Decrease planted area [b]	Perform ditches. Planting in terraces. Planting live fences. Apply bioles and natural fertilizers. Implement agroforestry and silvopastoral systems. Reforestation with native trees like alders. [a] Building awareness through workshops within communities about the consequences of the use of agrochemical on soil fertility and family health [a]	Idem	Perform ditches. Planting in terraces. Planting live fences. Apply bioles and natural fertilizers. Implement agroforestry and silvopastoral systems. Reforestation with native trees like alders. [a] Building awareness through workshops within communities about the consequences of deforestation on soil erosion [a]

(a) Adaptive strategies: Proactive strategies (generally new, planned and long term strategies) to adapt to changes
(b) Coping Mechanisms: Reactive strategies (generally short term strategies) to cope to changes

Appendix 4.3 Script of interview

ENTREVISTAS DE VULNERABILIDAD

Nombre:..... Edad:.....años Sexo: F○ M○ Lugar de residencia:.....
RAL: ○si ○no Cuánto tiempo: ....años ¿Cargo en RAL?:..... Cultura: ○Saraguro ○Mestizo

	PRODUCCIÓN:						
1	Según las entrevistas anteriores el cambio del **CLIMA** es un factor importante que puede influir (afectar/cambiar) la **producción** de alimentos. ¿Usted qué opina?						
1.1	**ECO** Lluvia, heladas, viento...	**¿Cómo se da este cambio de clima?** Duración, intensidad,	**¿Le afecta direc?**	**¿Desde cuándo ?**	**Benefi. O Perjud. + / -**	**→ ¿Por qué?:** ¿Principalmente a qué afecta? ¿Qué produce? ¿A quién más afecta? M o H	**Seguirá afectando en futuro**
			○Si ○No	....año		Afecta a: ○M ○H Produce:	○Si ○No
			○Si ○No	....año		Afecta a: ○M ○H Produce:	○Si ○No
			○Si ○No	....año		Afecta a: ○M ○H Produce:	○Si ○No
2	¿Hay **OTRO CAMBIO DEL AMBIENTE** que usted piensa que es un problema para la **producción** de alimentos?						
2.1	**ECO** Deforestación, erosión/suelo...	**¿Cómo se da este cambio?**	**¿Le afecta direc?**	**¿Desde cuándo ?**	**Benefi. O Perjud. + / -**	**→ ¿Por qué?:** ¿Principalmente a qué afecta? ¿Qué produce? ¿A quién más afecta? M o H	**Seguirá afectando en futuro**
			○Si ○No	....año		Afecta a: ○M ○H Produce:	○Si ○No
			○Si ○No	....año		Afecta a: ○M ○H Produce:	○Si ○No
3	¿Cuáles son todas las cosas que hacen (estrategias) su familia / comunidad/ red para enfrentar estos cambios (-)?						

3.1	**Drivers ECO**	**Lo que hacen para enfrentar los cambios:** (o fortalecer si es +)	**Quién la hace?**	Las hace cuando: *Está ya con problm *Antes de.	Cómo empezó a hacer estas cosas? Conocm. de padres, capacit → ¿de?	Las hace solo su: Familia Comunidad Sarag./RAL
	IMP○	1.-	○M ○H	○Reactiva ○Proactiva		
	IMP○	2.-	○M ○H	○Reactiva ○Proactiva		
	IMP○	3.-	○M ○H	○Reactiva ○Proactiva		
	IMP○	4.-	○M ○H	○Reactiva ○Proactiva		
	IMP○	5.-	○M ○H	○Reactiva ○Proactiva		
	IMP○	6.-	○M ○H	○Reactiva ○Proactiva		

