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EVALUATION OF AGRICULTURAL POLICIES FOR SMALL AND MIDDLE SCALE FARMERS IN MEXICO: THE CASE OF VILLA DE ARRIAGA

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Content

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Ann-Kathrin Volmer

San Luis Potosí, July 2014.

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Abbreviations

ASERCA: Agencia de Servicios a la Comercialización y Desarrollo de Mercados Agropecuarios

CEA: Comisión Estatal del Agua

Cefim: Coordinación Estatal para el Fortalecimiento Institucional de los Municipios

CONAGUA: National Water Agency (Comision Nacional de Agua)

CONAPO: Consejo Nacional de Población

Conasupo: Compania Nacional de Subsistencias Populares

CONAZA: Comisión Nacional de las Zonas Áridas

Coneval: Comisión Nacional de Evaluación

BANRURAL: Banco Rural

FAIS: Fondo para Aportaciones para Infraestructura Social

FAO: Food and Agricultural Organization of the United Nations

FiRCO: Fideocomiso de Riesgo Compartido

FISM: Fondo para la Infraestructura Social y Municipal

FFM: Fondo para el Fortalecimiento de los Municipios

FM: Fondo Municipales

GATT: General Agreement on Tariffs and Trade

HDI: Human Development Index

ILRI: International Livestock Institute

INEGI: Instituto Nacional de Estadística y Geografía

INIFAP: Instituto Nacional de Investigaciones Forestales, Agricolas y Pecuarias

LP: Livelihood Points

MXN: Mexican Peso

NAFTA: North American Free Trade Agreement

OSC: Organizaciones de la Sociedad Civil

PDSI: Palmer Drought Severity Index

PDZP: the development agenda for priority areas, Agenda de desarrollo de areas prioritarias

POCEDE: Programa de Certificación de Derechos Ejidales y Titulación de Solares

RAN: Registro Agrario Nacional

Sagarpa: Secretaria de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación

SCT: Secretaria de Comunicaciones y Transportes

Sedarh: Secretaria de Desarrollo Agropecuario y Recursos Hidráulicos

SEDATU: Secretaria de Desarrollo Agrario, Territorial y Urbano

Sedesol: Secretaria de Desarrollo Social

Sedesore: Secretario de Desarrollo Social y Regional

SEDIF: Secretaria Estatal de Desarrollo Integral de la Familia

SEGOB: Secretaria de Gobernación

Semarnat: Secretaria de Medioambiente y Recursos Naturales

SIAP: Servicio de Información Agroalimentario y Pesquera

SMDIF: Sistema Municipal de Desarrollo Integral de la Familia

SNDIF: Sistema Nacional de Desarrollo Integral de la Familia

SPI: Standardized Precipitation Index

TLU: Total Livestock Unit

Abstract

In March/April 2013 had been protests of the agricultural producers of Villa de Arriaga against the Agricultural Secretary in the Capital of San Luis Potosí, SLP, mandating their aids that have been promised. According to the producers they requested the assistance in 2012 and until that point in March 2013 they did not receive the promised help. This happened after two years of drought (2011 and 2012) in which most of the producers in the villages in the municipality of Villa de Arriaga, SLP, lost more than half or all of their products. This protests show, that there is a certain need of the state assistance. At the same time there are discrepancies between the solicitations of the producers and the help provided by the public policies. On the one hand the producers say that they always receive money for less area than they apply for. On the other hand the politicians argument that they do not have the money from the state-assistance programs or that they will pay it out soon.

The question arising here is why there are discrepancies between the demand and the supply side of agricultural policies. Another question is if the agricultural governmental programs are directed to the development opportunities of the farmers in Villa de Arriaga and are the problems addressed by these programs.

The questions will be answered with an analysis of the livelihoods capitals of Villa de Arriaga, which addresses the development potentials and needs of the farmers. The governmental side will be analyzed by a policy analysis, where the governmental programs will be characterized by livelihoods and other criteria. Finally, the demand and the support side will be compared, based on common success factor criteria.

The objective of this thesis is to evaluate the public policies referring to small and middle-scale agricultural and livestock producers in the municipality of Villa de Arriaga. The results will show possibilities for improvements in the policy framework and agricultural governmental programs in Villa de Arriaga.

Key Words: Mexican Agricultural Policies, Policy Analysis, Sustainable Livelihoods Framework,

Resumen

En marzo / abril 2013 había habido protestas de los productores agrícolas de Villa de Arriaga contra el Secretario de Agricultura en la capital de San Luis Potosí, SLP, donde demandaron las ayudas estatales que han sido prometidos. Según los productores, ellos solicitaron la ayuda en 2012 y hasta ese momento en Marzo 2013 no recibieron la ayuda prometida. Esto sucedió después de dos años de sequía (2011 y 2012) en los que la mayoría de los productores de los lugares en el municipio de Villa de Arriaga, SLP, perdió más de la mitad o la totalidad de sus productos. Estas protestas muestran, que existe cierta necesidad de la asistencia del estado. Al mismo tiempo, hay discrepancias entre las solicitudes de los productores y de la ayuda proporcionada por las políticas públicas. Por un lado, los productores dicen que ellos siempre reciben dinero por menos área que solicitan. Por otro lado, el argumentan de que los políticos no tienen el dinero de los programas estatales de asistencia o que van a pagarlo pronto.

La pregunta que surge aquí es por qué hay discrepancias entre la demanda y la oferta de las políticas agrícolas. Otra cuestión es si los programas gubernamentales agrícolas están dirigidos a las oportunidades de desarrollo de los agricultores de Villa de Arriaga y a los problemas en el nivel municipal.

Las preguntas serán contestadas por un análisis de los medios de vida de Villa de Arriaga, que aborda las potencialidades de desarrollo y necesidades. El lado gubernamental será analizado por un análisis de la política, donde los programas gubernamentales se caracterizarán por criterios relacionados a los medios de vida y otras categorias. Por último, se compara los potenciales y necesidades de los productores con la oferta de programas gubernamentales, en función de criterios comunes de factores de éxito.

El objetivo de esta tesis es evaluar las políticas públicas referidas a pequeños y medianos productores agrícolas y ganaderos del municipio de Villa de Arriaga. Los resultados mostrarán las posibilidades de mejoras en el marco de políticas y programas gubernamentales agrícolas en Villa de Arriaga.

Palabras Claves: Políticas Agrícolas Mexicanas, Análisis de políticas, Medios de Vida

Zusammenfassung

Im März/April 2013 hatte es Proteste der Bauern aus Villa de Arriaga gegen das Landwirtschaftsministerium in der Landeshauptstadt San Luis Potosí gegeben, die Hilfen aus der Politik einforderten, die ihnen versprochen wurden. Nach eigenen Angaben hatten sie die Unterstützung im Jahr 2012 beantragt und bis zu diesem Zeitpunkt im März 2013 noch nicht erhalten. Dies geschah nach zwei Jahren der Dürre (2011 und 2012), in denen die meisten Produzenten in den Orten in dem Regierungsbezirk Villa de Arriaga, SLP, die Hälfte oder die gesamte Ernte verloren hatten. Diese Proteste zeigen, dass es eine gewisse Notwendigkeit der staatlichen Unterstützung gibt. Zur gleichen Zeit gibt es Diskrepanzen zwischen den Bedürfnissen der Produzenten und der Unterstützung, die sie durch politische Programme erhalten. Auf der einen Seite sagen die Landwirte, dass sie für weniger Fläche Unterstützung erhalten, als sie beantragt haben und für nötig befinden. Auf der anderen Seite argumentieren die Politiker, dass sie die Unterstützung für die Programme selber noch nicht erhalten haben, oder, dass sie die Unterstützung bald zustellen.

Die Frage, die sich hier stellt, ist, warum gibt es Diskrepanzen zwischen der Nachfrage-und der Angebotsseite der Agrarpolitik. Eine andere Frage ist, ob die staatlichen Landwirtschaftsprogramme auf die Entwicklungsmöglichkeiten der Bauern in Villa de Arriaga ausgerichtet sind und ob ihre Probleme adressiert werden.

Den Fragen wird sich mit einer Analyse der Lebensgrundlagen in Villa de Arriaga, nach dem Sustainable Livelihoods Konzept genähert. Dabei wird der Schwerpunkt auf die Entwicklungspotenziale und Bedürfnisse der Landwirte gerichtet. Die staatliche Seite wird mit einer Policy Analyse untersucht, wobei die Landwirtschaftspolitiken nach Livelihoods-Kriterien und anderen Charakterisiken kategorisiert werden. Schließlich werden die Nachfrage und die Angebotsseite verglichen werden, auf der Grundlage gemeinsamer Kriterien.

Das Ziel dieser Arbeit ist es, die öffentliche Politik, die sich an kleine und mittlere Land-und Viehproduzenten in der Gemeinde Villa de Arriaga richtet, zu evaluieren. Die Ergebnisse werden Möglichkeiten zur Verbesserung der politischen Rahmen-und Agrarregierungsprogramme in Villa de Arriaga aufzeigen.

Schlüsselwörter: mexikanische Agrarpolitik, Policy Analysis, Sustainable Livelihoods Approach

1. Introduction

In March/April 2013 had been protests of the agricultural producers against the SEDARH (Secretary of Agricultural Development and Hydraulic Resources) in the Capital of San Luis Potosí, SLP, mandating their aids that have been promised (vision informativa 2013, Global Media.mx 2013). According to the producers they requested the assistance in 2012 and until that point in March 2013 they did not receive the promised help. This happened after two years of drought (2011 and 2012) in which most of the producers in the villages in the municipality of Villa de Arriaga, SLP, lost more than half or all of their products (according to their own information). This is an indicator for the functioning of the public policies of agricultural state assistance. It shows several aspects of the public policies. First of all there is a certain need of the assistance. The producers would not protest for their rights of state assistance if they would live properly without them. Secondly there are discrepancies between the solicitations of the producers and the help provided by the public policies. On the one hand the producers say that they always receive money for less area than they apply for (Provincia 2013). On the other hand the politicians' argument that they do not have the money from the state-assistance programs or that they will pay it out soon (Visión Informativa 2013).

At the same time on a federal level start processes to transform the agricultural policies. At this moment, these policy processes are in the state of problem definition and agenda setting, which includes an evaluation of the actual agricultural policies. In This context, the Food and Agricultural Organization (FAO) reminded the policy makers of the importance of the micro level in policy implementation. The importance of this level will be states out in this thesis.

These processes require a deeper analysis. First of all there must be stated out the needs of the small and middle-scale farmers in Villa de Arriaga. They depend on their perception and the livelihood background of the producers. The sustainable livelihood-concept can be used to define the development opportunities. To identify these potentials it is necessary to evaluate how this group perceives their economic situation and production opportunities, which can be investigated through empirical qualitative investigation and a risk assessment of the bio-physical and socio-economic factors (see Mata Cuellar 2008). On the other hand, in this case study the state assistance must be analyzed, in terms of its perception of which assistance is necessary and what are the conditions and criteria to enable the aid.

In this context the responsibilities of the political institutions at stake at different levels of organization are important, which can be acquired through literature review and interviews with decision makers in the institutions involved in the management of drought.

Consequently, the aim of the Villa de Arriaga case study is to highlight the weaknesses in the state assistance for Villa de Arriaga. Focusing on the policies that are dedicated to the needs of small- and middle scale farmers (see figure 1) the policies already established can be improved. This clearly allows empowerment of the affected population.

1.1 Justification

In a comparison of the investments in the agricultural sector between different low- and middle income countries, Mexico invests more in the agricultural sector than the average (Lowder et al. 2012). Another study states that the governmental incentives in Mexican agriculture have been decreasing since the 1990s. In 2004 were 15% of the agricultural GDP (Soloaga et al. 2007). In another general study about Mexican agricultural policy it is concluded that the politicians do not want that small farmers get to the same subsidies like big farmers, the policies do not reduce rural unemployment, it forces migration to the US and the program Procampo excludes poor farmers (Fox et al. 2010). All these studies have in common that they relate to the national average of Mexican statistics. In this case study the focus will lay on the perception of the small- and middle-scale farmers of a municipality, the recipients of the state assistance. Perception is an important basis for action. It was the perception of their situation that caused that the farmers protested in early 2013. Perception of the farmers also is basic for their decision making in production strategies (Rudell et al. 2012). In this study agricultural policies will be analyzed based on perception and only complementary by statistics, which will include a broader range of factors and a different variety of indices of valuation. By choosing the micro level as analysis scale can be gained a concrete view of the implementation of the public policies, because it is the last step of the processes of providing and receiving the state assistance. The outcome of this analysis can be used to validate the statistical indices used to evaluate agricultural policies on a national level and vice versa.

In Villa de Arriaga a percentage of 35% of the economically active population is working in the agricultural sector (Rodolfo et al. 2010) and an unspecified number of people depend indirectly on the production or forms of subsistence agricultural production. When the agricultural production cannot meet the needs of the people who depend on it, there are programs of state assistance or

self-help program of direct assistance that can improve the socio-economic situation of the communities or its members. However, these programs can also be unsustainable and cause land conversion in unproductive areas (Arredondo et al 2011).

In the state of San Luis Potosí, drought studies and plans for rural development are focused on other municipalities of San Luis Potosí, for example the management plans for the Huasteca by Algarra (2009). There is already an analysis of the physical and historical climate in the municipality of Villa de Arriaga (Mata Cuellar 2008), but the socio-economic impacts of drought and the state aid system for this event are not in the focus of this analysis. Thus, the case study of Villa de Arriaga will complement the existing information about past droughts with the policy analysis referring to the meteorological situation of the years 2011-2014. Therefore this study can contribute to a more tailored management to drought in Villa de Arriaga, SLP. Also the public politics have been discussed, for example the Development Plan for Villa de Arriaga (Ruiz Montejano 2009) and in analysis of different institutions like the FAO who analyzed the Public Policies of Procampo (FAO 2011). In this context the Villa de Arriaga case study can be found.

1.2 Objective

General Objective:

Policy evaluation of the public policies referring to small and middle-scale agricultural producers in Villa de Arriaga, Mexico

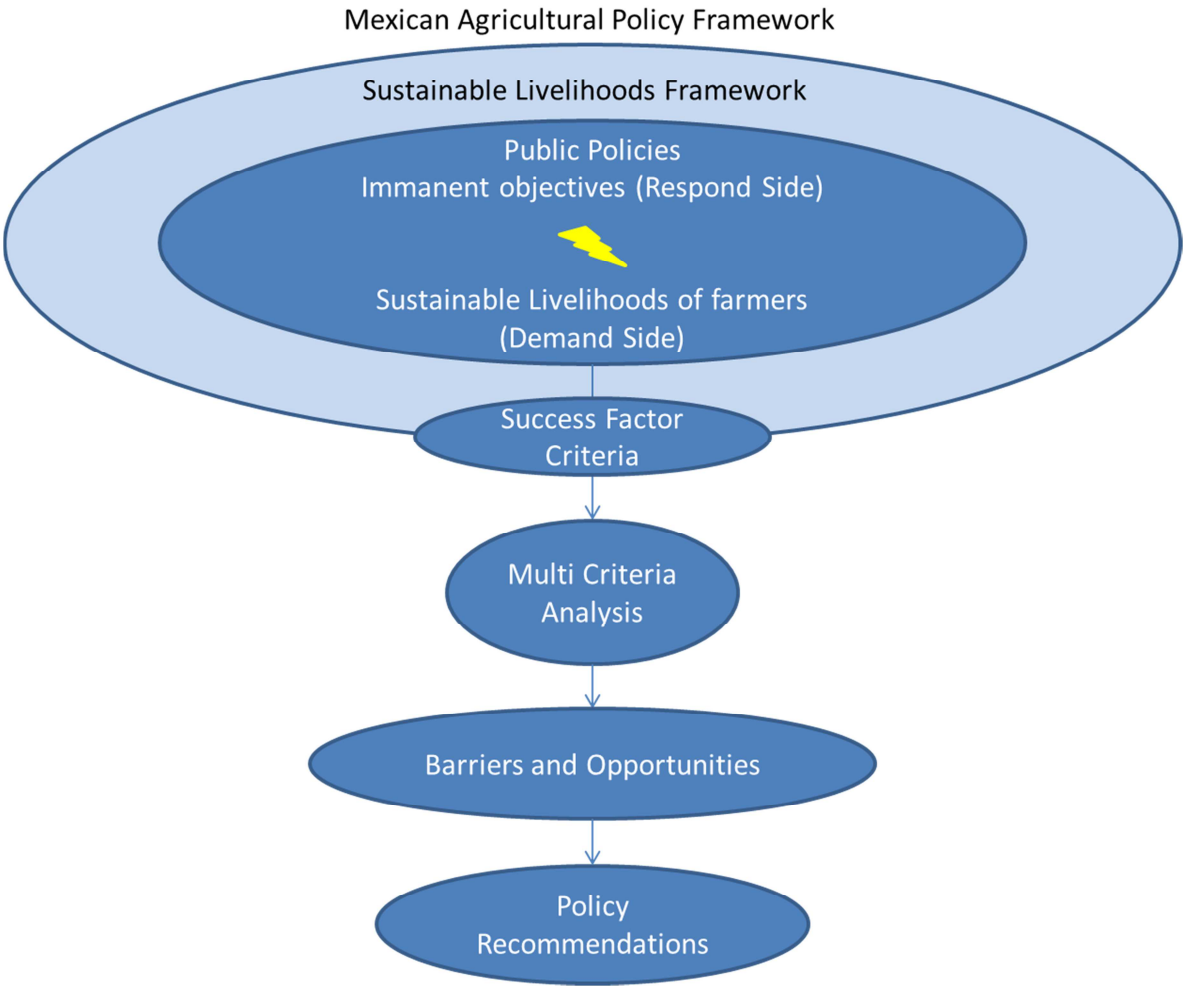
Specific Objectives:

1. Defining the entitlements of the farmers of Villa de Arriaga in their perception.
2. Livelihood Analysis to define the capitals, possible risks and the role of the policies for the agricultural producers in general and in times of drought.
3. Analyze the public policies that exist in Villa de Arriaga to assist agricultural producers, focusing on policy immanent and general criteria.
4. Discuss the similarities and differences regarding the needs of the farmers and the policies.
5. Discuss possibilities for improvements in the policy-framework.

1.3 Conceptual Framework

The focus of this conceptual framework is an analysis of the Mexican agricultural policies on a municipality level of analysis focused on small and middle scale farmers in Villa de Arriaga. The livelihood capitals will be analyzed with a multi-critera analysis, based on the methodology elaborated by Clausen (2012). Mainly, the demand and response sides of agricultural policies will be analyzed and the criteria, with which they value the agricultural policies, will be stated out (see figure 1).

Figure 1: Conceptual Framework



The demand side describes the perception of the small and middle scale farmers and their needs. The response side criteria are based on general criteria according to the sustainable livelihoods capitals. Referring to it, policy immanent criteria of resource allocation, the general political framework and the implementation of policies will be elaborated. These criteria will first be sub-

surmised as success-factor-criteria and then analyzed in a comparative multi criteria analysis. The results of the multi criteria analysis of the demand and the response side will be compared. As a consequence, barriers and opportunities will be identified and finally built the base for policy recommendations.

The basic concepts underlying the policy analysis will be the German theory of Policy Analysis and the Sustainable Livelihood Framework. Both contribute to the organization of the framework. They will be explained in the following.

1.4 Policy Analysis

This thesis will focus on the final beneficiaries and analyze the policy processes from their perception in agreement with the sustainable livelihoods framework. This combination of the two theoretical frameworks allows a deep analysis of the outcomes of the Mexican agricultural policies.

"Policy analysis is finding out what governments do, why they do it and what difference it makes" (Dye 1976). This is the definition the theory of policy analysis is based on. Accordingly, there are three main questions asked by the policy analysis: What do political actors do? Why do they do it? What do they cause with it? (Blum & Schubert 2011).

This thesis asks for the outputs of policies such as the hard facts and the effective consequences. Outcomes are specific political programs or actions. One typical evaluation design of policy evaluation includes the comparison between the originally defined objectives of the outcomes with the actual effects (Blum & Schubert 2011). This is the main approach of this thesis.

According to Easton (1965) there are four important factors which influence policy making: the environment, the political system, the input and the output. Therefore, there are different questions asked for example how the inputs of the environment influence the political system, or, how the characteristics of the political system influence the outcomes. This research perspective allows that political decisions not only are seen as made by the governmental actors, but that the society, the beneficiaries of the political programs and other events have influence on decision making (Blum & Schubert 2011).

The origins of the policy evaluation in Germany lay in the philosophical ideas of the pragmatism and pluralism in the USA. Pragmatism developed between the 1900s and 1940s and its most

popular formation is the “Chicago School of Pragmatism”. The main idea focuses on the practical and contextual consequences of human and, accordingly, political behavior (Blum & Schubert 2011).

The other theoretical origin relates to the philosophical ideas of pluralism, after William James. Pluralism sees the reality as a complex of various things, characteristic and experiences, which builds the base for the occurrence of changes in the world. Therefore, the perspective focuses on the individual and its actions. Political and societal arrangements have to be proven in front of the individual and the individual participates in their improvement and design. With this perspective, policy research gains a bottom up perspective (Blum & Schubert 2011).

Although policy evaluation is focused on the practical consequences, it has always to be seen in the context to Politics and Polity.

Politics describe the negotiation and political conflict as well as the consensus finding. Polity includes the political orders and constitutions, as well as the resulting structures and institutions, for example the political system. In the case of Mexico the political system is federalist, which has clear consequences for the policy making process. It also refers to the political culture of a country and the norms and values. Policies describe the concrete political contents and governmental actions. These material political contents are the result of decision making processes and implementations. At the same time, the institutions and structures build the framework for political processes and results (Blum & Schubert 2011).