4	Según entrevistas anteriores los cambios **SOCIALES, DE LA CULTURA Y DE LA ECONOMÍA** pueden influir (afectar/cambiar) en la **PRODUCCIÓN** de alimentos. ¿Usted qué opina?							
4.1	**S**	**Descripción de S**	**¿Le afecta direc?**	**¿Desde cuándo ?**	**Benefi. O Perjud. + / -**	→ **¿Por qué?:** ¿Principalmente a qué afecta? ¿Qué produce? ¿A quién más afecta? M o H		**Seguirá afectando**
			○Si ○No	….año		Afecta a:	○M ○H	○Si ○No
						Produce:		
			○Si ○No	….año		Afecta a:	○M ○H	○Si ○No
						Produce:		
			○Si ○No	….año		Afecta a:	○M ○H	○Si ○No
						Produce:		
			○Si ○No	….año		Afecta a:	○M ○H	○Si ○No
						Produce:		
			○Si ○No	….año		Afecta a:	○M ○H	○Si ○No
						Produce:		
5	… los cambios en las **POLÍTICAS** pueden influir (afectar/cambiar) en la **producción** de alimentos ¿Usted qué opina?							
5.1	**S**	**Descripción de S**	**¿Le afecta direc?**	**¿Desde cuándo ?**	**Benefi. O Perjud. + / -**	→ **¿Por qué?:** ¿Principalmente a qué afecta? ¿Qué produce? ¿A quién más afecta? M o H		**Seguirá afectando**
			○Si ○No	….año		Afecta a:	○M ○H	○Si ○No
						Produce:		
			○Si ○No	….año		Afecta a:	○M ○H	○Si ○No
						Produce:		
			○Si ○No	….año		Afecta a:	○M ○H	○Si ○No
						Produce:		
			○Si ○No	….año		Afecta a:	○M ○H	○Si ○No
						Produce:		
6	¿Cuáles son todas las cosas que hacen (estrategias) su familia / comunidad/ red para enfrentar estos cambios (-)?							
6.1	**Drivers S**	**Lo que hacen para enfrentar los cambios:** (o fortalecer si es +)				**Quién la hace?**	Las hace cuando: *Está ya con problm *Antes de.	Cómo empezó a hacer estas cosas? Conocm. de padres, capacit → ¿de?	Las hace solo su: Familia Comunidad Sarag./RAL
	IMP○	1.-				○M ○H	○Reactiva ○Antes		
	IMP○	2.-				○M ○H	○Reactiva ○Antes		
	IMP○	3.-				○M ○H	○Reactiva ○Antes		
	IMP○	4.-				○M ○H	○Reactiva ○Antes		
	IMP○	5.-				○M ○H	○Reactiva ○Antes		
	IMP○	6.-				○M ○H	○Reactiva ○Antes		
	IMP○	7.-				○M ○H	○Reactiva ○Antes		
7	Entre todos los factores (ECO/S) que me ha dicho. ¿Para usted cuáles son los 4 más importantes? señalar IMP ○								
8	¿Cómo es la calidad de suelo que dispone? ¿El tamaño de sus predios es suficiente para producir los alimentos?								
	Calidad:				Cantidad:				

PROCESAMIENTO:

9 ¿Usted procesa algún producto para vender?

○ Quesillo	○ Tortillas	○ Coladas-	○ Empanadas -	○ Pollo/cuy asado	○ Otros:

10 ¿Usted piensa a futuro procesar algún otro producto para vender?

○ Yogurt	○ Requesón	○ Mermelada-fruta	○ Tortillas-	○ Pollo/cuy asado	○ Otros:

11 ¿Hay algún problema **AMBIENTAL** que influya (afectar/cambiar) para el **procesamiento** de alimentos para vender?

11.1 **ECO**	**Descripción**	**¿Le afecta direc?**	**¿Desde cuándo ?**	**Benefi. O Perjud. + / -**	→ **¿Por qué?:** ¿Afecta a procesamiento de…? ¿A quién más afecta? M o H		**Seguirá afectando en futuro**
		○Si ○No	….año		Afecta a:	○M ○H	○Si ○No
					Produce:		

12 Usted cree que los cambios **SOCIALES, DE LA CULTURA Y DE LA ECONOMÍA** son factores que pueden influir (afectar/cambiar) al momento de decidir qué se va a **procesar** para vender ¿Usted qué opina?

12.1 **S**	**Descripción de S**	**¿Le afecta direc?**	**¿Desde cuándo ?**	**Benefi. O Perjud. + / -**	→ **¿Por qué?:** ¿Principalmente a qué afecta? ¿Qué produce? ¿A quién más afecta? M o H		**Seguirá afectando**
		○Si ○No	….año		Afecta a:	○M ○H	○Si ○No
					Produce:		
		○Si ○No	….año		Afecta a:	○M ○H	○Si ○No
					Produce:		

13 Según entrevistas anteriores los cambios en las **POLÍTICAS** pueden influir (afectar/cambiar) al momento de decidir qué y cómo se va a **procesar** los alimentos para vender ¿Usted qué opina?

13.1 **S**	**Descripción de S**	**¿Le afecta direc?**	**¿Desde cuándo ?**	**Benefi. O Perjud. + / -**	→ **¿Por qué?:** ¿Principalmente a qué afecta? ¿Qué produce? ¿A quién más afecta? M o H		**Seguirá afectando**
		○Si ○No	….año		Afecta a:	○M ○H	○Si ○No
					Produce:		
		○Si ○No	….año		Afecta a:	○M ○H	○Si ○No
					Produce:		

14 ¿Cuáles son todas las cosas que hacen (estrategias) su familia /comunidad/ red para enfrentar estos cambios (-) ?

14.1 **Drivers ECO/S**	**Lo que hacen para enfrentar los cambios:** (o fortalecer si es +)	**Quién la hace?**	Las hace cuando: *Está ya con problm *Antes de.	Cómo empezó a hacer estas cosas? Conocm. de padres, capacit → ¿de?	Las hace solo su: Familia Comunidad Sarag./RAL
IMP○	1.-	○M ○H	○Reactiva ○Antes		
IMP○	2.-	○M ○H	○Reactiva ○Antes		
IMP○	3.-	○M ○H	○Reactiva ○Antes		
IMP○	4.-	○M ○H	○Reactiva ○Antes		
IMP○	5.-	○M ○H	○Reactiva ○Antes		
IMP○	6.-	○M ○H	○Reactiva ○Antes		

15 Entre todos los factores (ECO/S) que me ha dicho. ¿Para usted cuáles son los 4 más importantes? señalar IMP ○

16 ¿Cómo es la calidad de los materiales que dispone para procesar? ¿La cantidad que tiene es suficiente para procesar?

Calidad:	Cantidad:

DISTRIBUCIÓN Y COMERCIALIZACIÓN:

17 Quizá una parte de lo que usted produce (alimentos/comida) lo destina para: ○ pagar trabajos en la finca; ○ compartir con familiares; ○ intercambiar; ○ Fiestas en la comunidad; ○ Otro destino:_____ Cuántas veces/año:____ ¿Solo entre familia?:____ ¿Cuáles fiestas?:_____

17.1 ¿Por qué ha disminuido el sentido comunitario de antes de compartir alimentos?
Factores que han provocado este cambio:____
Desde cuándo esto afecta: ____

18 Según las entrevistas anteriores el cambio del **CLIMA** es un factor que puede influir (afectar/cambiar) para la **COMERCIALIZACIÓN** ¿Usted qué opina? → ¿Hay otros cambios del AMBIENTE que puedan afectar?

18.1	**ECO**	**Descripción**	**¿Le afecta direc?**	**¿Desde cuándo ?**	**Benefi. O Perjud. + / -**	**→ ¿Por qué?:** ¿Principalmente a qué afecta? ¿Qué produce? ¿A quién más afecta? M o H		**Seguirá afectando en futuro**
			○Si ○No	….año		Afecta a:	○M ○H	○Si ○No
						Produce:		

19 Según las entrevistas anteriores los cambios **SOCIALES, DE LA CULTURA Y DE LA ECONOMÍA** son factores que pueden influir (afectar/cambiar) para la **comercialización**. ¿Usted qué opina?

19.1	**S**	**Descripción de S**	**¿Le afecta direc?**	**¿Desde cuándo ?**	**Benefi. O Perjud. + / -**	**→ ¿Por qué?:** ¿Principalmente a qué afecta? ¿Qué produce? ¿A quién más afecta? M o H		**Seguirá afectando**
			○Si ○No	….año		Afecta a:	○M ○H	○Si ○No
						Produce:		
			○Si ○No	….año		Afecta a:	○M ○H	○Si ○No
						Produce:		

20 … los cambios en las **POLÍTICAS** pueden influir (afectar/cambiar) para la **comercialización** ¿Usted qué opina?