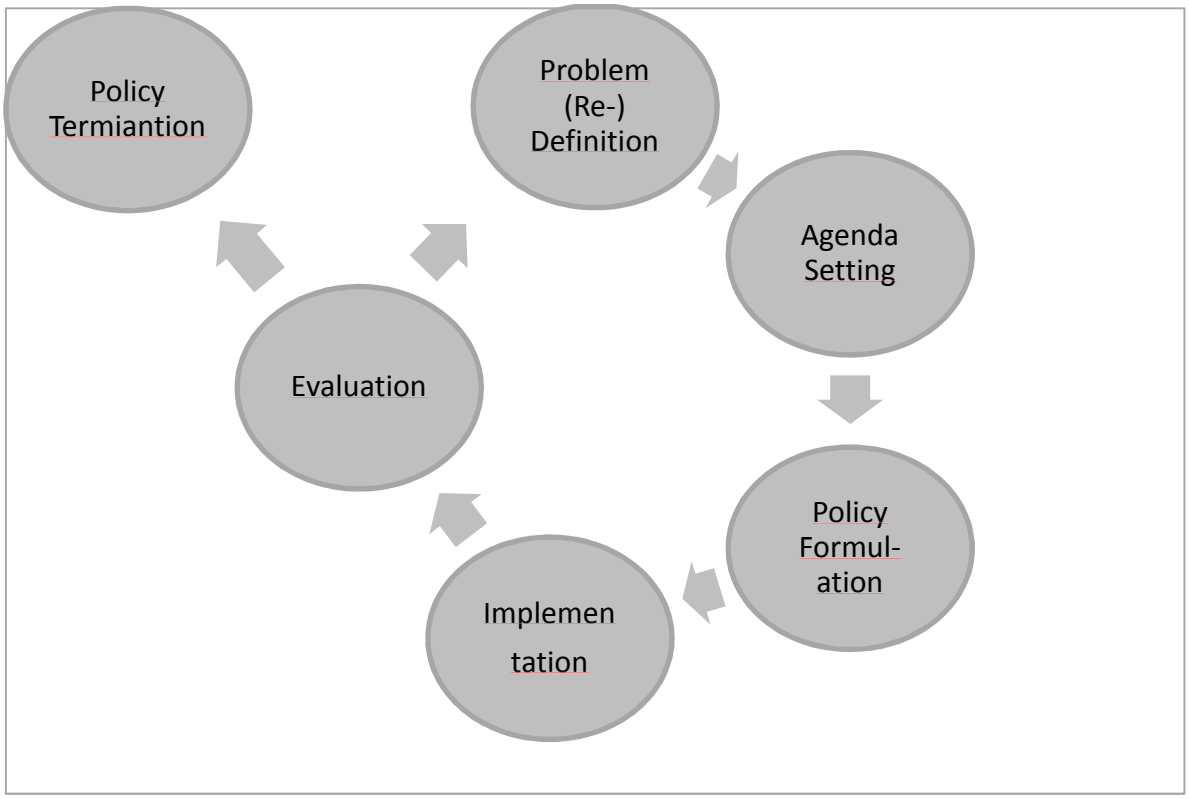
The following analysis will include quantitative, statistic based steps of analysis combined with very qualitative parts, always depending of the question which is to be answered and the practical circumstances of the research. Quantitative methods allow a focus on continuity and resilience of the policies, meanwhile qualitative methods concentrate on analysis of processes (Blum & Schubert 2011). The sustainable livelihoods framework also combines both ways of analysis, which is why it seems appropriate for this thesis.

The main perspective will be bottom-up, as a big part of the analysis concentrates on the local circumstances and the consequences of the policies in the context of the livelihoods of the agricultural producers there.

In the description of the history of agricultural policies in Mexico the focus will be Top-Down, as the chosen perspective is a scientific description from an institutional point of view.

This policy evaluation includes various steps of the policy cycle. The policy cycle (Jann & Wegerich 2009) begins with the Problem definition or in case of a reform the Problem Redefinition (see figure 2). Then an agenda is set to address the problems and in consequence concrete policies will be formulated. These three steps are described in the part of the history of the Mexican agricultural policy. The implementation with its consequences and the evaluation will be the focus of the livelihoods-analysis of the municipality of Villa de Arriaga, working with the terminated policies which currently apply in the case study.

Figure 2: Policy Cycle (own creation, based on Jann & Wegerich 2009)



1.5 The sustainable Livelihoods Framework

The sustainable Livelihoods Framework will be used to get an improved view on the agricultural production capacity of Villa de Arriaga. At the same time it will highlight the influences of the agricultural public policies of Mexico in the municipality level. Therefore will be analyzed the given resources and the access to this resources, having in mind always the influences of agricultural policies.

Other policy evaluations of Mexico always point out that the biggest programs (Procampo, Ingreso Objetivo) are not sufficiently reaching the poor as their goals imply (Fox et al. 2010, Eakin 2005). The objective of this sustainable livelihoods analysis is to figure out, whether or not the agricultural governmental programs improve the livelihoods of the producers of Villa de Arriaga.

The Sustainable Livelihoods Framework has its origins in the 1980s, where the development approaches shifted from a focus on a solemnly economic perspective to human well-being and sustainability. In the context of the Brundtland Report 1987 and the UN Conference on Environment and Development 1992, Chamber and Conway first defined the meaning of sustainable livelihoods in in 1992 (Solesbury 2003):

A livelihood comprises people, their capabilities and their means of living, including food, income and assets. Tangible assets are resources and stores, and intangible assets are claims and access. A livelihood is environmentally sustainable when it maintains or enhances local and global assets on which livelihoods depend, and has net beneficial effects on other livelihoods. A livelihood is socially sustainable which can cope with and recover from stress and shocks, and provide for future generations (Chambers & Conway 1991)

This study uses a livelihoods perspective to facilitate understanding of the influences by agricultural policies and political institutions in rural livelihoods in Villa de Arriaga and considers how a livelihoods perspective may strengthen the understanding of issues of access. A sustainable livelihood perspective is a holistic approach which takes into consideration linkages and processes between vulnerability and exposure to external shocks, the natural and social resources and their management. It is contextual and analysis how different people perceive their assets and how they choose and pursue a livelihood strategy. At the same time the analysis takes into consideration the opportunities and barriers given by the institutional context and the political framework (Seshia & Scoones 2003). This last point will be focused in the analysis of the case study.

Livelihoods perspective demonstrates how public policies influence the livelihoods and adaptation strategies in their complexity. This study states out the differences between the official strategies and goals of agricultural policies and the perception of the farmers for whom the policies should be designed. The approach does not only see the technical or generic approaches and goes

beyond the official statistics. It aims to describe a certain kind of local reality, which cannot sufficiently be captured with official statistics only.

Within the sustainable livelihoods framework access to natural resources and those provided by formal and informal institutions are crucial to achieve development goals like the improvement of productivity rates and income generation. These institutions work on different levels, at a range from local associations and networks, like *ejidos*[1], to national and international stakeholders who provide regulations and rules. Given the complex nature of access questions, and the wide range of public policies influencing the livelihood context of the farmers in Villa de Arriaga, there is a focus on three localities and a selection of public policies, which are targeted to agricultural producers.

The three locations chosen are EL Mezquital, El Tepetate y San Francisco. A detailed description and a justification follows in chapter 3. For the general policies the national statistics will be used, while these projects will be identified and verified through qualitative and quantitative interviews with farmers belonging to an *ejido* in Villa de Arriaga.

An analysis of the public policies influencing agriculture just based on statistics is insufficient. Statistics help to describe the surrounding circumstances the people in Villa de Arriaga live in, but they exclude internal factors which determine a proper implementation of policies. Part of it is the access to political resources and information and how they are generated. The local specific institutional arrangements restrict a proper implementation of the policies.

An evaluation of public policies based on the sustainable livelihoods framework must take into consideration different levels of political institutions and formal and informal regulations to describe the transforming processes related to public policies. Understanding the institutional complexity is key to understand the production decisions of the local farmers which finally determine the importance and influences of the agricultural sector (in economic terms and in view of their livelihood in its complexity).

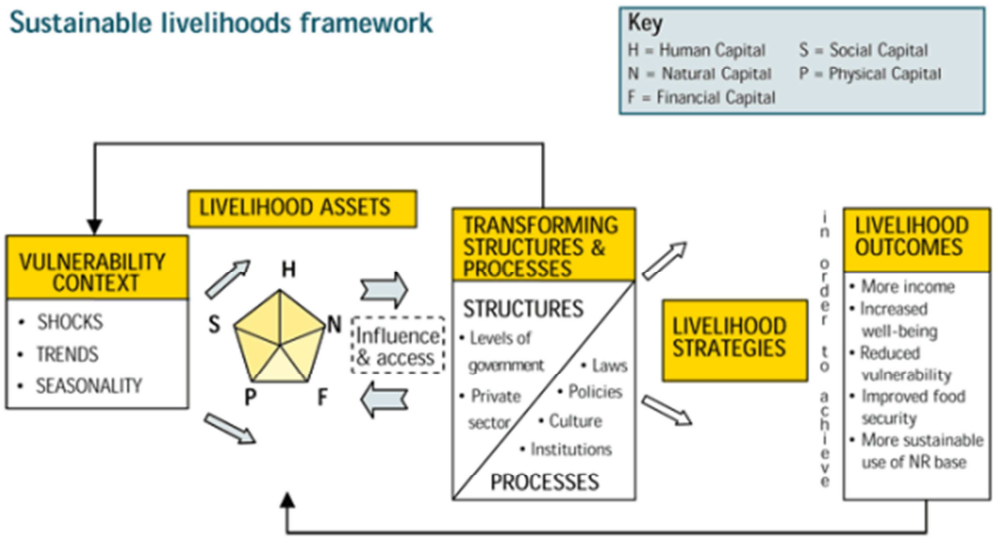
The goals set in the governmental agricultural programs must not be achieved on a local level, because these policies focus on a general agricultural panorama on national level. These average conditions of agricultural production do not necessarily apply to a more local level like the

[1] Ejido: Farmers´ union who share common land. It will be explained more detailed in the second chapter.

municipality. This is especially the case in Mexico, because of the diversity of ecosystems and differences in the exposure to environmental or other kinds of shocks. These circumstances require policies adapted to those changing environments.

Also the general objectives of the Mexican agricultural policy, e.g. the intensification of maize production, stay in contrast to the possibilities of small- and middlescale farmers (Fox 2010).

Figure 3: Livelihood Framework (practical action 2014)



Livelihood analysis:

For defining the individual level the characterization of the formal living circumstances like number of family members, characterization of income sources and access questions within the surveys is important. The survey was developed and applied in field studies in June 2013. The results will be discussed following the sustainable livelihoods framework and its categories. They will be compared to statistical data on regional, state and federal level, to put Villa de Arriaga into context.

Important principles of the livelihood analysis are Sequencing and Substitution. Sequencing asks the question “do those who escape from poverty start with a certain combination of assets? Which is either necessary or sufficient to escape from poverty?” (Seshia & Scoones 2003). In the case of Villa de Arriaga this question can be applied to the access to public policies: Do those, who

have access to public policies, which really help to improve the production or some livelihood capacities, count with a different set of assets?

The other principle is Substitution. Here the questions asked are the following:

“Can one type of capital be substituted for others? For Example, can increased human capital compensate for a lack of financial capital in any given circumstances?” (Seshia & Scoones 2003). This question cannot be answered completely in the Villa de Arriaga case study, because no every capacity will be analyzed into detail, due to time restrictions and the characteristics of the main question.

One important part of the sustainable livelihoods analysis are the Transforming Structures and Processes (see figure 3). These processes include the insitutions defining and implementing the policies, therefore they define big parts of the access to assets. They create and determine access and manage the distribution of benefits which influence the access accumulation. Besides the governmental actors these processes also are influences by groups and individuals, for example in the network of an *ejido*, when access needs to be defined internally. Generally, individuals with more access to assets have a better capacity to change between different adaptation strategies with the objective to protect and improve their livelihoods (Seshia & Scoones 2003).

Capitals:

In the following part the different kinds of capitals will be described and their characteristics as indicators will be identified.

Financial Capital:

Definition:

Financial resources the people use to achieve their livelihood objectives. This definition is not economically robust, it includes flows as well as stocks and can contribute to production as well as consumption. It indicates availability of cash or equivalent and enables people to adopt different livelihood strategies. It refers mainly to income sources and access to savings and loans (DFID 1999).

Human Capital:

Definition:

Human Capital refers to skills, knowledge and ability to labor and good health that together enable people to pursue different livelihood strategies and achieve their livelihood objectives. Also it refers to the amount and quality of labor available. Important variables are the household sizes, demography, education and health. There are different ways in which policies can influence the human capital. Indirect policies might provide the infrastructure like schools, but the people must be able and willing to use the offers by investing in their own and their families human capital or use the medical assistance (DFID 1999).

Possible Indicators refer mainly to educational and health infrastructure (assets) and health and educational indices (access).

Social capital:

Definition:

Social Capital includes social resources upon which people draw in pursuit of their livelihood objectives, including networks and connectedness (vertical: patron/client o horizontal) that increase peoples trust and ability to work together and expand their access to wider institutions, such as political or civic bodies. It also relates to organization of people in officially registered networks, often implying own intern sets of rules, norms and sanctions. In a well working network also can be found trust between the members, which facilitates cooperation, reduces transaction costs and may provide the basis for informal safety nets among the poor (DFID 1999).

Possible indicators refer to the inner structure and number of organizations, groups associations in the municipality (DFID 1999).

Natural Capital

Definition:

Natural capital is the term used for the natural resources stocks from which resources flows and services (e.g. nutrient cycling, erosion protection) useful for the livelihoods are derived (DFID 1999).

Possible indicators relate to land tenure and land use types, as well as the natural potentials of the area. They also include natural shocks like droughts and political managed access rights (DFID 1999)

Physical Capital

Definition:

Physical Capital comprises the basic infrastructure and producer goods needed to support livelihoods.

Possible indicators include quantity, quality and access to publicly provided infrastructure like roads, highways, water access, secure shelters and buildings. It also relates to access to energy and a working information infrastructure.

Financial Capacity

The Financial capacity of the farmers living in Villa de Arriaga can be measured through a combination of statistical and empirical data. The questionnaire from June 2013 includes some of the important factors which can be used in an index to measure the financial and other capacities of Villa de Arriaga. This index will mainly rely on the different income sources, which the farmers mention as their primary ones.

1.6 Method

The analysis will take place on a micro level. In the history of policy research the macro level mostly was the preferred one, but since the development of the policy analysis in the 1980s in Germany the micro level is analyzed more often. The advantage is the more detailed view of the policy consequences. The disadvantages include that the macro level of analysis like the influences of international politics is not sufficiently recognized (Blum & Schubert 2011).

The unit of analysis is the *ejido*, as it is the most common form of organization for agricultural producer and many policy instruments relate to it or, at least, have to recognize it in the steps of policy implementation.

The method of analysis will be inductive and empirical, as the evaluation of the local circumstances and the impact of policies will be measured according to the perspective of the individual producers. The evaluation will not be built on preceding assumptions, which makes it

inductive. The policy research includes a pluralism of methods, where the method will be used which best fits to the research question. It must be adequate for the main question and useful for achieving results (Blum & Schubert 2011). The objective of the evaluation of this thesis is to analyze and describe the results and effective impacts of the policies.

According to the German theory of policy analysis (Blum & Schubert 2011) the basic questions are again what the political actors do, why do they do what they do and what do they achieve with it. These questions will be answered in the following chapters, in combination with the sustainable livelihoods framework.

First of all, the agricultural political framework will be described, based on a literature review of the important steps of history since the Mexican Revolution.

Regarding the analysis of the demand and the response side, first, there will be built success factor criteria in the beginning of the analysis. These will be based on the five capitals of the sustainable livelihoods framework and the kind of policies analyzed. These criteria will be joined in a multi criteria analysis to characterize the sustainable livelihoods of the agricultural producers on the demand side and to portray the public policies on the supply side.

On the response side the livelihoods strategies will be described incompliance with the livelihoods capitals in chapter three. At the same time the vulnerability context also will be a result of the analysis of the livelihoods capitals, mainly the natural one.

The results of the characterization will be compared in a discussion. Based on this the transforming structures and processes of the sustainable livelihoods framework will be characterized and barriers and opportunities regarding this point will be stated out.

In a last step, based on the discussion, policy recommendations will be formulated.

2. Agricultural Policies in Mexico

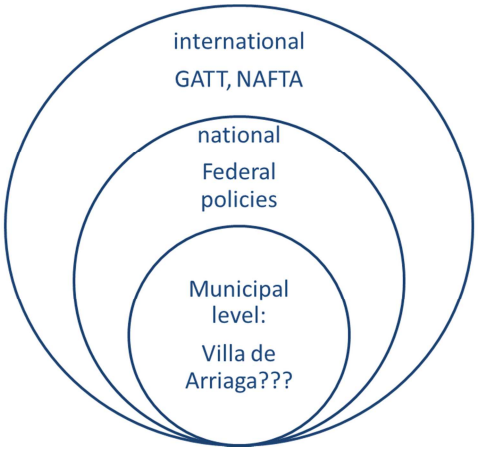
In this chapter the agricultural public policies of Mexico will be conceptualized, explained and analyzed. First of all, the historical context of these Mexican agricultural policies will be explained to highlight the background which influenced the generation of the recent agricultural policies. In a second step, the stakeholder important for the implementation of agricultural policies in Villa de Arriaga will be introduced in a stakeholder analysis. Then, success factor criteria will be developed

to characterize and categorize the recent agricultural policies. These criteria will be based on the sustainable livelihoods framework and the different policy types. The result of this analysis is a figure which shows which kinds of policies are created to support the five livelihoods capitals.

2. 1 History

First of all, there will be given an overview about main changes in agricultural politics of Mexico, focused on the changes since the 1980s, where the liberalization of the mexican agricultural market began, when Mexico joined the GATT in 1986 (Yuñez Naude 2006). En general there can be seen three levels of analysis of the mexican agricultural policies framework.

Figure 4: different policy levels influencing policies in Villa de Arriaga (own creation)



On the international level the trade agreements Mexico joined in the 1980s and 1990s are important, which still are causing changes in the other levels of analysis. The most important one is the North American Free Trade Agreement, which had implications on the design of the mexican agricultural policies. Another important global was the General Agreement on Tariffs and Trade (GATT) Mexico joined in 1986, which marks the beginning of the neoliberalization of the Mexican agricultural policies. These influence the national level, where the federal policies are created (s. Figure 1). On the municipal level, the level of interest in this analysis, not every federal policy applies or is intended to be applicable. This historical overview will relate to the first two levels of analysis, whereas the third level, the municipal one, will be of interest in the following parts of this thesis.

The current model of the mexican agriculture is based on article 27 of the new constitution of the year 1917, which until now was changed in some essential aspects. A discussion of this reform is well represented in Mexican and international literature (Bobinska 1972), which is why this chapter will only explain core aspects of the reform relevant for the present work. The most important regularities of this paragraph include the dedication of politics to share out the large estate properties (*haciendas*). As a second important change the credit options for small scale

producers were widened to receive material and funding for the new properties. Also the economic and social infrastructure was therefore improved. As consequence of these regulations between the years 1915 and 1965 52,5 billion hectares were distributed between 2,3 billion farmers (Bobinska 1972). These numbers seem high but at the same time the ex-hacienas stayed with the most fertile soils and those most beneficial for agricultural use. Therefore, inequalities were not eliminated by this land distribution (Macedo Castillejo 2014).

Another important change in this paragraph was the classification of land tenure. Still, there were *haciendas,* but at the same time grew the number of small private properties and *ejido* land, the haciendas were separated in. The ejido land was used as a common source. Consequently there were different types of land tenure, which coexisted parallel. A second consequence of article 27 was funding and material, which was facilitated for the new properties. This was due to credits and improvements in the social and economic infrastructure. The material state assistance consisted in seeds, livestock and machinery. At the same time the agricultural policies supported the modernization of the production by promoting irrigation systems, above all in the north of the country (Bobinska 1972). The third change introduced by article 27 of the Mexican constitution was the establishment of *ejidos*, which is defined as the areas, forests and water given for exploration by the government to an agricultural population core (INEGI 2006). Members of these groups have often less than 10 hectares of agricultural production area but everyone had the right to use the common areas (Bobinska 1972). These areas were officially inalienable, which was changed by law in 1992, when the Mexican agriculture underwent some neoliberal reforms. As a consequence the sizes of the private properties changed and the common areas of the *ejido*s reduced in size (Yetman 1998). In 1992, according to article 27 and the respective agrarian reform were three types of land ownership officially recognized: public, private and social land. The social land is the land under common use in de ownership of an ejido (INEGI 2006). Also, the *ejido* was loosened from state support (Perramont 2008). The detailed consequences differ from case to case; it also influences the *ejidos* in Villa de Arriaga. A more detailed analysis will be part of the discussion of the case study.

In the following part other relevant government programs will be explained which contextualize the changes of the *ejido*-related law in 1994.

Between the Mexican revolution in the 1930s and the 1970 in the Mexican agricultural market was strongly restricted (Eakin 2005). In the 1980s, during the de la Madrid Administration (1982-1988),

in some structural adjustments, the government privatized the services of the state owned CONASUPO[2] and eliminated input subsidies for most grain and oilseeds, with the exception of corn and beans (Soloaga & Lara 2007). These changes relate directly to the GATT agreement Mexico joined in 1986 and set the base for the liberalization of the Mexican agricultural market (Yuñez Naude 2006, Sweeney et al. 2013).

As a consequence, the prices of agricultural inputs in farm products were deregulated, the national budget for general agricultural services decreased, the investment in the agricultural sector was reduced and the price supports (provided by Conasupo) were not only reduced (Eakin 2005), but the market oriented smallholders had less access to them. Also the tariffs decreased. The farmers did not have whether experiences nor knowledge of marketing processes, so that the changes had negative consequences for the commercialization of agricultural products. In 1989, five years before the assignment of the North American Free Trade Agreement (NAFTA)[3], the government opened the market for international trade and stopped offering their own prices in the segment of grains and oilseeds, with support from the World Bank. Beans and corn were few grains not included in this reform. This quick change in politics and the sudden deregulation of the grain- and oilseed market made it impossible for the producers to adapt quickly. As a consequence, the commercialization of those products decreased significantly (Fox et al. 2010). Regarding beans and corn, the importance of Conasupo also declined until 1998. While in 1993 it was buying 41% of the domestic corn production, until 1998 this amount declined to 12.9% of the domestic corn supply. So, fewer farmers could sell their corn to guarantied prices (Yuñez-Naude 2000). Until 1999 the former subsidies from Conasupo were completely dismantled, eliminated or transferred to the farmers so that Conasupo was completely abolished. Therefore, in 1991, the agricultural marketing support system ASERCA[4] was founded to support buyers, as an agency of the Mexican agricultural ministry (Sagarpa)[5], with responsibilities in marketing and supporting services. It partly took over tasks of Conasupo, like compensatory payments and subsidies for grain and oilseed producers. It also helped farmers marketing their crops. In the focus group of the program also low income subsistence producers were included, and a small number of middle and

[2] Conasupo: Compania Nacional de Subsistencias Populares (National Company for public subsistencies)
[3] NAFTA: NAFTA contributed to Mexcio's trade liberalization: in the context of NAFTA almost all trade barriers with the United States were eliminated by 2005. The Mexican small holder corn production is not feasible enough to compete with the US-American corn sector (Eakin 2005).
[4] ASERCA: Agencia de Servicios a la Comercialización y Desarrollo de Mercados Agropecuarios
[5] Sagarpa: Secretaria de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación

large scale famers who produced mainly for the urban population (Fox et al. 2010). Specific states were supported more than others by this program (Yuñez Naude 2006), as it targeted a relatively small number of geographically concentrated middle and large scale producers whose grain feeds Mexico's urban population (Fox et al. 2010).