20.1	**S**	**Descripción de S**	**¿Le afecta direc?**	**¿Desde cuándo ?**	**Benefi. O Perjud. + / -**	**→ ¿Por qué?:** ¿Principalmente a qué afecta? ¿Qué produce? ¿A quién más afecta? M ó H		**Seguirá afectando**
			○Si ○No	….año		Afecta a:	○M ○H	○Si ○No
						Produce:		
			○Si ○No	….año		Afecta a:	○M ○H	○Si ○No
						Produce:		
			○Si ○No	….año		Afecta a:	○M ○H	○Si ○No
						Produce:		
			○Si ○No	….año		Afecta a:	○M ○H	○Si ○No
						Produce:		
			○Si ○No	….año		Afecta a:	○M ○H	○Si ○No
						Produce:		
			○Si ○No	….año		Afecta a:	○M ○H	○Si ○No
						Produce:		

21 ¿Cuáles son todas las cosas que hacen (estrategias) su familia / comunidad/ red para enfrentar estos cambios (-)?

21.1	**Drivers ECO/S**	**Lo que hacen para enfrentar los cambios:** (o fortalecer si es +)	**Quién la hace?**	Las hace cuando: *Está ya con problm *Antes de.	Cómo empezó a hacer estas cosas? Conocm. de padres, capacit → ¿de?	Las hace solo su: Familia Comunidad Sarag./RAL
	IMP○	1.-	○M ○H	○Reactiva ○Antes		
	IMP○	2.-	○M ○H	○Reactiva ○Antes		
	IMP○	3.-	○M ○H	○Reactiva ○Antes		
	IMP○	4.-	○M ○H	○Reactiva ○Antes		
	IMP○	5.-	○M ○H	○Reactiva ○Antes		

22	Entre todos los factores (ECO/S) que me ha dicho. ¿Para usted cuáles son los 4 más importantes? señalar IMP ○
23	¿Cómo es la calidad del puesto de venta que dispone? ¿El tamaño del puesto es suficiente?

Calidad:	Cantidad:

AUTO-CONSUMO:

24 Según entrevistas anteriores los cambios **SOCIALES, DE LA CULTURA Y DE LA ECONOMÍA** son factores que pueden influir (afectar/cambiar) las decisiones sobre lo que se prefiere **comer** ¿Usted qué opina?

24.1 S	Descripción de S	¿Le afecta direc?	¿Desde cuándo ?	Benefi. O Perjud. + / -	→ ¿Por qué?: ¿Afecta a consumo de…? ¿A quién más afecta? M o H		Seguirá afectando
		○Si ○No	….año		Afecta a:	○M ○H	○Si ○No
					Produce:		
		○Si ○No	….año		Afecta a:	○M ○H	○Si ○No
					Produce:		
		○Si ○No	….año		Afecta a:	○M ○H	○Si ○No
					Produce:		
		○Si ○No	….año		Afecta a:	○M ○H	○Si ○No
					Produce:		
		○Si ○No	….año		Afecta a:	○M ○H	○Si ○No
					Produce:		

25 …las **POLÍTICAS** son factores que pueden influir (afectar/cambiar) las decisiones sobre lo que se prefiere **comer** ¿Usted qué opina?

25.1 S	Descripción de S	¿Le afecta direc?	¿Desde cuándo ?	Benefi. O Perjud. + / -	→ ¿Por qué?: ¿Afecta a consumo de…? ¿A quién más afecta? M o H		Seguirá afectando
		○Si ○No	….año		Afecta a:	○M ○H	○Si ○No
					Produce:		
		○Si ○No	….año		Afecta a:	○M ○H	○Si ○No
					Produce:		
		○Si ○No	….año		Afecta a:	○M ○H	○Si ○No
					Produce:		

26 ¿Cuáles son todas las cosas que hacen (estrategias) su familia / comunidad/ red para enfrentar estos cambios (-)?

26.1 Drivers S	Lo que hacen para enfrentar los cambios: (o fortalecer si es +)	Quién la hace?	Las hace cuando: *Está ya con problm *Antes de.	Cómo empezó a hacer estas cosas? Conocm. de padres, capacit → ¿de?	Las hace solo su: Familia Comunidad Sarag./RAL
IMP○	1.-	○M ○H	○Reactiva ○Antes		
IMP○	2.-	○M ○H	○Reactiva ○Antes		
IMP○	3.-	○M ○H	○Reactiva ○Antes		
IMP○	4.-	○M ○H	○Reactiva ○Antes		
IMP○	5.-	○M ○H	○Reactiva ○Antes		
IMP○	6.-	○M ○H	○Reactiva ○Antes		

27	Entre todos los factores (S) que me ha dicho. ¿Para usted cuáles son los 4 más importantes? señalar IMP ○
28	¿Cómo es la calidad de alimentación que tiene? ¿La cantidad de alimentos que produce es suficiente para alimentar su hogar?