The biggest program of ASERCA is Procampo (Fox et al. 2010), which provides direct income support payments and replaced other input factor subsidy programs, which by now are all eliminated (Soloaga & Lara 2007). The basis for Procampo is the land tenure of a producer used for agricultural production of nine key crops and oilseeds, which must have been planted the three years between 1990 and 1993. These nine grains, cotton, soybeans, barley, sorghum, corn, beans, rice, wheat and cardamom, have previously been supported by Conasupo (Soloaga & Lara 2007). In 1995 the program also supported agricultural areas where other crops were seeded, as long as these areas had been registered before. In a second step, the payments were decoupled from the production, so that other agricultural uses of the former registered agricultural areas were possible (Yuñez Naude 2006). Procampo was planned as a 15 years program (1993-2008). In this time range, the expenses increased to 1.4 billion US-$ in 2005 and was extended to 2.4 million producers, including producers with small dropping lands. It was estimated to contribute about 8% on a household-income of *ejidos*, but can make 40% of the income of low income families (Soloaga & Lara 2007). Critiques point out that the process of registering the land tenure have not been equally successful in every part of Mexico, many farmers had doubt about it and so Procampo does not reach all smallholders. As Procampo was not capped, meaning that there was not set a maximum payment per farmer, and no sustainable development conditions were associated, the inequalities the support price system had produced were maintained. In the year 2002 the payments were caped, but it took until 2010 when the caps were recognizable in official numbers (Fox et al. 2010)

In 1995, the Zedillo Administration started another big agricultural policy program, *Alianza para el Campo* (at the present time called *Alianza Contigo*). This program was designed to increase agricultural productivity and competiveness and capitalize the rural areas with funds that supported investments in these areas and in sanitation. It was meant to relate the agricultural producers with the alimentation chain. The design of this program also required a good cooperation between different governance levels, as the federal level, state level, municipal and individual levels were included in the implementation of the program. Small scale farmers and

indigenous people were treated differently than large scale, commercial producers (Yuñez Naude 2006).

These three big programs, Procampo, ASERCA and Alianza para el Campo, were created to change the agricultural production structure, so that the producers were able to compete in a liberalized international market (Yuñez Naude 2006).

In the early 1990s the public agricultural bank (BANRURAL) was restructured and changed its objective population to only meet the needs of farmers which were commercially viable. Through this process, the access of most *ejidos* to insurance and credit decreased. As a consequence, only 6.7% of the farmers had a crop insurance in the mid-90s, before it hast been 44% (Soloaga & Lara 2007). At the same time, in 1991, POCEDE was founded to register the parcels as a base for Procampo. The same Program had the goal to stimulate private investment possibilities in rural areas, so that producer unions (*ejidos*) would be excluded from investment options (Soloaga & Lara 2007). After the change of article 27 in 1994, also other programs were induced, like Progresa (1997), which was changed to Oportunidades in 2001, or el Fondo para Aportaciones para Infraestructura Social[6] (1996), which provided basic infrastructure investment (Fox et al. 2010). In 2001, under the Fox administration (2001-2006), another important framework was created: the ley of sustainable rural development. Its aim was to have a coordinated framework for agricultural rural and development programs. The budget for this framework has doubled between the years 2000 and 2008, with 240 billion pesos in 2008 (Fox et al. 2010).

In 2003 Aserca launched a new program, called *Ingreso Objetivo* (target income) (Fox et al. 2010). These payments depend on the crop type seeded and pay the difference between the price the farmers receive and what *Ingreso Objetivo* sets as a minimum payment per ton (Sagarpa 2008).

In this program, 23% of the payments were received by 2% of the producers in 2008. This unequal distribution is why there were proposed some changes in 2008, which include for example a maximum payment per farmer (Sagarpa 2008).

[6] FAIS, formerly known as Pronasol (programa nacional de solidaridad), which is provided by Sedesol and is not only a program for agricultural or livestock producers, but a general governmental program for the rural regions.

This overview of the main Mexican public policies directed to the rural areas shows the most important government programs for agricultural and livestock producers. In the following, the relevant stakeholder in the process of policy implementation in Villa de Arriaga will be introduced.

2.2 Stakeholder Analysis

In the public policies in Villa de Arriaga are involved a lot of governmental organizations. They have different responsibilities and functions in the process of policy implementation in Villa de Arriaga. The present stakeholder analysis will give a general overview about the responsibilities of different institutions engaged in governmental programs in Villa de Arriaga. The analysis will focus on distribution of information and money (see figure 6). The applications schemes in different governmental programs differ always, so that this analysis does not cover the implementation processes of all governmental programs working in Villa de Arriaga[7].

There are basically five levels of analysis (individual, local, municipal, state, national and international) (see figure 1) whereas the focus lies on the local and individual level, where the execution of most of the programs takes place.

2.2.1 Individual and local levels of Operation

On the individual level, the agricultural and Livestock producers of Villa de Arriaga receive mostly money of different programs directly from the official governmental institutions. An example is Procampo, which reaches the farmers directly from ASERCA, which is an agency of Sagarpa. The information about governmental programs reaches the individual agricultural and livestock producers mainly on three ways: through the groups they are organized in, the ejido commissaries, through confidential persons (vocals) or through engineers[8]. Engineers are officially working for Sagarpa or other agencies belonging to Sagarpa, but they are paid for their information services by the farmers. Confidential persons or vocals are agricultural and livestock producers, which receive information directly from the CADER[9] and then share it with their

[7] An overview of the processes from application to implementation of different governmental programs in Villa de Arriaga will be given in the case study chapter of this document (see chapter 3)

[8] [8] Called *"gestores"*, representatives. These representatives are mostly agronomists or agricultural engineers which inform the farmers about accessible governmental programs and help them in the application process. They always keep parts of the program benefit for the farmer as a payment (Interviews with Joel Solis 3.5.2014).

[9] The Aid Center for Rural Development (CADER , for its Spanish abbreviation) is the municipal division of Sagarpa (Sagarpa 2014). In this office, located in the municipal capital Villa de Arriaga, the applications for Sagarpa programs can directly be made. So, the basic responsibilities of the CADER are the administration

community. Officially, every community has one. The third way of receiving information is through the spokespersons of groups the producers are organized in, for example the *ejido*. In this case, the spokesperson is the *comisariado*, the president of the *ejido*. In Villa de Arriaga, the organization of the private property owners has one spokesperson for the whole municipality. Producer organizations might apply for programs especially designated to their product, for example beans, wheat or corn. The information about the programs they can apply for will be transmitted by their spokesperson.

2.2.2 Municipal Level of Operation

The municipal level is the aggregated level of decision making in all localities in Villa de Arriaga.
The information about these processes is collected and filtered in the Municipal Government and, focused on the programs for agricultural and livestock producers in the CADER. The concrete programs which reach the single farmer or the producer organization are very much prearranged by the municipal government. It has various functions within the process of application for governmental programs: it is in charge of the documentation, administration, the processing of applications and data, it provides information about government programs and in some cases has to approve the applications. The responsibilities of the municipal government depend on the specific program. For example in the case of social programs, when the basic infrastructure like firm floor in houses or roadbuilding is supported, the municipal government does the feasibility study and suggests the most needy cases to the responsible state agency. Depending on the program the municipality is also obliged to fund the project partially, for example in the case of a new dam in the locality of San Francisco.

The information the municipal government provides refers particularly to the applicants by helping them address the right institution for the applications.

2.2.3 State Level of Operation

The municipal government is evaluated by the State Coordination for institutional improvement of the municipalities (Cefim[10], by its Spanish abbreviation)(Cefim 2014). This scientific agency works as a link between the municipal and state government, it documents and evaluates the municipal

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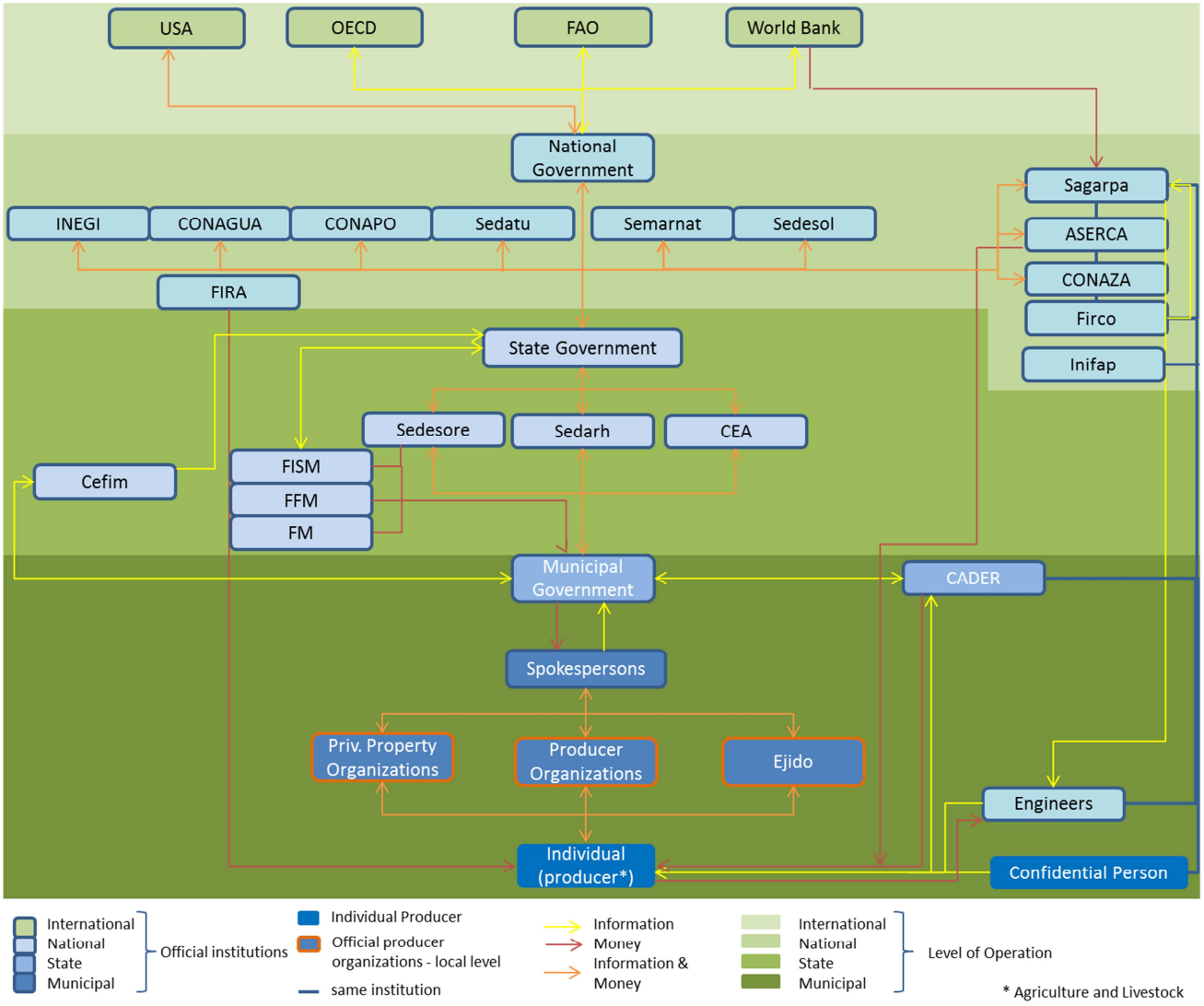
and implementation of Sagarpas programs in the municipality in Villa de Arriaga. It gets the information from Sagarpa and informs the municipal government and the individual agricultural and livestock producers about the programs. One employee of the municipal government also works here to help the applicants with the paperwork.

[10] Cefim: Coordinación Estatal para el Fortalecimiento Institucional de los Municipios

processes, publishes information for transparency reasons and recommends policy improvements to the state government which strengthen the municipalities (Cefim 2014).

Figure 6: Stakeholder Analysis (Own Creation)



The state government has different responsibilities regarding the rural sector and especially agricultural and livestock producer. Through its direct agencies, Sedesore[11](2014), Sedarh[12](2014) and CEA[13] (2014) and through a general framework of policies and governmental programs it contributes to the municipal and local levels of operation. In the municipality of Villa de Arriaga

[11] Sedesore: Secretario de Desarrollo Social y Regional (Ministry for social and regional development)
[12] Sedarh: Secretaria de desarrollo Agricola y Recursos Hidraulicos (Ministry for agricultural development and hydrolygic ressources)
[13] CEA: Comisión Estatal del Agua (Water Comission of the State)

some programs from these agencies are executed. Some of them have a shared funding by the different governmental levels (national, state, local and individual level). They receive information, advice and money from the state government and vice versa. They also provide information, advice and services to the municipal government, which gives and receives information and services.

FISM[14], FFM[15] and FM[16] are funds, which support the activities of the "ramo 33", a national funding program for infrastructure projects. These projects are usually funded by participation of the national, state and municipal stakeholders (Monografía de Villa de Arriaga).

2.2.4 National level of operation

The Mexican National Government has different ministries and agencies which basically are responsible for the governmental programs dedicated to the rural areas and agriculture and livestock producers. The most important ministries for the governmental programs applied in Villa de Arriaga are:

Sagarpa: Programs directly directed to the agricultural and livestock producers

Sedesol: Social Programs which provide direct financial support, the biggest one is *Oportunidades* (opportunities)

Semarnat[17]: Responsible for environmental public policies

Sedatu[18]: Responsible for different agricultural programs which apply in Villa de Arriaga

CONAPO[19]: Important for the implementation of many governmental programs: CONAPO evaluates the marginalization of the different entities. The degree of marginalization often is a criterion for the applicability of a governmental program.

CONAGUA[20]: agency responsible for water administration and monitoring in Mexico

[14]FISM: Fondo para la Infraestructura Social y Municipal (social and municipal infrastructure fund)
[15] Fondo para el Fortalecimiento de los Municipios (Fund for Strengthening the municipalities)
[16] Fondo Municipales (Municipal Fund)
[17] Secretaria de Medioambiente y Resursos Naturales (Ministry for environment ans natural ressources)
[18] Secretaria de Desarrollo Agrario, Territorial y Urbano (Ministry for agricultural, territorial and urban development)
[19] Consejo Nacional de Población (National Population Council)
[20] Comisión Nacional del Agua (National Water agency)

INEGI[21]: collects and provides statistical information until the individual level in Mexico, responsible for the census, also provides

All ministries and state agencies are advised and funded by the national government. At the same time they influence the policies of the other subordinated stakeholders.

Some agencies of Sagarpa are of special interest for the governmental programs on municipal and local level of operation in Villa de Arriaga. Aserca is an important provider of programs directed to the rural areas. CONAZA[22] is an agency working especially with arid zones. As Villa de Arriaga is a semi-arid region, there are some projects that are also supported and funded by CONAZA. FIRCO[23] is also an important agency of Sagarpa which influences the policies applied in Villa de Arriaga. Inifap[24] is an important investigation agency from Sagarpa. Besides technological questions it also analyzes the agricultural market. The results of those analyses have direct impact on the payments agricultural producers receive in Villa de Arriaga, for example in the case of the catastrophic insurance. The refund for the agricultural losses depends on the expected market value calculated by Inifap.

2.2.5 International level of operation

On the international level mainly three institutions are involved in the Mexican governmental programs directed to agricultural and livestock producers. The World Bank (2005), OECD (2006) and the FAO[25] (2007, 2009, 2012) have evaluated different of these programs and give suggestions for improvement. The Worldbank also has directly funded parts of the Procampo program (Fox et al. 2010).

The USA has an important influence on the actual agricultural policies. The Free Trade Agreement has changed the direction of these policies (See above). At the same time it is the most important buyer of Mexican agricultural products, so that the market prices often are determined by the USA (Fox et al. 2010). So there is an exchange of information and money, which will not be explained into detail at this point.

[21] INEGI: Instituto Nacional de Estadística y Geografía (National Statistic and Geography Institute)
[22] CONAZA: Comisión Nacional de las Zonas Áridas (National Agency for arid zones)
[23] FiRCO: Fideocomiso de Riesgo Compartido (Entailment of shared risk)
[24] INIFAP: Instituto Nacional de Investigaciones Forestales, Agricolas y Pecuarias (National Forest, Agriculture and Livestock Investigation Institute)
[25] FAO: Food and Agricultural Organization of the United Nations

2.3 Policy Analysis

This part of the chapter is divided in two parts. The first one explains the criteria for the characterization of the agricultural public policies and the second part shows the results of the analysis.

2.3.1 Method

The method used was to classify all public policies of the agricultural ministry (Sagarpa), the ministry for social development (Sedesol) and its agencies on different levels using criteria of the sustainable livelihoods approach. The five categories regarding human, natural, social, financial and physical capacities are used as explained in the livelihoods chapter. Consequently, different types of policies tend to relate to a specific category of capacity (see table 1). A second categorization refers to the policy objective and classifies, whether it is productive, assistencial or institutional. Furthermore, those policies will be categorized, which potentially are applicable in Villa de Arriaga. As there are different objective groups targeted by the government programs not every policy is designed to be applied in a context like Villa de Arriaga. Those applicable policies are then, in a third step, compared to those effectively implemented in Villa de Arriaga. This qualitative analysis will then be used for the comparison with the sustainable livelihoods capitals of the study region.

Table 1: Livelihoods Capacities and examples for policy objectives in these categories

Capacity	Examples of public policies
Financial	assurances, direct payments, financial support of agricultural incentives or technology,…
Physical	provision of technology or agricultural incentives, investment in infrastructure and energy,…
Human	knowledge transfer, capacitation of stakeholders, technification of processes
Social	Support in organizational structures (different levels), gender related policies, women projects, …
Natural	conserving areas, protecting natural goods and habitats, renewable energies,…

A second categorization divides the public policies in institutional, productive and assistential types.

Assistential

Public policies are categorized as assistential when they meet one or more of the following criteria:

- The policies refer to the household, not to the main income source
- They provide solemnly information (human capital) and do not necessarily implement the new ideas
- The programs do not provide a regular monetary value added through the sale of products
- Insurances

Productive

Public policies are categorized as productive when they meet one or more of the following criteria:

- They refer to the main income source (work)
- El objective of the policies is to increase productivity
- The concept of the policy includes investment in technology and infrastructure which increase productivity (including intensification of agriculture and change to organic production)
- The policy concept includes the provision of animals or seeds

Institutional

Public policies are categorized as institutional when they meet one or more of the following criteria:

- Investments in human capacities of organizations, institutions and state agencies

1.3.2 Results

The categories were crossed in analysis with Microsoft Excel and visualized. The results can be seen in the following part.

Figure 5: Agricultural policies with livelihoods capacities they support (own creation, Sagarpa 2014)

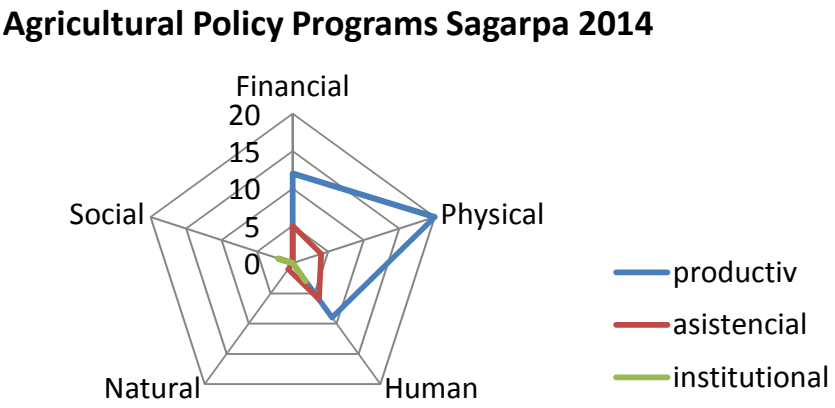


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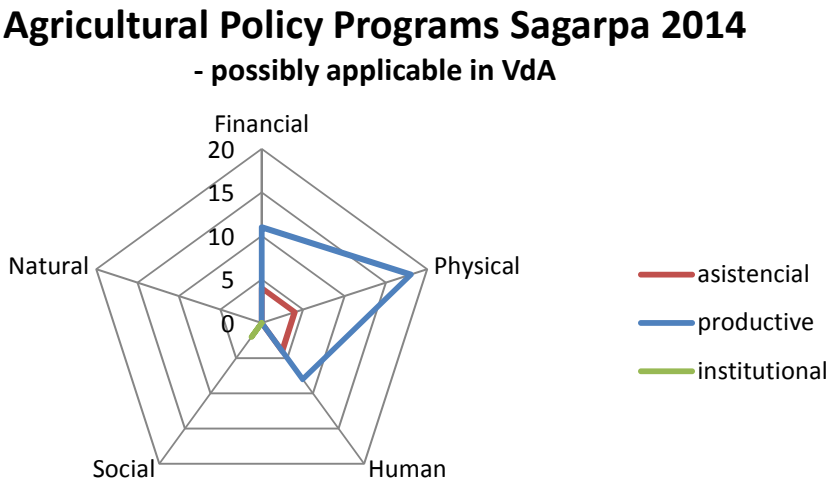
Figure 6: Agricultural policies possibly applicable in Villa de Arriaga with livelihoods capacities they support



Source: own creation, Sagarpa 2014

Figure 7: General Public Policies in Livelihoods Capacities they support (own creation, SEGOB 2014)

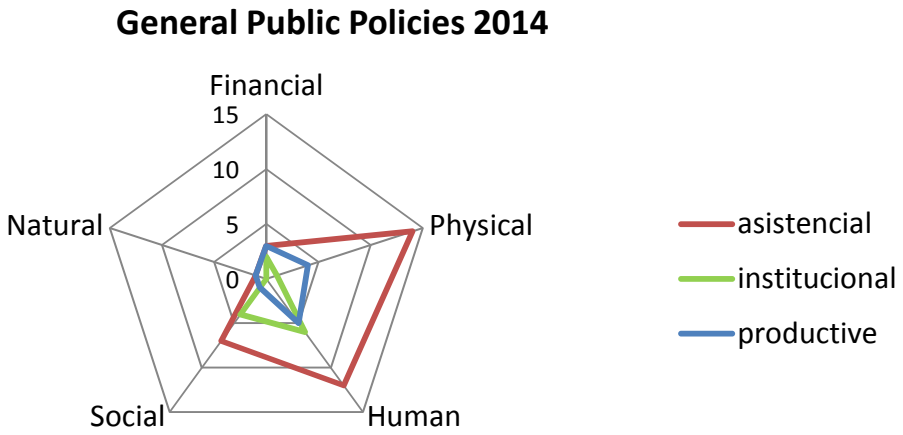
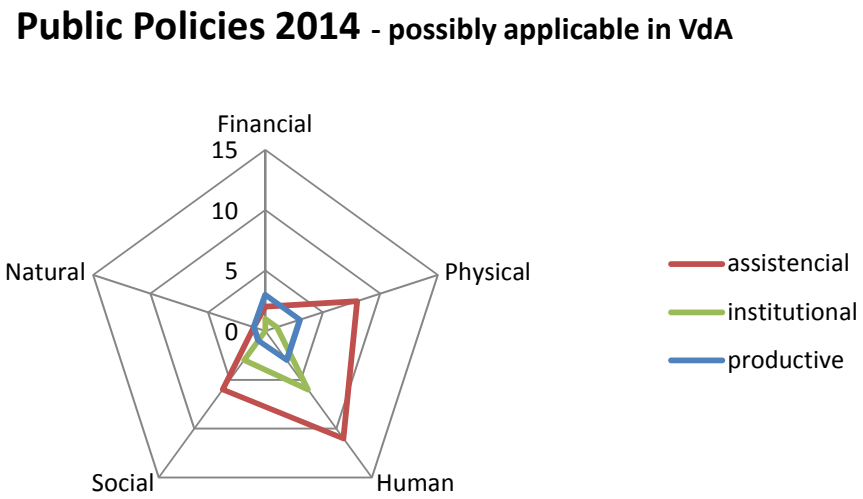


Figure 8: Public Policies in Livelihoods Categories (own creation, Segob 2014)



Source: SEGOB 2014

The most supported livelihoods capacity of Sagarpas policy programs is the physical one, always aiming to improve the productivity (see Figure 2). The programs included in this category often improve the technological possibilities of the farmers, by for example providing technological packages or helping buying tractors or other useful machinery to improve the agricultural production. The second most supported capacity is the human productive capacity, which includes projects which aim to investigate innovation and transfer in production technology, information about better marketing options and technical assistance related to knowledge transmission. The third most supported capacity is the financial and productive classification. This category includes direct substitution of incentives for the agricultural or livestock production, for machinery or for other components that improve productivity.