Calidad:	Cantidad:

	GÉNERO:
29	Según entrevistas anteriores, el llevar dinero a la casa por la venta de productos se relaciona con algunos cambios dentro de la casa. ¿Usted qué opina? (…)
	Se da cuenta por:…

30.1	○ Valoran más su trabajo en la casa ¿Quién?..	○ Tiene más confianza en usted
	○ Le ayudan más con las tareas de la casa ¿Quién?..	○ Ahora es más fácil dialogar y conversar entre compañeras
	○ Toma más decisiones en la casa ¿Cuáles?..	○ En la comunidad las mujeres son más respetadas o valoradas.
	○ Pide créditos usted sola ¿le ha ayudado a?..	○ Otros cambios:.. Tiene independencia económica

Otros:…

31	Estos cambios ocurren solo:	
32.1	○ Su familia	¿Cuáles? →
	○ Toda su comunidad	¿Cuáles? →
	○ La cultura Saraguro	¿Cuáles? →
	○ Todas las de la RAL	¿Cuáles? →

33.	**¿A dónde acuden si necesitan ayuda?**	
33.1	**¿A dónde van?**	**Tipo de ayuda que obtienen** (Alimentos, capacitación, información, etc.)
	○ Familia	
	○ Comunidad	
	○ RAL	
	○ Otros:..	

	INDICADORES DE OUTCOMES
34	Cómo hemos visto, nuestro sistema agro-alimentario tiene las actividades de producción, procesamiento, comercialización y consumo. (mostrar FOTOS) Me podría decir cómo usted se da cuenta que este sistema va bien o va mal. ¿En qué se fija? (¿Cómo se da cuenta que el sistema está débil/fuerte frente a los problemas? ¿Cómo sabe que la agroecología le ayuda?)
	Se fija en:
34.1	En la siguiente lista yo tengo ejemplos que nos muestran si nuestro sistema va bien/mal elijamos 10 con los que usted se siente mejor:

Respecto a la **producción y acceso a alimentos**	**Dimensión ecológica** y servicios de regulación ecológica que el sistema provee a mi familia	**Dimensión cultural** que se relaciona a los alimentos (activ. agro-alimentarias)	Otras **dimensiones socio-económicas** que se relacionan al sistema y Sb.A.
○ Tengo tierra suficiente para producir ○ Tengo más cantidad de cosechas/leche ○ Alcanza para comer en la casa y nadie se queda con hambre ○ Las cosechan alcanzan para guardar para los tiempos difíciles ○ Alcanza para vender ○ Alcanza para compartir con la familia ○ Produzco alimentos sanos y nutritivos para comer en la casa ○ Compro cada vez menos alimentos para la comida de la casa (yo produzco más y gasto menos en compras) ○ Otros: …	○ Mis sembríos y animales resisten a las enfermedades ○ Mi suelo sigue fértil para los próximos sembríos ○ Mi huerta tiene una gran variedad de plantas ○ En mi terreno tengo una gran variedad de animales ○ Tengo menos plagas ○ Otros: …	○ Trabajamos de manera organizada con las compañeras (mingas…) ○ Sigo preparando las comidas nutritivas de los abuelos (conocimiento local/tradicional) ○ Converso con los consumidores y les doy consejos de alimentos sanos/nutritivos ○ Los consumidores prefieren mis alimentos sanos/nutritivos ○ Los consumidores prefieren mis alimentos artesanales ○ En las ferias tenemos un ambiente familiar y nos sentimos bien con las compañeras ○ La presencia de cada compañera es importante en la feria ○ Otros: …	○ Tengo un lugar en los mercados para vender ○ Ya no vendo a los intermediarios ○ Vendo más cantidad/ vendo todo (mejores ingresos) ○Vendo a mejores precios porque mis productos son orgánicos (mejores ingresos) ○Vendo a mejores precios porque vendo alimentos procesados (mejores ingresos) ○ Los hijos no tienen que salir a buscar trabajos fuera de la casa ○ A los hijos les va mejor en la escuela con la alimentación nutritiva (salud) ○ El sabor de los alimentos es mejor cuando son orgánicos ○ Otros: …