There are fewer assistential policies than productive provided by Sagarpa, and they support basically the human and the financial capital, a few also the physical one. Assistential programs supporting the human capacity are for example organizing reunions to differ information about different modernization possibilities, where the program[26] only provides information and does not support the implementation of any strategies. A financial assistential program is for example the assurance of crop failures due to catastrophic events. The physical capacity is supported, when for

[26] For example Sistemas Productivo Agricolas (SISPROA) (Poductive Agricultural Systems)

example the general development of certain areas is promoted by direct payments, work forces and material for the general and not the personal deficit of a locality[27].

There are only few programs supporting the institutional capacity. Here for example the organization of projects is supported. These projects can target different kinds of developments in a community[28].

General Public Policies listed in the federal programs catalog (Bonilla Lopez 2014) are mainly assistential and refer to physical, human or social capital (see figure 3). Programs which support the human capital for example encourage indigenous children in marginalized areas to visit school[29], or others build short term employment for young people older than 16[30]. The physical capacities are mainly strengthened through, for example, infrastructural improvements (roads, houses)[31]. The social assistential programs support for example the integration of minorities in general and in cultural aspects[32] or encourage social organizational processes[33] in general.

In comparison to the general agricultural policy programs there are fewer programs applicable in Villa de Arriaga, but the distribution pattern regarding the categories in agricultural policies does not change significantly. Regarding the general public policies applicable in Villa de Arriaga the most supported capacity is the human one, which differs from the general public policies. Some programs are not applicable, because they relate to indigenous producers or because the support fishery, which is not a part of the production scheme in Villa de Arriaga.

For the analysis of the programs applied in Villa de Arriaga, the director of the rural development districts of the state of San Luis Potosí in Sedarh facilitated an overview over the finished and still processed programs in the municipality. This list is the base for the following analysis.

Between the years 2009 and 2014 a total number of 919 single projects were finished in Villa de Arriaga by the following state agencies: CONAZA, FIRCO, SAGARPA, SEDARH, SEDATU and SEDESOL

[27] An example is the program “Desarrollo de las zonas aridas” (Development of the dry regions)
[28] For example Fortalecimiento a Organizaciones Rurales (Strengthening Rural Organizations)
[29] Programa de Apoyo a la Educación Indigena (Assistance program for education of indigenes); provided by SEDESOL, SCT, SEMARNAT
[30] Programa de empleo temporal (Program for temporal employment); provided by CDI
[31]For example: Programa de fomento a la urbanización rural (Facilitation Program for rural urbanization) o Programa Vivienda Rural (Rural Acommodation Program), provided by Sedatu
[32] Programa de Atención a personas con discapacidad (Attention Program for disabled persons); provided by SEDIF, SMDIF, SNDIF, OSC
[33]Programa de Coinversión Social (Social coinversión program); provided by Indesol (SEDESOL)

(see stakeholder analysis). Until July 2014 four projects are still in process. This list of programs is not complete, because it does not include the individually paid programs like Oportunidades. According to the interviews made in June 2013 and May 2014 nearly every producers received support from Oportunidades when fitting in the characteristics.

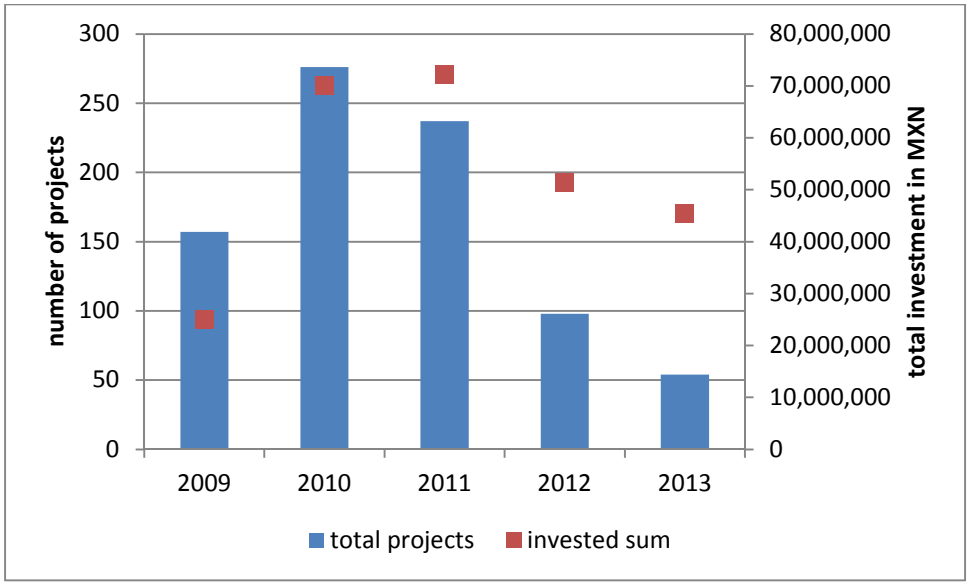
In general needs to be recognized, that in accordance with the federal political system of Mexico, not every political program applied on municipal level only origins in federal organizations. For example, in the statistics of the state agricultural ministry of San Luis Potosí (SEDARH), the programs are listed according to the names given by SEDARH. These programs are similar to the ones the federal agricultural ministry (SAGARPA) applies, because they are also (or solemnly) financed by the federal agency. Effectively, in the analysis of the municipally applied programs only those programs are listed as SAGARPA programs, when they are directed directly to the individual producer (e.g. Procampo). Also, when the program is implemented by a SAGARPA sub agency (see stakeholder analysis), for example CONAZA, the program is listed as implemented by the sub agency.

As a consequence for the analysis, the agricultural policy programs will be analyzed as such, even though they might not be listed as SAGARPA programs. This implies that there is no data about the general public policies applied in Villa de Arriaga.

The programs applied in Villa de Arriaga registered by the department of rural development of Sedarh will be measured by number of projects. A project means one item of expenses and is to be identified by a code given by Sedarh. It has between one and 1818 beneficiaries, depending on the kind of state assistance it is associated with.

By quantifying the total sum of inversion in rural development in the years 2009 until 2013 in finished and unfinished projects including the Procampo and the siniestral payments can be seen, that the general payments are between 25 in 2009 billion and 72 billion in 2011 pesos mexicanos. Between 54 (2013) and 276 (2011) projects per year have been realized or are to be realized between 2009 and April 2014 (see figure 1).

Figure 9: Number of projects and total inversión in mexican pesos in policies for the rural development in Villa de Arriaga per year



Between the years 2009 and 2014 in total have been invested 264,427,734.8 MXN in Villa de Arriaga, where 1,816,798.19 MXN (0.79%) have been spent in San Francisco, 5,953,125.68 MXN (2.25%) in El Mezquital and 7,070,569.81 (2.67%) MXN in El Tepetate. The calculation for the study localities does not include programs which support producers in the whole municipality, because these payments could not be related to single villages.

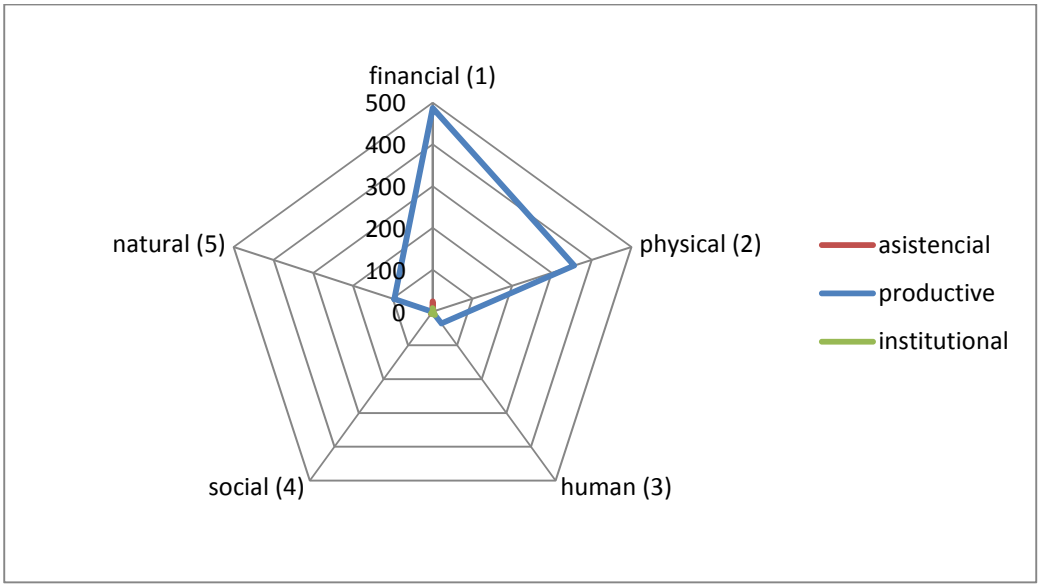
These policies also have been categorized according to the same criteria used above. As all the state agencies of these data are agencies related to SAGARPA, the results will be compared to the results of the analysis of the agricultural policies only.

The results show that according to the number of projects that are to be found in one category, the productive projects who support financially and physically are the most common ones. The financial capital also includes restricted payments which are earmarked for special purposes. These projects are listed double, in the financial capital and as the capital of the purpose of the investment. This is justifies, because hereby get supported two capitals at the same time. These are counted double in the statistics.

The assistential and institutional projects are rare in comparison. The dominance of productive projects reflects the trend in the general agricultural policies of SAGARPA (see above) but the

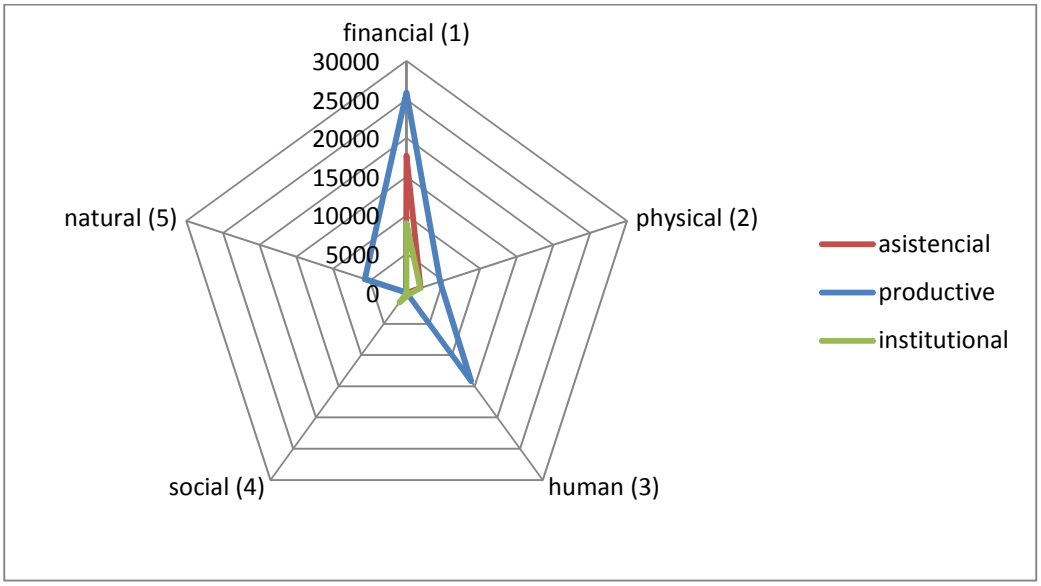
financial dominance and the support of the human capital in comparison to the general analysis are different.

Figure 10: Classification of agricultural policies based on number of projects realized per category



Comparing the classification by projects to the characterization by beneficiaries the panorama changes a bit (see figure 11).

Figure 11: Classification of agricultural policies based on number of beneficiaries per category



Here, the productive policies directed to increase productivity still are the most applied, but the assistential and institutional policies become more visible. In this comparison, the human and the financial productive policies are the dominant ones and in comparison to the general agricultural policies the natural capital also gets benefitted.

The assistencial policies mainly are concentrated on the financial and the physical capital, meanwhile the institutional policies also mainly support financial and human capital but also the social capacities.

Some policies have been difficult to categorize, because the objectives of the policy formulation were not explicit enough to be categorized. In these cases the policy-intern measures built the basis for categorization.

An interpretation of the results will follow in comparison with the livelihood capacities identified in Villa de Arriaga in discussion.

3. Livelihoods Capitals of Villa de Arriaga

In the following chapter the case study will be introduced. After the general facts follows a more detailed analysis of the different capitals of the sustainable livelihoods framework beginning with the natural capital and then explaining the physical, financial, human and social capital of the municipality and the three localities of the case study.

3.1 Introductive Description of Villa de Arriaga

The municipality Villa de Arriaga lies in the central plateau region of the state of San Luis Potosí between Longitude 101°22'56'' O and Latitude 21°54'37'' N with an average altitude of 2 161 m above sea level (SEGOB 2014).

It adjoins in east with Villa de Reyes, another municipality of San Luis Potosí, in North east with the capital of San Luis Potosí, the north with Mezquitic de Carmona, in the west with Pinos (Zacatecas), in the south with San Felipe and in the south east with Ocampo (Guanajuato). The area of Villa de Arriaga measures 880.219 km² with a population of 16.216 habitants. It contains 98 localities which have between 100 and 10 000 habitants. The principal localities are Villa de Arriaga (municipal capital), Santa Rosa de Gallinas, San Antonio, San Francisco y El Tepetate (SEDESOL, 2010).

The statistical data used in this analysis does refer to the municipality as a whole, whereas the information obtained in interviews is based on a survey and key person interviews in June 2013 and May 2014 in three different localities: El Mezquital (EM), San Francisco (SF) and El Tepetate (ET). All three localities rely on agricultural and livestock production and most of the producers are organized in *ejidos*.

The municipality is listed as part of the development agenda for priority areas (PDZP) since most of their locations are classified at the highest levels of social exclusion, affecting the development of more than 15,000 people (SEDESOL 2010). It is considered as a largely rural area and its population, regardless of their place of residence, derives at least dome part of their income from primary activities. Agriculture is rain fed, emphasizing the cultivation of beans, corn, barley, oats, corn and wheat. These crops have been affected by prolonged drought periods. The same happened to livestock, according to the farmers has suffered extensive damage, affecting both, large and small scale producers. There are eleven *ejidos* and one smallholder property constituted association registered with the Agrarian National Registry (RAN), for example the Livestock Group Villa de Arriaga, Integrativo Nuevo Horizonte, La Regional, Ejido Union Ponciano Arriaga, Integrated Center between others (Ruiz Montejano 2010) .

3.1.1 Poverty in Villa de Arriaga

The principal indices of poverty in Villa de Arriaga give a differentiated overview over the situation in Villa de Arriaga. Nearly 80% of the population in Villa de Arriaga is defined to be poor and has an average of 2.9 shortages of access to some kind of social service (see table 2).

Table 2: Poverty in Villa de Arriaga (own creation based on CONEVAL 2010)

Indicators	Porcentage	Number of Persons	Average Number of Shortages
Poverty			
Poor Population	79.9	13,841	2.9
Moderately poor population	48.8	8,450	2.3
Extremly poor population	31.1	5,391	3.8
Social Deprivation			
Population with minimum one social shortage	99.1	17,157	2.8
Population with minimum three social shortages	58.2	10,085	3.7

Villa de Arriaga has a medium degree of marginalization, defined by CONAPO, which is rank 22 of the 58 municipalities in the state of San Luis Potosí (INEGI 2010). Again, this ranking does not give Villa de Arriaga a special importance, because it is neither between the richest nor between the poorest municipalities of San Luis Potosí.

3.1.2 Migration

Migration is an important aspect of the livelihood design. Various capitals are influenced by this adaptation strategy (McDowell et. al 1997). The importance for the different kinds of capitals will be explored in the specific sub-chapters.

The total migration based on the census of June 2005 shows a total migration rate of 3.9, while it is the 22nd place in the ranking of the municipalities in the state of San Luis Potosí (INEGI 2010). Most of the emigrants of Villa de Arriaga, a number of 266, live in the United States of America, meanwhile 257 persons emigrated to other entities within Mexico. In general migrate more women than men, but the majority of female migrants stays in Mexico, while most men migrate to the United States. In comparison to other municipalities in San Luis Potosí, Villa de Arriaga is on the 34th place and has a medium grade of migration (Cámara de Diputados del H. Congreso de la Unión 2010). The number of people migrating to Villa de Arriaga is higher with approximately 10 %. This is the 12th place in the state comparison (Cefim 2012).

Table 3: Migration in Villa de Arriaga (own creation based on INEGI 2010)

Places of Residence in June 2005	Other Entity	Population with 5 years and more	Gender	
			Male	Female
Total	**Total**	**14,409**	**7,165**	**7,244**
Stayed in entity	**Total**	**13,845**	**6,834**	**7,011**
In different entity	**Total**	**257**	**95**	**162**
In different entity	01 Aguascalientes	6	4	2
In different entity	02 Baja California	1	1	0
In different entity	09 Distrito Federal	5	3	2
In different entity	11 Guanajuato	71	26	45
In different entity	12 Guerrero	3	1	2
In different entity	13 Hidalgo	2	1	1
In different entity	14 Jalisco	45	18	27

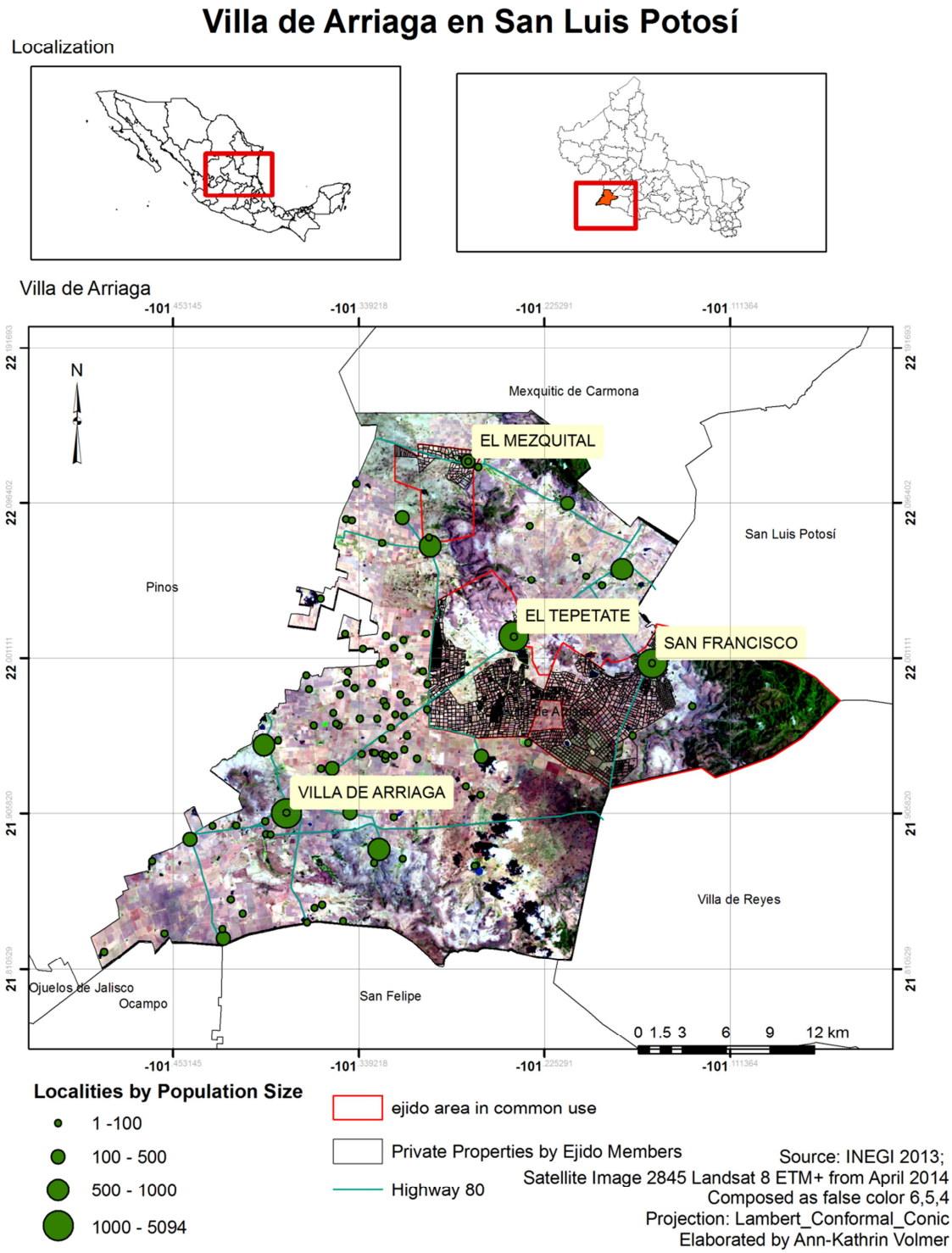
In different entity	15 México	7	4	3
In different entity	19 Nuevo León	30	14	16
In different entity	28 Tamaulipas	11	4	7
In different entity	30 Veracruz de Ignacio de la Llave	2	1	1
In different entity	32 Zacatecas	74	18	56
In The Unites States of America	**Total**	**266**	**215**	**51**
In different country	**Total**	**1**	**0**	**1**
Not specified	**Total**	**40**	**21**	**19**

Most of those people migrated to other places within or outer the Mexican territory, because of better job opportunities (interviews in May 2014 and June 2013). Some older people stated that they felt the necessity to change to another place to improve the income opportunities but mentioned their age as a limiting factor. Migration generally is seen as an opportunity to adapt to the circumstances which include insufficient income opportunities. Remittances are one reason for the importance of migration for the livelihoods strategies in Villa de Arriaga. Here, 4.91% of the dwellings receive remittances(Cámara de Diputados del H. Congreso de la Unión 2010). This part of the population bases the sustainment of their living partly on the income of (mostly) migrated family members.

3.1.3 San Francisco

San Francisco is the largest *ejido* of Villa de Arriaga. It has 267 *ejido* members. The *ejido* leader is Mr. Felipe Bravo García. The place is connected to Highway 80 (see map 1), between the capital San Luis Potosí and the head of Villa de Arriaga and counts with a paved street. It is the only street paved in town and at its end it becomes a dirt road. The village has 1353 inhabitants, of which 708 are men and 645 women. There are 303 private dwellings inhabited. The degree of marginalization of the town is high and the degree of social shortages is medium (SEDESOL 2013). The *ejido* area is mostly subdivided in registered properties from individual *ejido* members of San Francisco. The parceled area is used for temporary agriculture and induced grasslands. The common area in the *ejido* of San Francisco has natural grasslands and is less used for agricultural production. In the mountainous areas precipitation is higher. Thus there are reserves and water tanks in the mountains. This infrastructure is not sufficiently improved to use water more intensively (Interview with the *ejido* commissar, Felipe Garcia Bravo). In San Francisco there is brick

Map 1: Localization of Villa de Arriaga (own creation based on INEGI 2013 and Images Landsat 8)



production. Here some producers may find work in the times in which the land does not give enough harvest. At the same time it is a source of contamination of the environment, because for the production they burn wheels and waste. The dirt particles can be found in the water, the air, the walls of some houses and on the plants growing there (Interview with a farmer in June 2013).

The *ejido* of San Francisco owns some common use area in the mountains of Cerro de San Miguelito (see Map 1). This area is used to graze the smaller cattle and water basins are located there. The superficial water resources do not constantly exist, only after short periods of rain. The water related infrastructure will further be explained in the description of the physical capital of Villa de Arriaga.

3.1.4 El Tepetate

El Tepetate is the second largest *ejido* of Villa de Arriaga with 314 *ejido* members. The *Ejido*-Commissar is Mr. Guadalupe Jasso. The place is directly connected to Highway 80 (see map 1). The village has 1367 inhabitants, of whom 693 are men and 674 are women. The degree of marginalization of the people is high and the degree of poverty is medium (SEDESOL 2013).

El Tepetate has a red of water distribution to nearly all of the households. The water comes from deep wells and a dam owned by the *ejido*. It also has a water drainage system, although it is not yet fully constructed (interviews May 2014). The *ejido* of El Tepetate does not have a forested part of the mountains like San Francisco. The hills there are smaller and the water storage possibilities are less, too. A more detailed description will be given in the explication of the livelihoods capitals.

3.1.5 El Mezquital

El Mezquital is the smallest of the three places. It has 306 inhabitants, which distribute in 153 women and 153 men, living in 62 households. The mathematical gender relations are the same for three places. The degree of marginalization of this place is high and the degree social shortages is low (SEDESOL 2013). The common area is used primarily for rain fed agriculture and pastures, but includes a small area of Conifer and another part Xeric Shrubland. The common area of the *ejido* includes smaller parts of hill land, where water storage capacities in tanks can be found. There is no possibility to construct another dam (interview with *ejido* commissar Joel Solis in May 2014). El Mezquital is connected with Highway 80 between San Luis Potosí and Villa de Arriaga through a new street.

3.1.6 Justification of the case study selection

Villa de Arriaga is a municipality, which is politically not important; it is on rank 34 beginning with the most populated of the 58 municipalities in the state of San Luis Potosí. Therefore, it is whether neither one of the smallest nor one of the biggest populations.

The Human Development Indice (HDI) developed by the UNDP of Villa de Arriaga is 0.78 in 2010, which is a little bit higher than in 2005 (0.76), both higher than the national average (0.74) in 2010. It is ranked as 41st in municipal comparison in the San Luis Potosí (UNDP 2014).

The agricultural production in Villa de Arriaga is the 31st most important in San Luis Potosí according to its value. Gran parts of this production is used for own consumption or as livestock fodder, as the main agricultural products in Villa de Arriaga are grains (INEGI 2010). However, many farmers at least complement their income by selling agricultural products.

In Villa de Arriaga lives no significant indigenous population (11 persons), so it does not get special attention from programs destined to this part of the population (INEGI 2010).

The general academic investigation concentrates on more productive parts of the state of San Luis Potosí, with a more humid ecosystem (see e.g. Algarra 1999). At the same time there is a certain need of this level of analysis. The average level of small and middle-scale farmers is high and this is the group the agricultural policies should focus on, as the possibilities of improvement are various. Bigger farmers have more modernized tools for managing their lands.

3.1.7 Justification sample localities

The sample of the localities is basically a homogeneous[34] one, as they have the same basic political circumstances, as they depend on the same government and also their inner political structure is similar (*ejido*). Agricultural production is an important part of the livelihoods strategies of the population and therefore matches with the focus of this work. The investigation is focused on the political processes regarding small and middle scale farmers and specifically *ejido* members. The structures of an *ejido* have the advantage, that they are similarly organized and, as can be assumed, share common knowledge regarding governmental programs based on regular member

[34] As defined by Hernandez Sapieri et. al (2006): *en estas las unidades a seleccionar poseen un mismo perfil o características, o bien, comparten rasgos similares. Su propósito es centrarse en el tema a investigar o resaltar situaciones, procesos o episodos en un grupo social* (ibid. P. 567)

assemblies.This focus group, the *ejido* members, forms an important part of the population of these localities.

However, there are some particularities, which make it interesting to study these three communities in comparison: San Francisco and El Tepetate are two of the three biggest communities in the municipality and both are not the municipal capital, whereas El Mezquital is significantly smaller. Regarding the access to goods and services also can be found differences in these three places. The transport and the access to public transport is different, dependent on the distance to the main highway. El Tepetate is located right next to the highway; meanwhile San Francisco and El Mezquital have access through a longer paved street. These localities have different infrastructure conditions. The agricultural production in all three places is mainly rain fed but the water distribution in the urbanized areas is different, in El Tepetate better than in the other two places. The organizational circumstances also differ between the three places. For example the *ejido* of San Francisco managed to start building a dam which will improve their water distribution. The importance of the *ejido* assemblies in El Tepetate is fewer than in San Francisco because at the moment they did not have a bigger shared project. In El Mezquital the *ejido* assemblies sometimes do not take place because of the disinterest of its members. They also did not have a vocal which is important for the distribution of assistance by governmental programs (Interviews May 2014).

In the deeper analysis of the different livelihood capitals the differences and similarities will be stated out more detailed in the following part.

3.2 Natural Capital

First of all, the agricultural production of Villa de Arriaga needs to be analyzed and put into context.

Regarding the natural potential of Villa de Arriaga there already exists an extensive analysis (Mata Cuellar 2008). Hence, the following part will summarize the relevant results regarding the topic of this thesis.

3.2.1 Land Use

The objective of this spatial analysis is to evaluate the changes in the coverage of soil in Villa de Arriaga. Especially the forest and the agricultural area will be focused on. Forests have specific importance for the maintenance of an ecosystem. They stabilize the micro climate, prevent soil

erosion, are important for the water cycle and define the living conditions for a lot of different species (Agar 2014). The area used for agricultural production and pastureland is usually classified as degraded, because the former vegetation form (forests, other kinds of vegetation) often were more diverse, had more conserving functions than soil used for production and the land use change caused vegetation loss (Palacio Prieto et. al 2004).

The results will be based on Landsat 8 satellite images from April 2014 and will be compared to the land use in the years 1984, 2000 and 2005 as calculated by Mata Cuellar (2008). This 30 year comparison will highlight the changes between these years, caused by interactions between humans and nature. They are indicators for the development of the region and the change in the use of resources (Palacio Prieto 2004).

The rate of vegetation loss by vegetation type of the principal vegetation in Villa de Arriaga will be calculated in comparison to the results of the land use analysis by Mata Cuellar (2008). Her calculation will be complemented by the information of 2014. For the year of 2014 the annual change rate will be calculated with the formula used by the FAO (2005):

$$q= \left(\frac{A_2}{A_1}\right)^{1/(t_2-t_1)}\text{-}1$$

where

q = rate of change

A_1 = forest cover year t1 (earlier)

A_2= Forest cover year t2 (most recent year)

t_1 = year 1 (year of reference)

t_2 = year 2 (most recent year)

This rate shows the losses or gains of the pino-encino and Encino pino forests as well as the crasicaule shrubland.

This calculations will be compared to those by Mata Cuella (2008). This implies a few error possibilities:

- The data is not based on the same Landsat series
- The software used for the land use determination is different. Mata Cuella used ILWIS 3.3 following the principles of spatial analysis by Chuvieco (1990), meanwhile the analysis 2014 is made with the program eCognition Developer 8.7. The basics of vegetation cover identification due to visual interpretation and colors of the images are the same, but might change in details.
- In the analysis of Mata Cuellar the classification is based on Raster level, meanwhile the analysis with the program works with small polygons, which are identifies according to their characteristics on the different caps of spatial analysis
- The categories seem to be defined differently, because according to Mata Cuellar she used also the categories urban area and water, but in her calculations they do not appear. She does not define the minimum size of mapped area. In the case of the present analysis, for reasons of efficiency in presentation and lecture of the map and because of utility reasons, the map has a minimum area of 4x4 mm, which in a scale of 1:50 000, restricted by the images of Landsat. This means, that the minimum size of a land use type must be 4 has to be seen in this map, according to the calculations of Priego (et al. 2009).

The first step of the spatial analysis is defining the different land use types, based on a false color landsat 8 image:

The categorization of the land use types is based on the reflection of the soil cover captured by the Landsat 8 satellite images. For the human eye, there is only a variation spectrum between 0.4 and 0.7 µm visible, but the satellite images provide a greater light spectrum which allows a better analysis of the ground. The bands used in the analysis, their spectral range, use and grid size are indicated in table 4.

Table 4: LDCM imager spectral bands, Landsat 8 (Kramer 2002)

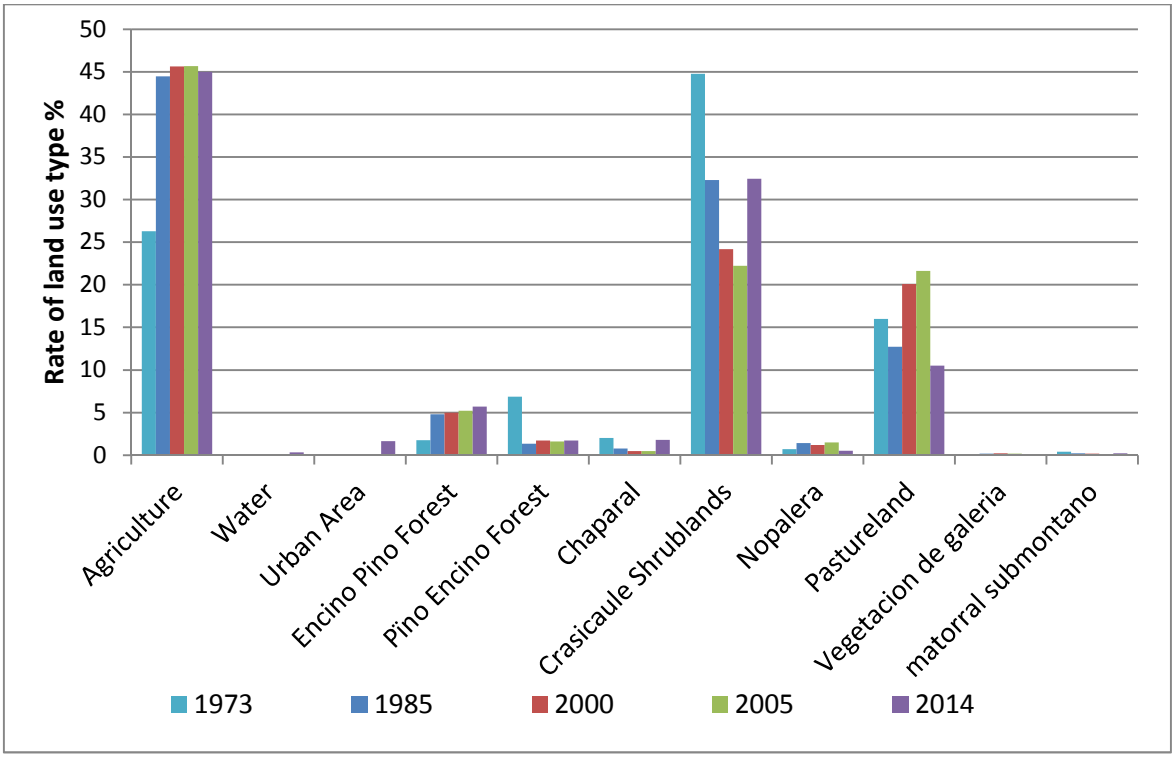
Band Nr	Band Name	Spectral range (nm)	Use of data	GSD
1	New Deep Blue	433-453	Aerosol/coastal zone	30 m
2	Blue	450-515	Pigments/scatter/coastal	30 m (TM heritage bands)
3	Green	525-600	Pigments/coastal	
4	Red	630-680	Pigments/coastal	
5	NIR	845-885	Foliage/coastal	
6	SWIR 2	1560-1660	Foliage	
7	SWIR 3	2100-2300	Minerals/litter/no scatter	
8	**PAN**	**500-680**	**Image sharpening**	**15 m**
9	SWIR	1360-1390	Cirrus cloud detection	30 m

For the classification of land use was used the "eCognition Developer 8.7" software, which is a computer system that performs interpretation tasks of remote sensing images using multi-resolution segmentation, object-oriented analysis and decision hierarchy (Definiens, 2006).

In the image processing, the algorithm multiresolution segmentation was used with a parameter of scale 60 and the criteria of shape 0.8 and compactness 0.2. for the bands 2 (blue), 3 (green), 4 (red), 5 (near infrared), 6 (mid infrared) and 7 (far infrared or thermal) of the electromagnetic spectrum, analysis based on other studies using Landsat images (Weckmüller et al., 2011; Peralta-Rivero et al., 2013). For the hierarchical classification, which results in different levels of interrelated classes according to a defined topology, the Nearest Neighbor Algorithm was used. The definition of thematic classes and selection of samples representing each of the kinds was based on the prior knowledge of the study area and the used color composition.

The classification was drawing exclusively on the fuzzy modeling of spectral descriptors supported by the selection of training areas (samples). The fuzzy analysis provides a degree of involvement (relevance) of an object for all defined classes in the legend, the values of which can be inserted into new contexts of classification (Cruz et al., 2007). This way, a supervised classification oriented to objects with field verifications in the area in the municipality of Villa de Arriaga was performed.

Table 5: Areas occupied by vegetation type and land use in the years 1973, 1985, 2000, 2005 and 2014.



In a second step the size of the land use types will be compared to those from Mata Cuellar (2008). The analyzed types are:

Agriculture

Water

Urban Area

Encino Pino Forest

Pïno Encino Forest

Chaparal

Crasicaule Shrublands

Nopalera

Pastureland

Vegetacion de galeria

matorral submontano

A comparison to the year of 1973 (see table 5), in 2014 the area for rain fed agricultural was augmented by 0.02% per year to a total area of 38,936.56 has. Together with the crasicaule shrublands this land use types are dominant in the municipal area. The agricultural change according to the calculation of Palacio Prieto (2004) the area decreased 0.006% per year between 1973 and 2014.

Referring to the Encino pino forest, there is a growth of 0.03% per year between the years 1973 and 2014. In 2014 this forest type occupied 5.72% of the municipal area, which is a size of 4,948.64 ha.

The Pino Encino Forest decreased in an average rate of 0.03 between the years 1973 and 2014, which results in a size of 1,491.03 has in 2014, which is the same size as in 2000, according to the calculations of Mata Cuellar (2008). This is 1.72% of the area of Villa de Arriaga.

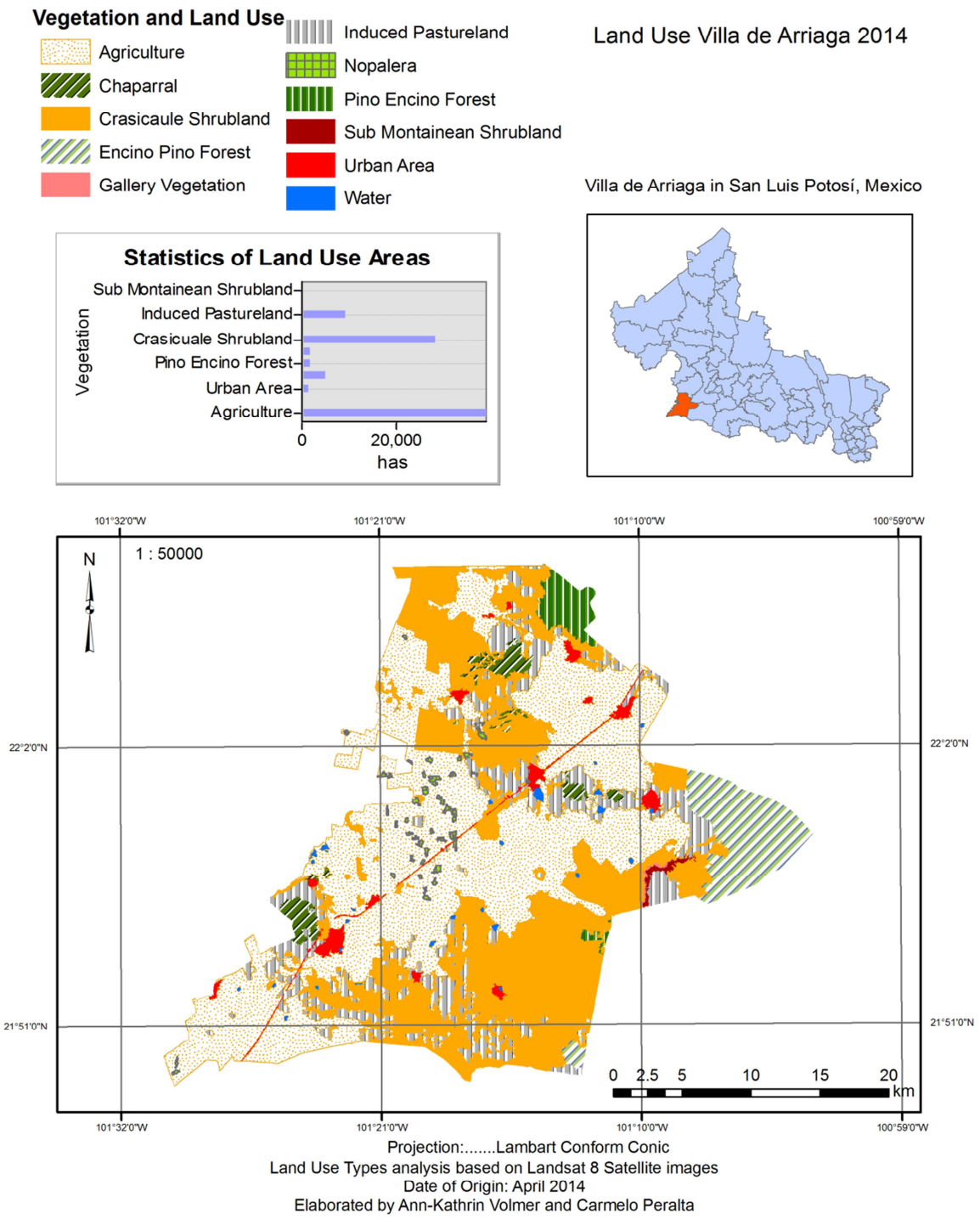
In comparison to the Chaparral calculated by Mata Cuellar, which according to her was decreasing remarkably (from 2.00% in 1973 to 0.46% in 2005), according to the new calculation occupies a land size of 1,547.67 has, which makes it 1.75% of the municipal area. This number might be based in different classifications of the land use types.

According to the new calculations, the area of crasicaule shrubland is 28098.72 has, which represents 32.47 % of the total study area. The annual forest change rate is in average –0.008 % annual between 1973 and 2014. The forest areas mostly are located in higher elevations with difficult access. Consequently, it is difficult to exploit these areas for agricultural production. Nevertheless, they are sometimes used for grazing cattle.

The sub mountainean Shrubland occupies 0.10% more area than in 2005, with a size of 188.48 has.

The Noplalean area stays in conflict with the area used for agricultural production and pastureland (Mata Cuellar 2008). In April 2014 it represents 0.51% of the total area which is a size of 444.26 has and is 1% less than in 2005.

Map 2: Land Use in Villa de Arriaga 2014



Projection:.....Lambart Conform Conic
Land Use Types analysis based on Landsat 8 Satellite images
Date of Origin: April 2014
Elaborated by Ann-Kathrin Volmer and Carmelo Peralta

Meanwhile, the area of the induced pastureland in 2014 was 9105.51 has, which represents 10.52% of the municipal area. This is a size lower than in the whole period until 1973.

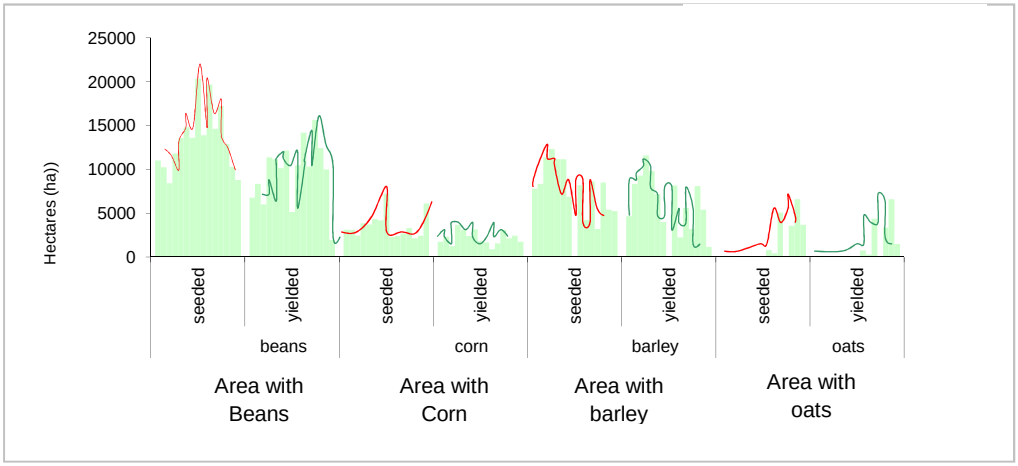
The vegetation of gallery grew about 0.09% in comparison to 2005, with a size of 67.11 has. This makes it the smallest land use type in Villa de Arriaga.

3.2.2 Agriculture

If agriculture and livestock are the most important activities in Villa de Arriaga is not easy to define, because many people have agricultural property, but at the same time are compromised in other economic activities to gain their income. The municipal report sees the primary sector after the secondary sector, according to the people employed there (Ruiz 2010). This statistics do not capture, that many agricultural producers work without or with temporal external employees (see financial capital). Other analysis concludes that it is the most important income source (Mata Cuellar 2008). Nevertheless, because of the importance for this work, the natural capacities will be analyzed according to their interrelations with the agricultural production. First of all, the agricultural production will be described, and secondly the different factors influencing it.

The main crops seeded in Villa de Arriaga are oats, beans, corn, barley and a small quantity of wheat. Which crop types are seeded can be decided by the individual farmer, so that not every crop is seeded by every producer. The crop types seeded also vary annually, and there are differences between the area seeded and the area that finally is reaped (see figure 13).