35	Le invito a participar en un taller. Su opinión será muy importante.
	○ Moraspamba/San Lucas ○ Illinzhapa/ Jimbilla
	Teléfono para contacto:

Appendix 4.4 Slides with protocol used in workshops

Actividad 1

INSCRIPCIÓN DE PARTICIPANTES

1

Actividad 2

PRESENTACIÓN DE LA AGENDA DEL DÍA Y OBJETIVOS DEL TALLER

Agenda del día

1. Inscripción de participantes
2. Presentación de la agenda del día y objetivos del taller
3. Dinámica y café de bienvenida
4. **Presentación de los factores de cambio** (objetivo 1)
5. **Diseño de alternativas de futuro de nuestro sistema agroalimentario** (objetivo 2)
6. **Estrategias para alcanzar el futuro deseado** (objetivo 3)
7. Comida
8. Evaluación del taller

Objetivos del taller

Ver video como ejemplo de lo que se va a trabajar

- **Objetivo 1:** Presentar los principales **motores de cambio que están afectando actualmente (y a futuro) al sistema agroalimentario** (producción, procesamiento, distribución-comercialización, auto-consumo)
- **Objetivo 2:** Diseñar **alternativas de futuro** del sistema agroalimentario: **¿Cómo estaremos en 15-20 años, en el 2030-2035?**
- **Objetivo 3:** Analizar las **estrategias** que se deben poner en marcha para llegar al futuro que todos deseamos

Actividad 3

DINÁMICA Y CAFÉ DE BIENVENIDA

Actividad 4 (parte 1)

PRESENTACIÓN DE LOS MOTORES DE CAMBIO (OBJETIVO 1)

CAMBIOS AMBIENTALES en:

comunidades de: Jimbilla, San Lucas, Saraguro y del cantón Loja

1. CAMBIOS DEL CLIMA:

- En los <u>últimos 20 años</u> ha habido un cambio en el ciclo de las lluvias y de los vientos. Las lluvias y los vientos son y serán mucho más fuertes y llegarán en otras fechas. Esto hará cambiar el calendario agrícola.

2. FERTILIDAD DEL SUELO:

- Cambios en la cultura que cambian las prácticas de manejo. Hay dos posibles cambios:
  - Los vecinos de nuestras comunidades tienen prácticas agro-ecológicas que permiten recuperar la fertilidad del suelo. "Copian" lo que hace la RAL.
  - Los vecinos de nuestras comunidades tienen malas prácticas como el uso de químicos. Esto hace que el suelo tenga menos fertilidad, y que cada vez usen más fertilizantes para poder producir.

3. DEFORESTACIÓN:

- Cambios en el uso que se da al terreno. Hay dos posibles cambios:
  - Seguimos un manejo agro-forestal (tenemos cultivos con árboles de aliso, frutales, etc).
  - Se sigue pelando la montaña para tener pastos y más lugares para siembra

Referencia: Productoras entrevistadas (Illinzhapa, San Lucas, cantón Loja)

POLÍTICAS DEL AGRO para Campesinos Andinos

1. LEGALIZACIÓN DE LA TIERRA

Existe un proceso obligatorio de legalización de la tierra (para mestizos e indígenas).

CAMBIOS EN LA (RE-) DISTRIBUCIÓN DE LA TIERRA

- Se establecen reglas claras para el cumplimiento de función social, ambiental y productiva de la tierra
- No se establecen reglas claras de cumplimiento de función social, ambiental y productiva de la tierra

CAMBIOS EN LA ORGANIZACIÓN EN LAS COMUNIDADES INDÍGENAS. Ellas deciden:

- Tener la titularidad a nivel comunitario (comunas)
- Tener la titularidad a nivel individual

Referencia: Productoras entrevistadas (Illinzhapa, San Lucas, cantón Loja)

POLÍTICAS DEL AGRO para Campesinos Andinos

2. POLÍTICA AGROALIMENTARIA:

- **A FAVOR** DEL AGRO-ANDINO

(tendencias alternativas a partir de la Constitución, Plan del Buen Vivir y La Ley de Soberanía Alimentaria (LORSA))

RESPECTO AL REGISTRO SANITARIO Y OTRAS

- Los movimientos campesinos participan para la crear el manual de "buenas prácticas campesinas artesanales"; el Estado reconoce este manual a nivel nacional.
- El Estado reconoce los sistemas participativos de garantía (SPG).