Figure 12: Comparison of the seeded and yielded área of the principal crop types in Villa de Arriaga 1987-2005 (Mata Cuellar 2008)

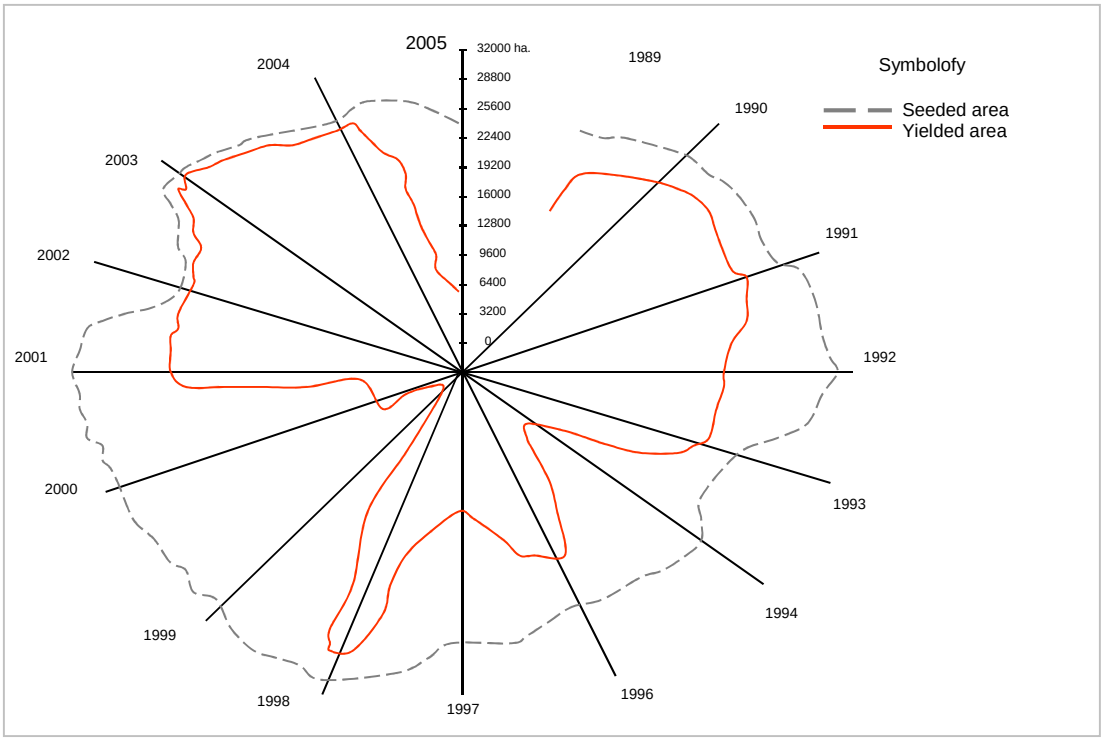


Most of these crops are cultivated in spring and summer (SIAP 2014).

The cultivation technology depends on the wealth of the producer. Some own tractor or other machines helpful for the seed or reap, other rent those machines and the poorest still cultivate with the help of yugos.

As can be seen in figure 13 the seeded area and the yielded area differ. The differences get much more obvious in figure 14 where the total numbers of seeded and yielded areas are compared. The years with low areas yielded (1987, 1989 and 1997) relate to years with droughts, whereas within the years with the highest production (1990, 1991 and 2003) do not occur severe droughts (Mata Cuellar 2008).

Figure 13: Differences between total seeded and yielded areas in the years 1989 – 2005 (Mata Cuellar 2008)



3.2.3 Livestock productions

The livestock production nowadays is mainly concentrated con bovine and ovine livestock. The statistics are based on the annual slaughter rates in the municipal slaughter houses (INEGI 2013). Caprine and porcine livestock are also produced in Villa de Arriaga, but it is not the most important livestock.

The ovine production is relatively more important in Villa de Arriaga than in the state of San Luis Potosí. The inter-annual changes between the productions are not statistically significant.

Figure 14: Meat Production in Villa de Arriaga (own creation based on SIAP 2014).

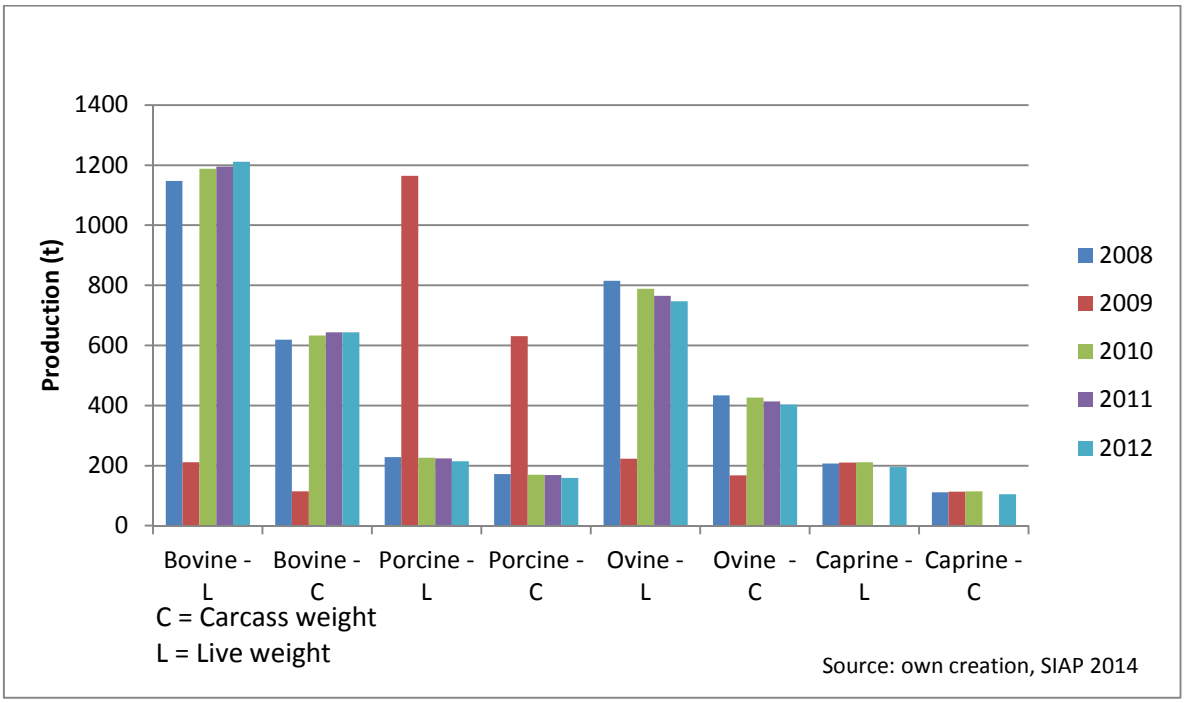
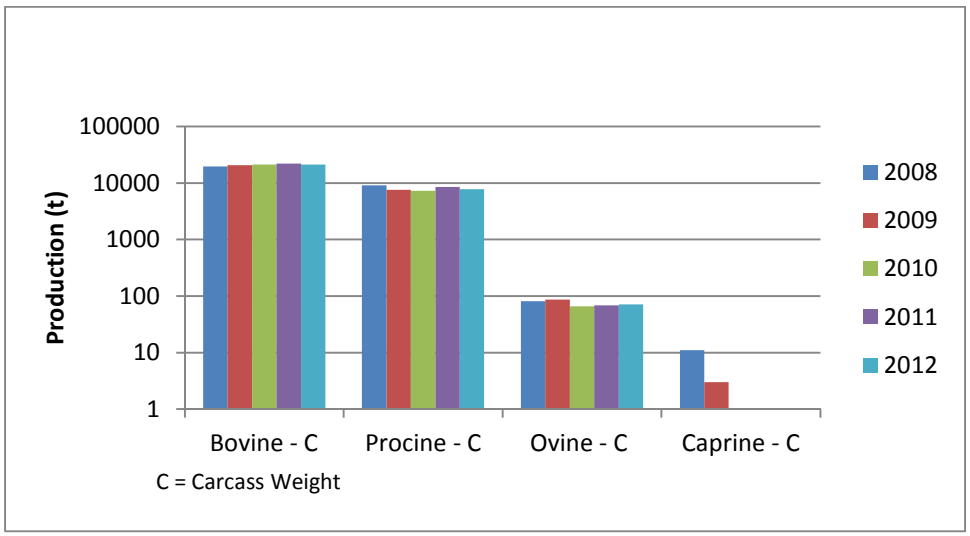


Figure 15: Livestock Production in San Luis Potosí 2008 – 2013 (own creation based in SIAP 2014)



3.2.4 Edaphology

Generally, the producer interviewed in the localities answered, when asked, that the soil of Villa de Arriaga is fertile and useful for the agricultural production (personal interviews in June 2013 and May 2014).

The principal soil types are: Yermosol (41.16%), Litosol (16.95%), Feozem (16.07%), Planosol (14.66 %), Xerosol (7.95 %) and Regosol (3.16%). These types of soils generally are fertile and useful for agricultural production or at least for pasture (Mata Cuellar 2008).

- Yermosols is a bleak kind of soil and is characteristic for desert regions. Usually its superficial layers are thin and clear with a low content of organic material and are highly permeable, but with fertilizers it can generate good yields. One condition is that it receives sufficient water (INEGI 2002).
- Lithosol is a stone soil with a thickness of 10 cm. They are not viable for agricultural production, but they are recommended for pasture land (INEGI 2002).
- Feozems are productive soils with an organic layer of not more than 100 cm in the case of Villa de Arriaga (Mata Cuellar 2008).
- Planosols is to be found in plane areas, it has a deficiency in drainage and it is highly susceptible for erosion. It is poor in nutrients, but can be used for production of plant with shallow roots.
- Xerosol is a dry soil, typical for dry and semi dry areas. Its natural vegetation are scrubs and pasture land (INEGI 2002).
- Regosol can be found in different climates. This soil is not well developed so it is difficult to identify the layers. It consists of a layer of loose material covering the solid rock (INEGI 2002).

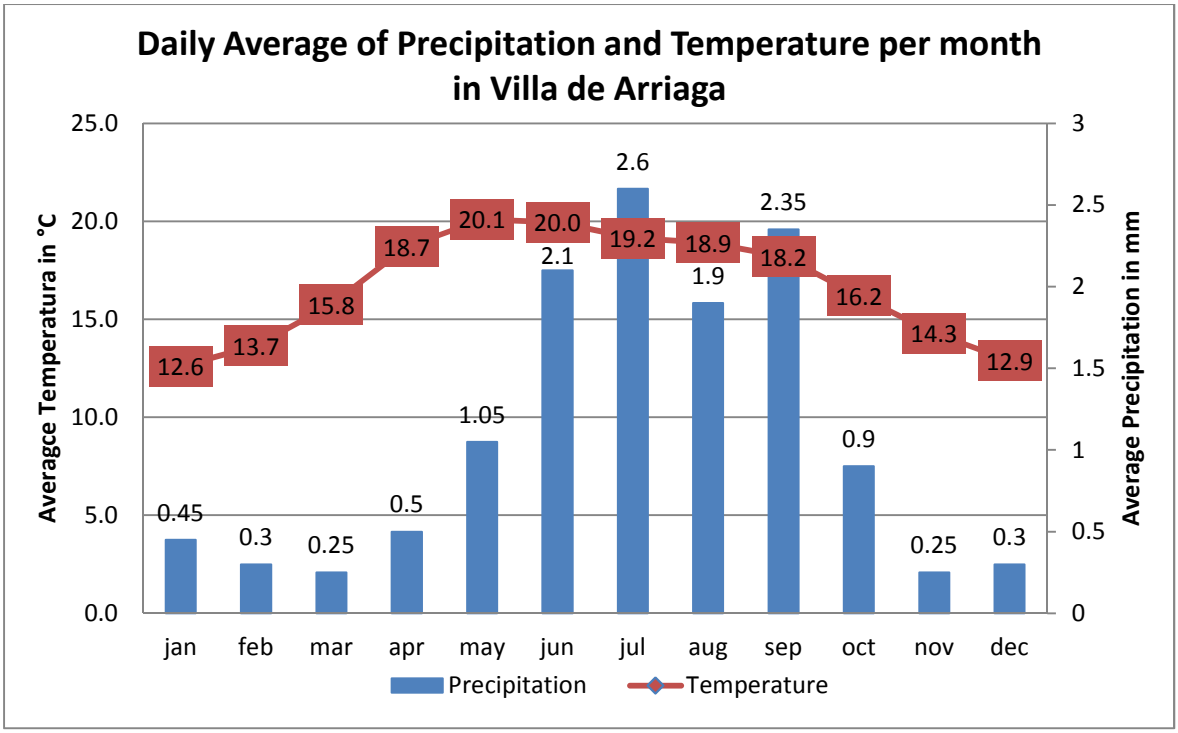
3.2.5 Climate

The climate is generally one of the most impacting factors on agricultural production, above all in the case of Villa de Arriaga, where it is a 100% rain fed. According to the Köppen climate classification, modified by Enrique García, the climate in Villa de Arriaga is semi dry with summer rain season (BS1kw). The classification belongs to the dry climates, with the special characteristic that the evaporation exceeds precipitation. It is the most humid of the dry climates and is nearly classified as sub humid; also it is characterized as warm and mild. The factors which are most important for defining the dry and semi dry climates are the temperature and the quantity of

precipitation. Additionally, humidity and the direction and force of the wind are important factors as well as the altitude, latitude and orographic characteristics of the place (Mata Cuellar 2008).

The average rainfall between 1960 and 2005 was 351 mm/ year. In the study area the average temperature lies between 12.6°C and 20.1°C. The months with the highest amount of precipitation are June, Juli, August and September, with between 2.1 mm and 2.6 mm monthly. The minimum temperatures of the months between November and February can reach -11.0°C. Therefore, a second risk for the agricultural production can be frosts and hailstorms in winter (Mata Cuellar 2008, CONAGUA 2012).

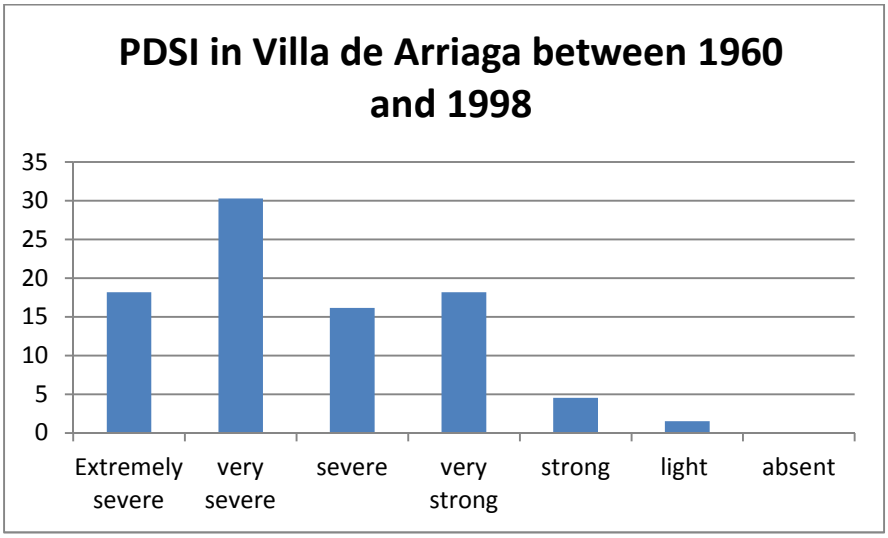
Figure 16: Average Temperature and Precipitation in Villa de Arriaga (own creation based on CONAGUA 2012)



In her analysis, Mata Cuellar (2008) concludes that Villa de Arriaga is highly vulnerable to the phenomenon of drought. The analysis is based on the calculation of the Palmer Drought Severity Index (PDSI), which basically measures the soil humidity (fecyt 2005). It is used to measure longterm accumulative meteorological droughts. Weather conditions can change rapidly between drought like and wetter patterns. The PDSI can respond relatively rapid to those kinds of changes (National Climatic Data Center 2013).

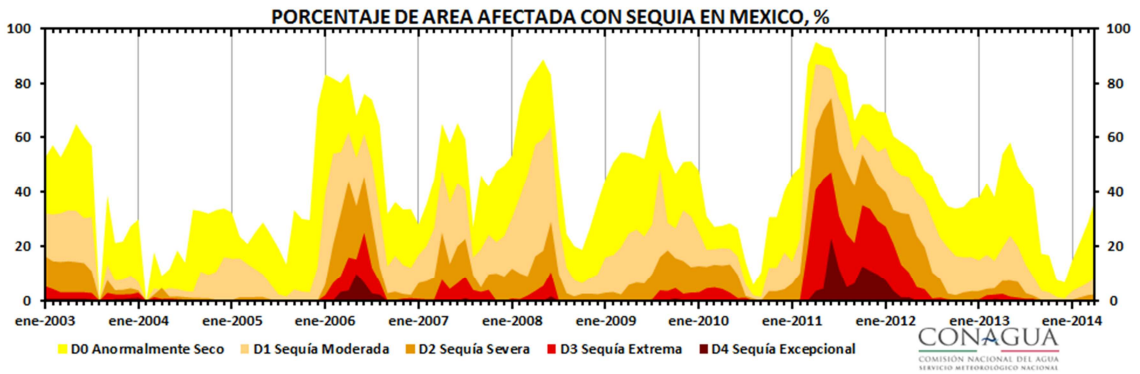
According to her analysis of the meteorological data of the two climate stations in Villa de Arriaga (number 24100 and 24078, provided by CONAGUA) between the years 1960 and 1998 only has been 1.51% of the time under normal conditions of soil humidity (see table 6). In most years (30.3%), Villa de Arriaga counts with a very severe drought, and because of this, drought can be counted as a mayor risk for Villa de Arriaga (Mata Cuellar 2008).

Table 6: Drought Severity in Villa de Arriaga between the years 1960 and 1998 (own creation based on Mata Cuellar 2008)



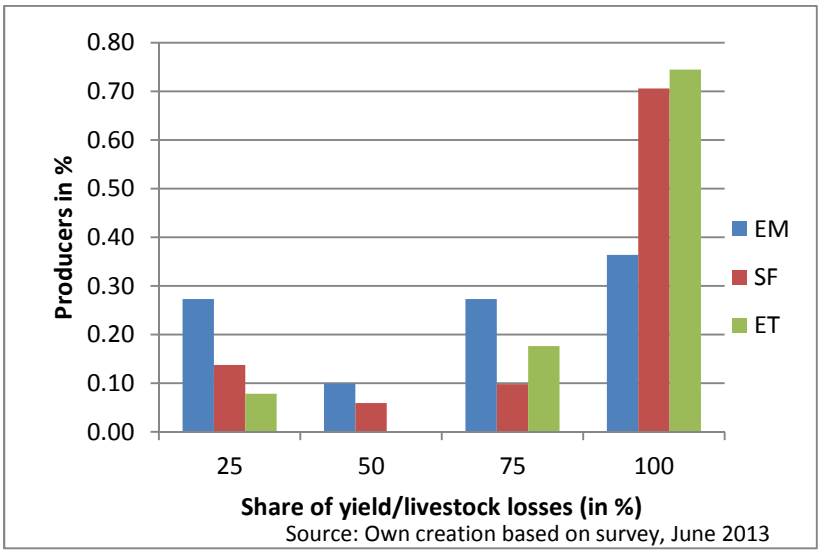
In the year of 2011 has been a severe drought in nearly the whole country. Between the months of March and August between 82.99 and 95.11 % of the whole area was affected by drought. This has been the most severe drought in 12 years (2002-2014), according to the severity grades of the SPI (see figure 18). As a consequence, SAGARPA declared the drought as a catastrophic event (CEDRSSA 2011). This is important for the payment of the catastrophic agricultural security and other aid mechanisms .

Figure 17: Drought in Mexico 2003-2014 (smn 2014)



In the perception of the agricultural producers in the localities of the case study, droughts are a risk to the community. In the years of 2011 and 2012 the majority of the farmers lost big parts of their yields due to the drought in these years. The losses were classified in quantity rather than in monetary terms.

Figure 18: Yield and Livestock Losses because of Drought in 2011



Source: Own creation based on survey, June 2013

The losses in agricultural and livestock production have been evident in the perception of the farmers, the majority lost all of what they had seeded (see figure 19).

These losses also can be found in official statistics. According to the agricultural, livestock and fishery information service (SIAP), the agricultural producers of Villa de Arriaga in 2011 seeded an area of 26,027 ha and reaped just 4,920 ha, which is a total of 18.9 %. The rest of the area, 21,107 has, was paid by the agricultural catastrophic insurance Siniestro. It was the second biggest area

seeded in municipalities of the state of San Luis Potosí and the second biggest area with Siniestro, after the municipality Villa de Ramos (siap 2014). That shows two things: the agricultural production of Villa de Arriaga is highly vulnerable to droughts and secondly, that other municipalities in the same state are less vulnerable to drought, because they either have different climatic conditions, or their production is more mechanized or adapted to the climatic conditions. Nevertheless, despite of that they knew it would not grow under these climatic conditions, the farmers seeded, because this guaranteed them the payments of the agricultural catastrophic assurance (personal interviews with different agricultural producers in May 2014).

3.2.6 Water

Water in Villa de Arriaga is restricted in use by the national water agency (CONAGUA), which can also define tariffs for water use. Above all it refers to regions, where no superficial water flows are and where the water therefore needs to be gained from the groundwater, the regulation may be more restricted. The basic consequence is that people have to pay to get licenses to legally receive water through the wells they built.

There is a governmental program which supports the building of deep wells in the municipality, which deliver water in higher quality and quantity. This program belongs to the second development edge of the government of San Luis Potosí (Gobierno San Luis Potosí 2014). The communities have to apply for this program. The bigger communities like San Francisco and El Tepetate have such a deep wells, which in the case of El Tepetate secure the different homes with potable water. San Francisco also has deep wells, but they do not regenerate sufficient water to supply the whole community. In El Mezquital nearly every house has a small and not officially registered well which delivers potable water, and sometimes sufficient to irrigate a small area for agricultural production (Interview with *ejido* leader May 2014). It does not count with a centralized water supply.

Water distribution is regulated by federal agencies, since they have to register every well they build. Nevertheless, in Villa de Arriaga is no agency responsible for potable water distribution on municipal level (Coordinación Estatal para el Fortalecimiento Institucional de los Municipios 2012).

In Villa de Arriaga water from small wells is not the most clean: a deeper well would deliver a better water quality and higher amounts of water for the water distribution of the whole community.

There are no modernized irrigations systems for the agricultural production (Ruiz Montejano 2010). Only in rainy seasons, when the dams are full, some water can be used to irrigate small areas of agricultural production (interview with Felipe Garcia Bravo). Therefore the agricultural production is concentrated on a few types of grain (wheat, beans, oats, corn and barley) which can grow under these conditions.

3.2.7 Problems

According to the municipal monography the main environmental problems are the trash dumping within a 2 km distance to the localizations, the contaminations caused by the brick production in San Francisco due to the burning of car tires and the discharge of dirty water.

The leader of the *ejidos* define as principal environmental problems the distribution of water, as there is no sufficient water supply for the homes and no irrigation systems. Furthermore, they claim that there is no high conscience of the environment. For example people throw garbage into a river basin, which in rainy times fills with water and then distributed the trash. Another farmer mentioned that livestock holders, when in the mountains, build theirselfs a fire, which then damages the natural vegetation. In San Francisco, in 2013 came a man who wanted to buy their part of the mountains from the *ejido*, which could define the price. With this sale the *ejido* would have lost big parts of their pasture land and possibilities of growing Nopal. Finally, the *ejido* assembly voted against it, but there was a willingness of members who wanted to sell the access to those resources (Interviews in May 2014).

According to the perception of the interviewed farmer, there should be more governmental attention in different fields of the natural capital. By government programs could be build a working potable water infrastructure. In El Tepetate, for example, nearly all the houses have tab water access, but in the other two places of the study area no or just a few houses receive water through a tap water system.

Another governmental program should address the trash problem. It does exist a garbage recollection system and a place to store the trash, but the coverage of the system is not sufficiently elaborated. The Secretary for Ecology and Environmental Management of the state of San Luis Potosí officially assists in developing such a garbage collection system, but the farmers did not know about it (Ruiz 2010).

Table 7: Livelihood points according to multiple criteria of the natural capital

Criteria	Livelihoods Points (Scale: 1-4)	Reason
Edaphology	3	Adequate for agricultural production
Agriculture	1.5	High changes in productivity, crops adapted to climate, production methods have more adaptation potential
Land Use	2	adapted to edaphological and geomorphological restraints
Climate	1	High risk for agricultural production, frequent extreme events like droughts
Water	2	Sufficient access and resources for household needs, little/no irrigation possibilities, management inadequate
Rating	1.9	

3.3. Physical Capital

The question of access to goods and services is an important factor for the poverty calculation in Mexico's statistics. As explained above, the poverty indices in general and especially according to the circumstances in Villa de Arriaga are more a question of access than of income. So the physical capital is important for the existing poverty indices.

Villa de Arriaga is connected by highway 80 between the capital of San Luis Potosí and Guadalajara. All of the villages in Villa de Arriaga have access to the highway by a paved. In the localities are reds of roads, which not necessarily are paved. Even the bigger villages like San Francisco and El Tepetate have mainly dirt roads.

The for the poverty indices important accesses are the quality and space of the dwelling, the access to basic services and the access to alimentation. In the municipality 19.2% of the population lives in poverty caused by a lack of services and goods (Coneval 2010).

Table 8: Indicators of different rejections / shortages in Villa de Arriaga based on the census 2010 (Coneval 2014)

Indicators (lack of…)	Percentage of population	Number	Average of lacks
Quality and Space of the dwelling	15.6	2,703	4.3
Access to basic services of dwelling	64.5	11,171	3.3
Access to alimentation	34.6	5,987	3.9

Table 9: Physical Characteristics of Villa de Arriaga in 2012, if not described differently (Own creation based on INEGI 2014)

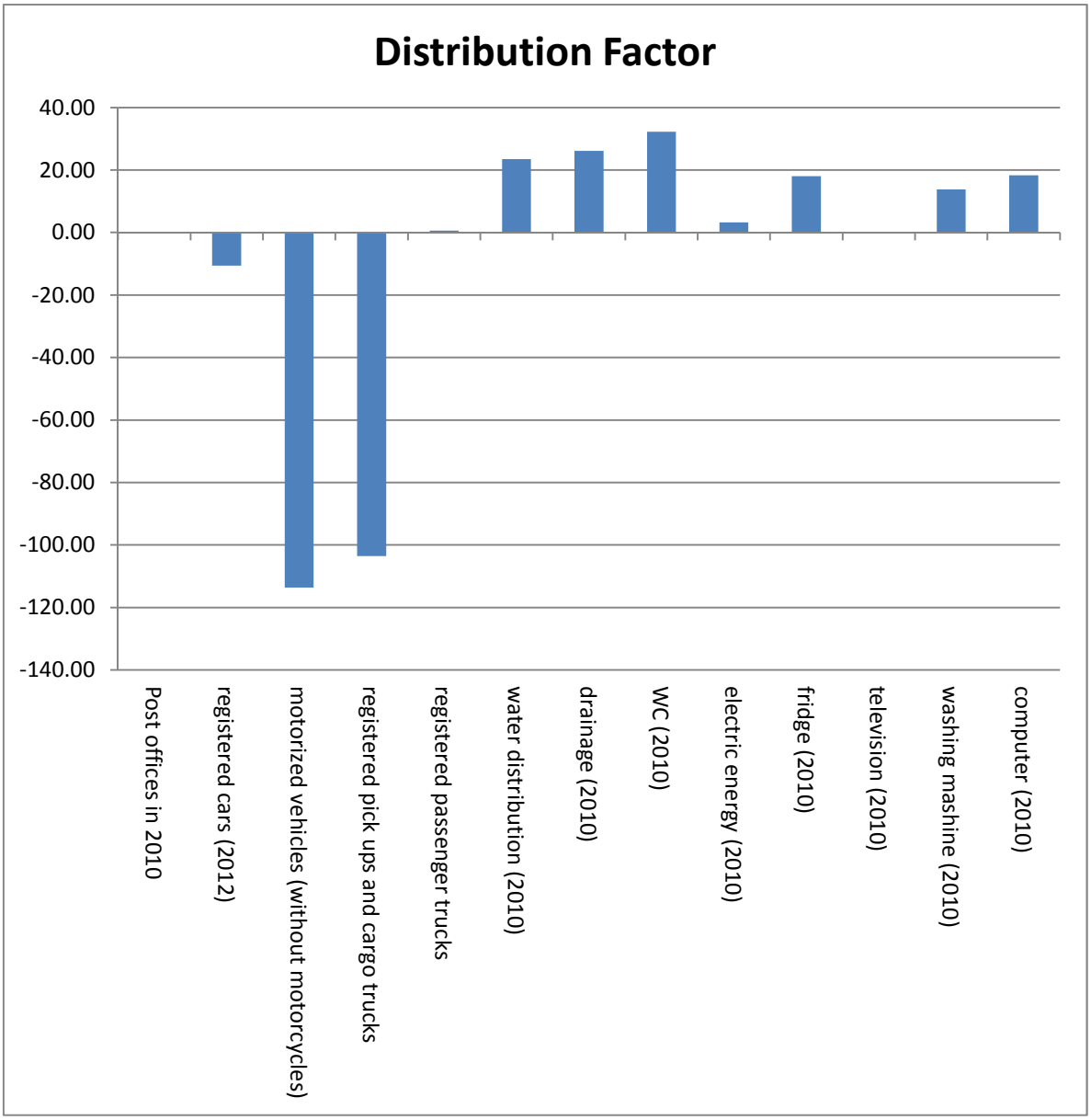
characteristic	Villa de Arriaga	% of households	San Luis Potosí	% Villa de Arriaga /SLP	Distribution Factor
households	3645	100.00	631578	0.58	
Post offices in 2010	8	0.22	981	0.82	0.24
registered cars (2012)	3,137	86.06	476,508	0.66	0.08
motorized vehicles (without motorcycles)	8,786	241.04	804,784	1.09	0.51
registered pick ups and cargo trucks	5,647	154.92	324,349	1.74	1.16
registered passenger trucks	2	0.05	3,927	0.05	-0.53
highway length (km) (2010)	161		12,071	1.33	0.76
shared federal highway (km, 2010)	26		281	9.25	8.68
partially inhabited dwellings with access to public water distribution (2010)	2,160	59.26	522,730	0.41	-0.16

partially inhabited dwellings with access to drainage (2010)	1,985	54.46	509,117	0.39	-0.19
partially inhabited dwellings with access to WC (2010)	2,282	62.61	599,023	0.38	-0.20
partially inhabited dwellings with access to electric energy (2010)	3,364	92.29	603,636	0.56	-0.02
partially inhabited dwellings with fridge (2010)	2,187	60.00	493,050	0.44	-0.13
partially inhabited dwellings with television (2010)	3,211	88.09	555,492	0.58	0.00
partially inhabited dwellings with washing mashine (2010)	1,860	51.03	409,181	0.45	-0.12
partially inhabited dwellings with computer (2010)	206	5.65	151,052	0.14	-0.44

The physical main characteristics are described in table 9. The first row explains the characteristics, which relate to the transportation infrastructure and the facilities of the dwellings. The second row describes the number of households which count with these facilities in the municipality of Villa de Arriaga. The third column shows the share of households in Villa de Arriaga which have access to the infrastructure. Then there is given the number of these characteristics related to the state of San Luis Potosí and then the share Villa de Arriaga holds compared to the total sum of access in San Luis Potosí. The distribution factor is an interesting number, which indirectly shows the marginalization of Villa de Arriaga in comparison to the state of San Luis Potosí. It shows the difference between the characteristics per dwelling in Villa de Arriaga compared to the characteristics per dwelling in San Luis Potosí. Every positive number shows a better average distribution in San Luis Potosí than in Villa de Arriaga, every negative number means that households of Villa de Arriaga have better characteristics than the average of the

state. Only referring to vehicles Villa de Arriaga has an above average distribution of vehicles per household in comparison to the average state level. The infrastructure access like water drainage and electric energy are more accessible in the state average than in Villa de Arriaga (see figure x).

Figure 19: Distribution factor of household access to different assets of Villa de Arriaga compared to the average access distribution of households in the state of San Luis Potosí (own creation based on statistics by INEGI 2014)



The high distribution factor of vehicles in Villa de Arriaga is caused by spatial characteristics of the municipality: the different villages are loosely distributed and connected by roads of not classified quality. They must not be paved; there is a possibility that they are dirt roads. There is a red of

public transport, but it does not generate much flexibility, because the timetable of the buses are restricted, meaning, that there are only few buses a day. An exception is highway 80, where a bus between the municipal capital and the city of San Luis Potosí passes every hour.

At the same time these vehicle categories include machines necessary for agricultural production. In the basic infrastructure like transportation and basic needs like water, drainage and electricity the household supply in Villa de Arriaga is worse than in the average of San Luis Potosí. Only 54.65% of the households of Villa de Arriaga have access to drainage system, 59.26% to water distribution and 62.62% to WC. The average access is up to 20% lower than in the state of San Luis Potosí.

A reason for the worse access to these kinds of infrastructure is that most of the villages in Villa de Arriaga have less than 100 inhabitants and they are widely distributed through the municipality, so that the construction of the infrastructure is more expensive than in more centralized areas.

3.3.1. Information

The information infrastructure can be related to the access to communication devices, such as computers with internet access, mobile phones and telephone. The mobile phone signal is 27% worse in Villa de Arriaga than the Mexican average and 45% worse than the world wide average (http://opensignal.com/). Most of the villages do not have mobile phone access. The internet is one of the most complete sources of information about governmental programs, but there is only rare access to it. The most reliable possibility to access the internet is in the city of Villa de Arriaga (interviews May 2014).

The information about the governmental programs can be received by the farmers through three ways: through the commissary of the *ejido*, through another responsible person in charge in the *ejido (vocal)* and through agronomists or agricultural engineers which sell the program information to the farmers (Interviews in May 2014). These sources of information are accessible in the communities, but they also have the chance to go directly to the city of Villa de Arriaga and ask the CADER or the municipal government for further information.

These representatives (the agronomists or engineers) are officially working for different government agencies (for example CONAZA), nevertheless the farmers pay with a share of the sum they are going to receive by the governmental program these middlemen helped them to apply for (interviews in May 2014).

3.3.2. Problems

According to official information (Ruiz Montajano 2010), Villa de Arriaga has problems with potable water distribution, the whole year long and especially in times of drought. There is no waste water treatment in the municipality and the waste water is not used in any sense. There are plans to build a waste water treatment plant, but there is financing missing.

Also the quality of some dwellings does not fulfill basic standards (Ruiz Montajano 2010).

Regarding the missing distribution of potable water, the people in Villa de Arriaga found individual solutions. This lowers their dependency on governmental solutions, but at the same time reduces its capacity to effectively manage the water resources.

To calculate the evaluation factor of the physical capital in Villa de Arriaga the average access in the municipality will be the criterion to define the value of the physical capital. For example, 15.6% of the municipal habitants have a lack of quality and space in Villa de Arriaga. That includes, that 84.4% of the population do not lack this criteria. In consequence, the evaluation value of this access is 4, because the majority of the population does not lack access. Regarding the access to basic services of the dwelling, 64.5% lack access. That implies that 35.5% have sufficient access, which equals an evaluation value of 2. Regarding the access of alimentation, 34.6% have shortages. That means, that 65.4 % of the municipal population has sufficient access to alimentation, which equals a 3. So the physical capital of Villa de Arriaga can be measured as 2.75 / 4 (see table 11).

Table 10: Evaluation value and the corresponding average access values

Average of Villa de Arriaga with access	Evaluation Value
0-25%	1
25.1-50%	2
50.1-75%	3
75.1-100%	4

Table 11: Final Qualification of Physical Capital

Factor (Lack of ..)	Factor Value	Evaluation Value
Space and quality in dwelling	15.6%	4
Access to basic services of dwelling	64.5%	2
Access to alimentation	34.6	3
Drinking Water Access	59.26	2
Total	/	2.75

3.4. Financial capital

This capital describes the financial resources the people use to achieve their livelihood objectives. This definition is not economically robust; it includes flows as well as stocks and can contribute to production as well as consumption. It indicates availability of cash or equivalent and enables people to adopt different livelihood strategies (DFID 1999).

The election of income sources also reflects choices of livelihood strategies. By diversifying the income sources, the households protect themselves against uncertainties in agricultural production, by lowering the dependency of it. In the discourse about the changes in agricultural policies (see chapter XX), it can be said that in comparison to the agricultural friendly policies of the years 1930s, the economy nowadays is more diversified which leads Davis (2000) to the conclusion that more than half of the *ejido* members' income is generated in non-agricultural activities and 60% of the *ejido* members´ families have one or more children working in non-agricultural sectors (Ibid.). This conclusion will be recognized in the following analysis.

Regarding the general importance of income in Villa de Arriaga, according to the official poverty analysis of Villa de Arriaga, only 0.4% of the population is poor by income, which makes a total number of 76 people (CONEVAL 2014). That does not mean, that Villa de Arriaga is not poor, it rather implies, that poverty is more defined by access than by income (see figure 11). Generally, 79.9% of the municipal population is considered to live in poverty, considering other poverty factor like different kinds of rejection (see poverty definitions above).

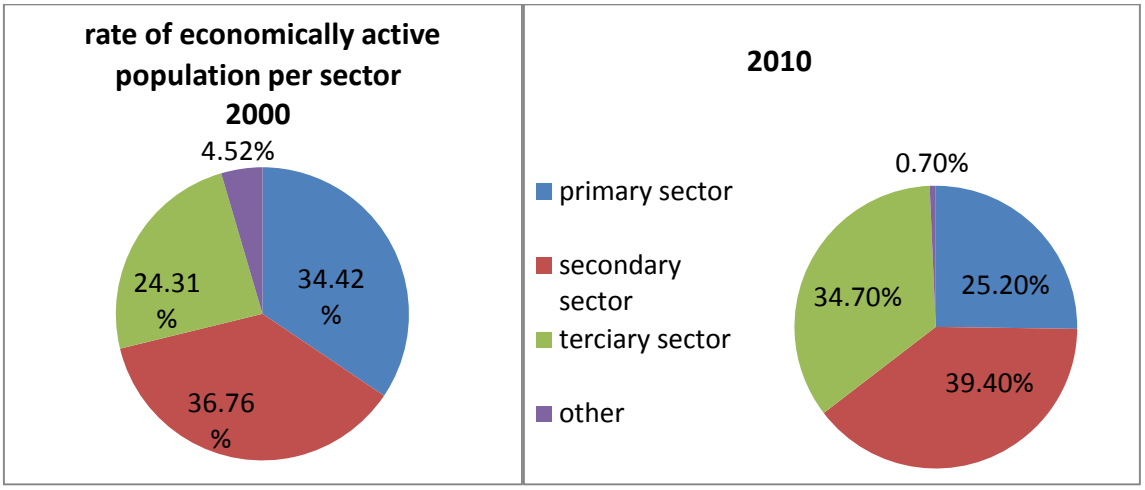
In Villa de Arriaga

In general, 58.41% of the economic active population in Villa de Arriaga has an income as high as maximum two mexican minimum salaries. One minimum salary in Mexico in the year 2014 is 63.77 mxn (=4,90 USD) daily (Conasami 2014).

More than 50% of the area of Villa de Arriaga is used for agricultural production (see figure 3) mostly rain-fed, and as pastureland. In Villa de Arriaga, 48.82% of the population is economically active and has an occupation, of which 76.52% are male and 21.71% female (INEGI 2010). In 2010 25.2 % (in 2000 34,42%) of the economically active population (5361 in 2010 out of 4396 (2000) persons) was working in the primary economical sector (agriculture, livestock, hunting and fishing), 39,4 % (in 2000: 36.76%) in the secondary sector (mining, oil, manufacturing, construction and electricity) and 34,7% (in 2000 24.31%) in the tertiary sector (trade, tourism and services). 0.7% (in 2000 4.52%) work in other sectors (Gobierno San Luis Potosí 2012, Ruiz Montejano 2009) (see figure 21). This data gives an idea about the importance of the different economic sectors, but it has a reduced meaningfulness as many persons have different occupations which not only are to be found in the same economic sector. More accurate data which would give an overview about the employment rate in the different economic sectors in Villa de Arriaga, but this data is not available. In the state of San Luis Potosí the primary sector contributes 3.95% to the BIP, the secondary sector with 39.58 % and the tertiary sector with 56.47 % (INEGI 2009). It can be resumed that, compared to the importance of the sector for the state of San Luis Potosí, in Villa de Arriaga an over proportional part of the economic active population works in the primary sector compared to the PIB generated by the sector.

Other income possibilities are remittances paid by migrated family members. In Villa de Arriaga 2.4% of the agricultural production units receive remittances as additional income, which represents a number of 41 out of 1713 production units. In comparison in the state of San Luis Potosí 8.3% of the production units receive remittances, which three to four times more than in Villa de Arriaga (INEGI 2009).

Figure 20: Rate of economically active population per sector in 2000 and 2010 (own creation based on INEGI 2010)



3.4.1 Governmental Programs and Income

Policies are important for the income of the farmers, because for some it is the only reason to seed. The process of seeding, treatment of the plants and harvesting is more expensive than the actual market value of the harvest. The governmental programs like Procampo or in case of an extreme weather event, SINIESTRO, solemnly apply for the area seeded. They also define, which crop type is to be seeded, as the payment of the SINIESTRO only applies to specific crop types (interviews May 2014).

According to the agricultural census 2009 the income of 512 productive units depends on governmental programs. This census allowed the interviewed to give more than one answers to the question of their main income, so it is not sure that the only income source is the governmental aid. The numbers show, that around 30% of the agricultural production units depend to a certain point on the agricultural political programs (INEGI 2009 (agric. Censo)).

This analysis must be seen in context of the absolute poverty indices of Villa de Arriaga. According to the poverty indices published by CONEVAL (2012) based on the census in 2010 79.9% of the population in Villa de Arriaga lives in poverty, 48.8% in moderate and 31.1% in extreme poverty as explained above (ibid.).

80.8% receive an income under the welfare line and 43.3% under the minimum line of welfare (see table 12). The minimum welfare line defines the mensal minimum income necessary to pay the basic basket of products to survive. The welfare line includes the income necessary to pay also

basic necessities regarding education, health, dwelling, transport and recreation (Government of San Luis Potosí 2012).

In comparison the state of San Luis Potosí and the country of Mexico, the poverty situation in Villa de Arriaga is worse. The rate of people living in extreme poverty is two times as big as the of the state of San Luis Potosí and three times bigger than the same rate in the country of Mexico. But in comparison con other municipalities in San Luis Potosí, it is in the middle field, as it is ranked in all indices between the 27th and 32nd place. Consequently, there are municipalities in Villa de Arriaga which are poorer and therefore can be more in the focus of political support. At the same time, Villa de Arriaga is not rich, which also does not give it a special political attention.

Table 12: Income levels of different measurements of income poverty and respective percentages applying in Villa de Arriaga (Government of San Luis Potosí 2012)

	rural income level (mxn)	% in VdA in 2010	Municipal Position in state, beginning with the poorest (from 58 municip.)	% of population in SLP in 2010	% of population in SLP in 2012	% of population in Mexico in 2010
moderate poverty	1329	48.80	27	37.1	37.7	35.8
extreme poverty	684	31.10	30	15.3	12.8	10.4
population in poverty	total	79.90	27	52.4	50.5	46.2
minimum welfare line	755.73	43.50	32	26	23.3	19.4
welfare line	1,444.17	80.40	27	59.6	57.1	52

In this poverty context, and bearing in mind that only 0.4% of the municipal population of Villa de Arriaga lives only in income based poverty (CONEVAL 2014), the following analysis shows the income generating strategies of the three localities of the case study.

The following description of the financial capital of the localities of the case study will be based on the envy made in June 2013 and the qualitative interviews made in May 2014. The classification of

the income sources will be based on the elevated data and the producer highest levels in one category will be factors defining the scale. The data examines a general characterization of the farmers their economic activities, their perception of the drought and assistance by governmental programs.

Following the results of the questionnaire, three main sources of income can be identified: Agriculture, Livestock Production and other sources, mainly Construction, *Ladrilleria* or an own store. Also remittances from family members in the United States or other places they migrated to play an important role.

The result of the index will be a classification of the farmers in the three places of investigation according to their income sources. The categories will be high income, middle income, low income and very low income, as described in the development report of the government of Villa de Arriaga (Ruiz Montejano 2009).

Following the own classification of the municipal development report, the categories are described as table 13 shows:

Table 13: Income Classification Groups and its characteristics (cf. Ruiz Montejano 2009)

Income Groups	Characteristics
High Income	Agricultural property bigger than 20 hectares The agricultural production is semi modernized The main income is gained by sale of meat, milk and milk products and agricultural products like beans, barley and fodder crops like corn and oats The employees are family workers and externally contracted
Middle Income	Size of agricultural property between 11 and 20 hectares The agricultural production is mechanized Main income is gained by sale of milk and milk products, crops like barley and beans and different kinds of cattle The employees are family workers and occasionally externally contracted
Low Income	Size of agricultural property between 5 and 20 hectares The agricultural production is semi mechanized (rented machinery o yokes) Main income gained by local sale of corn, beans and oats as other products,

	as well as *Tuna* o *Nopal* Seldom sale of cattle Employees are family members and some products are for own consumption
Very low Income	Agricultural property between 0 and 5 hectares Rainfed cultivation of corn and beans Products mainly used for own consumption, few, local sale of surplus In case of owning cattle it is used for own consumption and few times for sale.

Within these main income categories will be differences in choice of livelihood strategies, which will be calculated separately. They will be graded with "livelihood – points" (LP) within each income category. These LP will show the importance of the rated factor for the livelihoods of the producers. The criteria for the LPs will be explained in detail further on.

The main classification will rely on main employment and the size of agricultural property. The other indicators will classify the different income groups regarding other important components. These components will rate the impact on a sustainable livelihood (see table 2).

The result will be a categorization of four income groups.

Table 14: Classification of income groups (own creation, source: Ruiz Montejado 2009)

	Land sizes	Number of People in this group	Livestock (LP)	Main source(s) of income	Total LP	Remesas	Migración (# de personas)	Age
Very low income	0-5 ha							
Low income	5-10 ha							
Middle income	10-20 ha							

High Income	20 ha	+

Land sizes:

The land sizes refer to the classification of income groups in the municipal development report from 2009 (Ruiz Montejano 2009, see table 14).

3.4.2 Livestock

Livestock plays multiple roles in livelihoods. In deriving these indicators, it can be categorized differently within the sustainable livelihoods framework. One option is placing livestock within an assets and capital framework, the other option is to classify it as a pathway out of poverty. The latter recognizes that for livestock to translate into poverty reduction the necessary conditions are a pre-requisite, e.g. technologies and services to generate productive, sustainable and profitable markets (ILRI 2011).