PROGRAMAS DEL ESTADO PARA COMERCIALIZACIÓN

- Se elimina el acuerdo con la Unión Europea.
- Los movimientos campesinos participan para la formulación de los programas del MAGAP.
- El MAGAP crea nuevos programas para la comercialización en mercados (locales, de exportación) a precios justos y da capacitaciones en agro- ecología.
- El Estado facilita el ingreso de los campesinos al programa de compras públicas de alimentos con precios justos (por ejemplo: desayunos escolares).
- Para acceder a estos programas es necesaria la legalización de las organizaciones

- **TODO SIGUE IGUAL** PARA EL AGRO-ANDINO

(tendencia actual en el agro)

QUESOS DE EUROPA

RESPECTO AL REGISTRO SANITARIO Y OTRAS

- El Estado obliga a tener un registro sanitario con pagos de trámites.

PROGRAMAS DEL ESTADO PARA COMERCIALIZACIÓN

- El MAGAP da poco apoyo a programas alternativos para la comercialización. Los precios están definido por la competencia y los intermediarios
- El Estado importa (trae de otros países) productos lácteos (queso, leche) y carne más baratos. La

SALIDA DEL CAMPO PARA IR A LA CIUDAD

1. TRABAJOS FUERA DE LA CASA:

- Hay un incremento de la salida de los hombres hacia las ciudades en busca de trabajo (por ejemplo en el sector de construcción) con consecuencias sobre la organización de la familia y la comunidad en relación con las actividades campesinas (por ejemplo la mujer se carga con más trabajo).

2. ESTUDIO DE LOS JÓVENES:

- Los jóvenes estudiantes salen a los colegios y universidades de la ciudad. Hay dos posibles cambios:
  - Los jóvenes obtienen profesiones (mayor acceso a educación e información) y valoran el campo.
  - Los jóvenes no valoran las actividades del campo (disminución del relevo inter-generacional).

Referencia: Productoras entrevistadas (Illinzhapa, San Lucas, cantón Loja)

CAMBIOS CULTURALES EN PRODUCCIÓN Y CONSUMO

1. ESTILO DE VIDA:

- Cambia el estilo de vida.

Por ejemplo: cambio de la cultura, cambio en la participación durante las celebraciones y trabajos comunitarios (mingas, intercambios - reciprocidad).

2. FORMAS DE CONSUMO:

- Cambio de las formas de consumo en todo el mundo. Hay dos posibles cambios:
  - Mayor conciencia del consumidor y preferencia de productos orgánicos y de trasformación artesanal.
  - Menor conciencia del consumidor y preferencia de productos "chatarra" e industriales.

3. IDENTIDAD Y CONOCIMIENTO LOCAL:

- Cambios en la cultura que cambian las prácticas de manejo. Hay dos posibles cambios:
  - Los campesinos se capacitan más en agro-ecología, las mujeres se organizan para la producción y la comercialización, más campesinos se organizan en movimientos agro-ecológicos a nivel local, de la provincia de Loja, nacional, y mundial.
  - Los campesinos dejan de sembrar los cultivos andinos. Se pierden los conocimientos tradicionales para sembrarlos y para su manejo.

Referencia: Productoras entrevistadas (Illinzhapa, San Lucas, cantón Loja)

Actividad 4 (parte 2)

PRIORIZACIÓN DE LOS FACTORES DE CAMBIO

SELECCIONAR 2 FACTORES:

SALIDA DEL CAMPO PARA IR A LA CIUDAD

CAMBIOS CULTURALES EN PRODUCCIÓN Y CONSUMO

POLÍTICAS DEL AGRO para Campesinos Andinos

CAMBIOS AMBIENTALES en:
comunidades de: Jimbilla, San Lucas, Saraguro y del cantón Loja

¿Este cambio es importante para las actividades campesinas? (importancia)				
	Mucho	..	..	
	Regular			
	Poco			
		No	Quizá	Si

¿Sabemos cómo se va a dar este cambio?
¿Sabemos lo que nos va a pasar en el 2030?
(incertidumbre)

Actividad 5

DISEÑO DE ALTERNATIVAS DE FUTURO DE NUESTRO SISTEMA AGROALIMENTARIO (OBJETIVO 2)

GRUPO 1	• GRUPO 2
Motor de cambio 1:	Motor de cambio 1:
Motor de cambio 2:	Motor de cambio 2:

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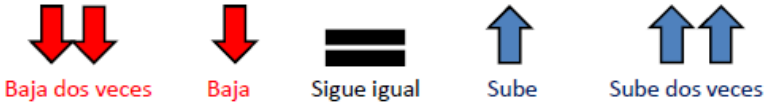

Actividad 6

EVALUACIÓN DE LOS INDICADORES

INDICADORES PRIORIZADOS EN LAS ENTREVISTAS

Indicadores
RESPECTO A LA PRODUCCIÓN Y ACCESO A ALIMENTOS:
Producción de alimentos nutritivos (para auto-consumo)
Producción propia para alimentarse en casa (nadie se queda con hambre y no compro)
Producción alcanza para vender
Producción para compartir con la familia
DIMENSIÓN ECOLÓGICA:
Mantenimiento de gran diversidad (de plantas y animales)
Cultivos y animales con resistencia a enfermedades (criollos/buena salud)
Menos plagas
Fertilidad del suelo (la mantengo en el tiempo)
DIMENSIÓN CULTURAL:
Consumidor valora productos artesanales
Consumidor prefiere alimentos sanos
Buen ambiente en ferias (cooperación para trabajar juntas)
Conocimiento tradicional (preparar comidas de los abuelos)
OTRAS DIMENSIONES:
Acceso a mercados para vender
Sabor de alimentos orgánicos (es mejor)
Mayores ingresos por ventas (vendo más; precios justos)
Mejora la salud de mi familia (los hijos van mejor en la escuela)

Indicador	Futuro de GRUPO 1 Título:	Futuro de GRUPO 2 Título: .....
RESPECTO A LA PRODUCCIÓN Y ACCESO A ALIMENTOS:		
(...) (...) (...)		
DIMENSIÓN ECOLÓGICA:		
(...) (...) (...)		
DIMENSIÓN CULTURAL:		
(...) (...) (...)		
OTRAS DIMENSIONES SOCIO-ECONÓMICAS:		
(...) (...) (...)		

Actividad 7

DESCANSO PARA PARTICIPANTES

(10 MINUTOS)

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Actividad 8

ESTRATEGIAS PARA ALCANZAR EL FUTURO DESEADO (OBJETIVO 3)

ESTRATEGIAS desde entrevistas:

SALIDA DEL CAMPO PARA IR A LA CIUDAD
- Trabaja más la mujer. - Se capacitan para sembrar y mejorar los ingresos.

CAMBIOS CULTURALES EN PRODUCCIÓN Y CONSUMO
- Aconseja a sus hijos/familiares para alimentación sana. - Compra menos pan, arroz; comen lo más natural y propio. Cultiva más para consumir dentro de la casa. Compra a las compañeras de la RAL lo que le falta. - Prepara más platos con verduras (aprende nuevas recetas). - Se concientiza en talleres de la RAL.

POLÍTICAS DEL AGRO para Campesinos Andinos
- Se capacitan en higiene. - Inician trámite para tener el registro sanitario. - Se agrupan para crear una planta de lácteos artesanal (cultura Saraguro).

CAMBIOS AMBIENTALES
- Hacen acequias, siembra en terrazas. - Aplican ceniza, cal. - Aplican abonos y/o bioles. - Siembra árboles (aliso, frutales, etc).

Estrategias llegar al futuro deseado

Actividades productivas	Estrategias propuestas		¿Quiénes deben participar? (Para lograr la estrategia: productores, municipio, universidad, MAGAP, ONGs…)	¿Quiénes se beneficiarán? (productores, consumidores-compradores/ ciudad)
	A corto plazo (en 5 años: **2020**)	A largo plazo (en 15 años: **2030**)		
Producción				
Procesamiento				
Comercialización				
Auto-Consumo				

Actividad 9

ALMUERZO

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Actividad 10

EVALUACIÓN DEL TALLER

Evaluación del taller:

1. ¿Esta reunión fue útil para que usted de su opinión acerca de cómo desearía que fueran las actividades productivas en el futuro? Si/no
2. ¿En esta reunión usted pudo decir libremente lo que piensa? Si/no
3. ¿Cree que lo que se ha dicho ahora es lo que piensan la mayoría de las personas que están aquí reunidas? Si/no
4. ¿Le interesaría participar en futuras reuniones para analizar el futuro de sus actividades productivas? Si/no

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