Different types of livestock represent different requirements (food, space, time, work forces). To value different kinds of livestock, the Total Livestock Unit (TLU) will be used. It is a general index based on the feed a livestock unit eats and the means of metabolic weights. This index is also recommended by the Food and Agriculture Organization (FAO 2003, adapted by International Livestock Institute (ILRI) 2011).

The index compares different kinds of livestock to a general North American cattle union with an average body weight of 250 kg (see ILRI 2011).

Table 15: different TLU rates refering to regions (ILRI 2011)

	Cattle	Buffalo	Sheep	Goats	Pigs	Horses	Camels	Chickens	Ducks / Turkeys / Geese	Rabbits
North Africa	0.7	0.7	0.1	0.1	0.2	0.8	1.1	0.01	0.03	0.02
Sub-Saharan Africa	0.5	0.5	0.1	0.1	0.2	0.8	1.1	0.01	0.03	0.02
South Africa	0.7	0.7	0.1	0.1	0.2	0.8	1.1	0.01	0.03	0.02
North America	1	1	0.15	0.1	0.25	0.8	1.1	0.01	0.03	0.02
Central America	0.7	0.7	0.1	0.1	0.25	0.8	1.1	0.01	0.03	0.02

The total value of the livestock owned by a farmer will therefore be calculated by the following formula for the calculation total livestock holding:

$$Total\ livestock\ holding = \sum_{i=1}^{n} TLU_i ,$$

n = number of species/type, TLU_i = TLU for species/type i

3.4.3 Remittances

The survey asked for whether remittances are an income source or not, it does not provide any details like the amount or the frequency. Nevertheless, it is a main income source for the people and therefore as important as an additional employment. Consequently, it will be rated like an employment in the classification of income sources. The seasonality of remittances does not vary a lot because it is not dependent on the factors which define seasonality in agricultural production: it does not depend on climatic conditions. The income classification is therefore rated with 3 LP (see table 16)

In the following will be used the data elevated in 2013 to classify the different income sources. Every income source will be rated by different indicators. They will be explained in the following.

Table 16: Classification of income sources (own creation)

Characteristics / Indicators	Seasonality (LP)	Income classification (LP)	Possible Public policies (LP)	Final LPs
Agriculture	0	Factor per croptype	1	2 + croptype
Livestock	1	type	1	3 + livestock
worker	1	1.34	?	4.34
Store	1	1.33	?	4.33
Ladrillero	1	*Decreasing income*	0	2.x
Remittances	1	1	0	3

Explication Characteristics:

Seasonality:

Seasonality of the income source is important to calculate the stability of income and consequently for the stability of the livelihood. The agricultural production in Villa de Arriaga is rain-fed and happens mainly in the spring term, so that the income is not generated steadily throughout the year. Therefore, agriculture is rated with cero, because it has a high degree of insecurity. The other income sources do not include this type of insecurity, which is why it is rated with 1 LP. The information about remittances gained by the survey in 2013 is not sufficient to rate the seasonality of remittances, therefore general statistics of the municipality will be used.

Income classification:

The income classification is based on an analysis of data provided by the national statistical and geographic institute (INEGI). The LPs are related to the minimum income of Mexico and general data on how the different employments relate to it. The statistical mean of these employments is 1.4. So every employment will be given the number 1.4, because it is not definite who has which employment.

	Construction	repairman	Ladrillero	store
LP (% del salario minimo)	1.34	1.51		1.33

Table 17: Classification Income Sources (salariominimo.com.mx)

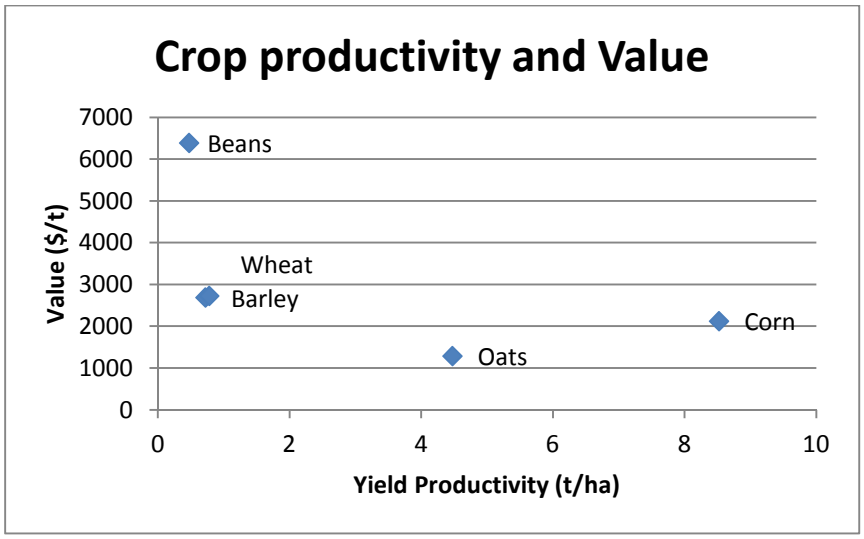
Agriculture

The agricultural income classification is based on production and productivity by crop types. Production refers to the income gained by the seeded grain in comparison to other grains seeded in the state of San Luis Potosí. The income calculation will be based on the information provided by the agricultural and fishery information service (SIAP) of the Agricultural Secretary (Sagarpa). Data about the productivity will be gained of the same information source. There the seeded area will be compared with the harvested area by different crop types. By a ten year comparison this data will describe the adaptation of each crop to the climatic and spatial circumstances in Villa de Arriaga. The most adapted crop will be rated best, because it is a potentially a more stable income generator or can contribute better to the subsistence of the household in terms of income ($/ha).

Table 18: Characteristics of different crop types in Villa de Arriaga (Source: own creation, www.siap.mx.com)

	Beans	Oats	Barley	Corn	Wheat
Production (area seeded)(ha)	9361.44	3114.84	7265.5	1920.64	1754
Yield (t/ha)	0.477	4.48	0.726	8.52733333	0.782
Production worth (thousands of pesos)	14569.55	3829.26	9320.65	5005.1	2222.1
Relative importance on state level	8.14% seed; 4.67% production value	100% grano For: 15.61% seed, 9.27% production value	100%	1.27% Seed; 1.93% Production value	100%

Figure 21: Crop Productivity and Value



By comparing the yield (t/ha) with the PMR ($/ha) results, that the both crops most economically viable are beans and corn. Beans have a low productivity rate, but the value of the crops is relatively high. Meanwhile, corn has the opposite conditions, which means a lower yield price per hectare but higher yield productivity. These two crops seem to be the most viable ones in Villa de Arriaga. Additionally there is a policy that distributes seed to bean producers. This explains that beans are the most seeded crop in Villa de Arriaga.

Wheat is only produced at a really low rate, so that it is whether an important crop for the agricultural production in Villa de Arriaga, nor in San Luis Potosí.

Barley is the second most seeded crop in Villa de Arriaga. The yield productivity is 0.74 t/ha. The production value with on average 2686.62 $/ha is higher than the value of corn. Additionally, the sales are secure, because the harvest is sold to a beer-factory in the nearby state of Zacatecas (Interviews in June 2013). This geographical proximity might also explain why Villa de Arriaga is the only municipality growing barley in San Luis Potosí.

Oats are the third most grown crops in Villa de Arriaga. Their yield productivity is 4.48 t/ha, which makes it the second most productive crop in Villa de Arriaga. But the value is the lowest of all crops grown in Villa de Arriaga, its 1250 $/t. Therefore the total production value is the second lowest of all crops grown in Villa de Arriaga, only the production of wheat is worth less. Wheat is barely grown in Villa de Arriaga, which explains the low production value. Villa de Arriaga produces 9.35% of the production values of forage oats-production in San Luis Potosí and 100% of grain-oats. It therefore is the crop with the most influences in comparison to the other crops grown in Villa de Arriaga.

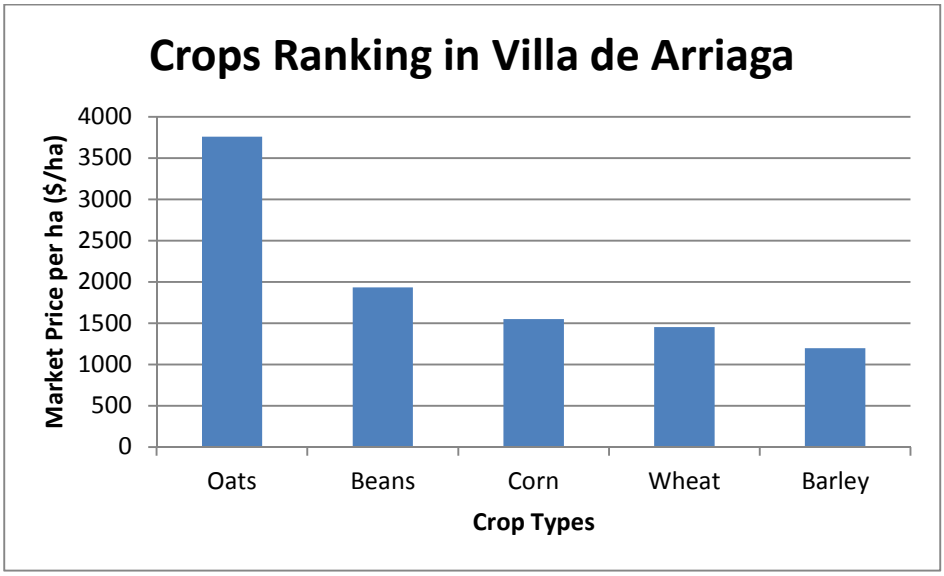
As a conclusion, the best crop to seed will be the one with the highest market price per ha. When there are small and middle-scale areas that are used for agricultural production, this criterion of market price per ha is the most suitable. In Villa de Arriaga is a difference between the areas seeded and the area harvested, as described by Mata Cuellar (2008) (see natural capital). Generally, there are more hectares seeded than reaped. Therefore, the difference between the seeded and the harvested area has to be taken into account in this analysis. This difference is influenced by many factors, like the weather in a certain year, the amount and distribution of rainfall, the soil quality or the land management (between others).The harvest loss is in average 35.75%, but it varies depending on the crop type.

The calculation of the importance of the different crops will be calculated according to this formula:

Value of crop ($/t) * productivity (t/ha)*harvest loss= importance of crop type

The result of this calculation can be seen in figure 24. One component not taken into account in this calculation is the high number of subsistence farmers. As the statistics used for the analysis are based on products that were sold. There might be another outcome if the total numbers of production and self-consume would be known.

Figure 22: Crops ranking of Villa de Arriaga



The valuation for the evaluation of the survey will also be measured in livelihood points (LP).Every crop will get Livelihood Points related to the market price value.

Table 19: Livelihood Points per crop type

Crops	LP
Oats	0.37580052
Beans	0.19338802
Corn	0.15496904
Wheat	0.14525448
Barley	0.11967353

The results will be described in chapter three, the description of the case study.

The results show the following:

The income classes are now scaled according to the comparison of the values between the three localities. The main criterion in the original classification, which is the size of the agricultural parcel, is included in the factor agricultural production (see above).

The Sum LP reflects a weighted sum, where number of people in the different categories are multiplied with the income class and then summarized.

Average represents the average total income class of the locality per category. For example El Mezquital has an average income class from their employment from 1.93, which is nearly the middle income class (2).

The advantage of this categorization is that the different financial capacities of the three places of the case study become clear. So, it becomes obvious, which is the biggest income potential in the different localities.

The number in brackets indicates how many interviewed have 0 LPs in the specific category.

The interviews made in June 2013 are statistically relevant for the *ejidos* in the three villages (see annex) with a standard error of 0.5.

Table 20: Final income classification per category in El Mezquital (own creation)

Income classes (EM)	Employment (# people)	Livestock (# people)	Agricultural production (# people)
1.00	11.00	41.00 (13)	33.00 (6)
2.00	26.00	3.00	8.00
3.00	6.00	0.00	2.00
4.00	1.00	0.00	1.00
Sum LP	85.00	47.00	59.00
Average	1.93	1.07	1.34

Table 21: Final income classification per category in San Francisco (arriba) and El Tepetate (abajo) (own creation)

Income classes (SF)	Employment (# people)	Livestock (# people)	Agricultural production (# people)
1.00	24.00	52.00 (33)	42.00 (5)
2.00	25.00	2.00	10.00
3.00	4.00	0.00	1.00
4.00	1.00	0.00	1.00
Sum LP	90.00	56.00	69.00
Average	1.67	1.04	1.28
Income classes (ET)	**Employment (# people)**	**Livestock (# people)**	**Agricultural production (# people)**
1.00	25.00	46.00 (25)	22.00 (0)
2.00	10.00	0.00	18.00
3.00	13.00	2.00	8.00
4.00	1.00	1.00	1.00
Sum LP	88.00	56.00	86.00
Average	1.80	1.14	1.76

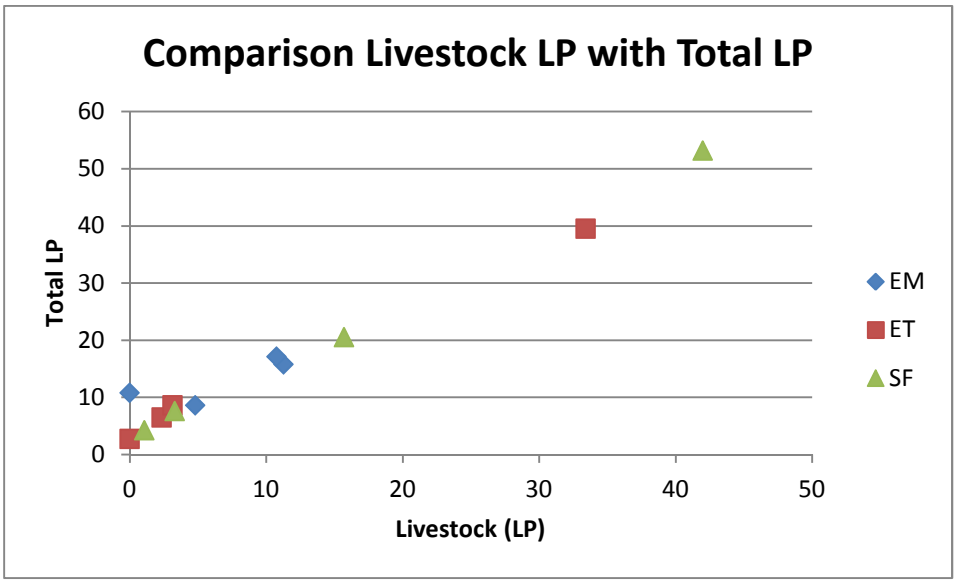
The results show, that all localities in all categories can be found in an income classification between one and two, which demonstrates low and middle income.

The highest income seems to be generated from different sources, as the income class of the employment category is the highest in all three localities. The highest income value by employment is to be found in El Mezquital (1.93), followed by El Tepetate (1.8) and San Francisco (1.67). The second highest values are to be found in the income classes by agricultural production

(ET 1.76, EM 1.34, SF 1.28) followed by the income classes of the livestock production. These are the results by the comparison of the inner scales of the factors.

Compared to the other two villages, El Tepetate has the most livelihood points. This is basically because of the high values in employment and agricultural production. The better employment rate is connected to the better infrastructural access to transport, like the highway, which divides the village and the bus which passes every hour between San Luis and Villa de Arriaga. So the income opportunities can easier be widened by employment in other places. The agricultural production factor is high, because of the crop choices of the farmer. Additionally, the farmers of El Tepetate have more individual area for agricultural production than the other two villages (Interviews in June 2013).

Figure 23: Comparison of Livestock LP with Total LP (own creation)



When compared between the factors (Employment, Livestock, Agricultural Production) (see Table 4), it can be seen that the livestock production has higher LP levels in the classification as the other two factor groups. That means, that in the inter-factural comparison, livestock has a higher importance. The total LP, which finally indicate the income classes, are directly influenced by the livestock owned (see figure 25).

3.2.4 Problems

One of the problems mentioned by the farmers is, that the market prices of the agricultural products are low, so that the production costs are in some cases higher than the income. This is

due to bigger distributors of the capital of San Luis Potosí which buy the grains in Villa de Arriaga in a monopolistic manner. As they are the only buyers, they define the prices. In the opinion of some farmers, the politics should regulate the prices to avoid price dumping.

Another criticized circumstance is that the support from the official agencies which provide the governmental programs to the receiving individual does not come directly. This policy implementation involucres many people and agencies, what makes the process in transparent.

3.5. Human capital

The human capital in Villa de Arriaga will concentrate on the two aspects of health and education.

First, there will be analyzed the existing infrastructure for this types of human capital, then the statistics about the population will be described.

Regarding education, 35.0 % of the population lack sufficient access. That includes young people between 3 and 15 who did not terminate secondary school or do not assist to school, people of generations until 1981 who did not finish primary school and people younger than generation birth year 1982 who did not finish secondary school (CONEVAL 2010).

Regarding the infrastructure, every of the three localities have a kindergarten and a primary school. San Francisco also has a secondary school. The municipality has 14 kindergartens, 14 primary schools, two secondary schools, 14 Telesecundaries, one Bachelor College and one partial preparatory school (see table 15).

In San Luis Potosí this lack of education is in average 43.6% and 40.7% in federal level. Therefore the education in Villa de Arriaga according to this index is better than in the other two levels of analysis (state and federal level).

In average, 11.08 % of the population (1175 people) older than 15 years is analphabetic (CONEVAL 2014). This is a higher average than in the state of San Luis Potosí, where 7.91% of the population older than 15 is analphabetic (CONEVAL 2012).

In the year 2012 there was no student of a superior education and a number of 366 persons was educated in a medio-superior level as a bachillerato. This higher education stratum is underrepresented in the communities of Villa de Arriaga.

Table 22: Educational Infrastructure of Villa de Arriaga (own creation base don Ruiz Montajano 2010)

Form of education	Number of facilities	Number of students	Number of Teachers
Kindergarten	14	458	28
Primary School	14	2,551	248
Technical Secundary School	2 (1 en El Tepetate, 1 en San Francisco)		
Telesecundarias[35]	14	400	31
Bachelor College	1		
Partial Preparatory School	1 (El Tepetate)		

In Villa de Arriaga are 3 Health centers, two of them run by IMSS *Oportunidades*. Additionally, they have one Itinerant Health Team and one health unit of IMSS *Oportunidades* (Ruiz Montajano 2010). One health center is located in the municipal capital of Villa de Arriaga, the other two are in San Francisco and El Tepetate (Cefim 2012). The access to a health center is more limited than the number of persons entitled with a health insurance. There is also no access to health centers for health insurances other than IMSS and the public insurance[36]. People with other health insurances have to get to the specific hospitals in the capital of San Luis Potosí (Gómez Dantés 2011).

Although not accessible for everyone, the existing health centers are not sufficient to cover the demand by the people who have access. The medical staff has to deal with work overload, as the center has to attend persons from various localities (Interviews May 2014).

The indicators used by CONEVAL to describe the poverty in Villa de Arriaga show, that 43.1% of the population has a health insurance. In Villa de Arriaga they are mostly provided by IMSS and Pemex, Defensa o Marina (SNIM 2014). That does not automatically mean that they have access to a health center or a hospital, as Villa de Arriaga does not have a hospital.

[35] *Telesecundaria*: Secunday School with classes in television

[36] Public insurance: *Seguro Popular,* a health security destined to people not working on a paid employment, for example agricultural producers, freelance workers or students, basically all who do not have another health insurance and are beneficiaries of *Oportunidades* (http://seguropopular.saludsonora.gob.mx/)

The social security refers to other kinds of insurances, mostly the pension. The aim of the social securities is to protect the people from circumstances they cannot control, like accidents or illnesses and against socially recognized circumstances, like aging or pregnancy (CONEVAL 2010). In this case, 86.4% have at least some kind of protection against one of the named uncertainties (see table 16).

The indices of access to health and to social security are better on the state level of San Luis Potosí (health: 25.93%, social security: 57.20% in SLP 2012) (Coneval 2012). These indices improved on state level in the period between 2000 and 2010. This progress did not reach the municipality. Villa de Arriaga is ranked on place 7, beginning by the poorest index value (CONEVAL 2010).

Table 23: Lack of Access regardin human capital in Villa de Arriaga in 2010 (own creation based on CONEVAL 2010).

Shortages	%	Total #
Educative shortages	35.0	6,053
Access to health services	43.1	7,470
Access to social security	86.4	14,960

In summary, it can be stated that regarding the education, the lack of basic education is under the state average of San Luis Potosí, but the medium and high education is underrepresented. Regarding health there is a lack of medical infrastructure, although the average number of people with insurance is higher than on state level.

The demographic component, which also is important to discuss the human capital, is discussed in the social capital (see above). The human capital also refers to the number and qualification of the work forces in the municipality, so it is important to mention it here, but the analysis is to be found in the description of Villa de Arriaga.

3.5.1 Problems

The government describes the insufficient access to health services, the lack of doctors and medical equipment and medicine as the most urgent problems in the health sector (Ruiz Montejano 2010).

Regarding the educational sector, problems lay in the sustaining and construction of the basic infrastructure of the buildings. Furthermore the technical and educational equipment of the schools needs to be upgraded (Ruiz Montejano 2010).

The urgent problems described by the farmers also relate to the deficient access to health centers and medical attention.

The scholarity was not defined as a problem by the farmers.

Regarding the work forces was mentioned, that there are not very much alternatives to the agricultural and livestock production in Villa de Arriaga, but that more employments are to be found in the capital of San Luis Potosí or in other places farer away (Interviews May 2014 and June 2013).

For the final evaluation, the criteria for the human capital need to be put into a scale. The factors of education, health, social security and economically active population will be compared to the same factors on national level and ranked dependent on the results. First, the national level will be put into scale relating to the rate of people which count with this capital. Then, according to this classification, the value of Villa de Arriaga will be ranked (see table 17).

Table 24: Different Human Capital Indices in Villa de Arriaga and other levels (INEGI 2014)

	Villa de Arriaga	San Luis Potosí	Mexico	Level country	Final qualification VdA
Lack of Education	35	22.2	20.6	3	2
Lack of health security	43.1	21	31.8	3	2
Lack of social security	86.4	57.2	60.7	2	1
Unemployment	612	53121	2,031,369		
Economically Active Population	5,687	971,734	44,701,044		

Unemployment rate	10.8	5.5	4.5	4	1
Final Rate					1.5

3.6 Social

The organizational capacities of a community are important for very different problems regarding rural zones, like agricultural productivity and livestock related shortcomings in San Luis Potosí (Fuentes Rodriguez 2010).

The social capital in this chapter will be described regarding three main factors: the demographic distribution, the organizational structures of the communities and trust in horizontal and vertical relations. In the three localities of interest in Villa de Arriaga the most important organizational form is the *ejido*, because most families living in these villages are *ejido* members. The *ejido* also has important political responsibilities, also regarding applying governmental programs in those villages. The history of the *ejidos* explained in chapter two shows that this form of organization had different legal frameworks over the time.

3.6.1 Demography

According to the XIII general population and dwelling census 2010 (INEGI 2010), the total population of Villa de Arriaga is 16,316 peoples, which represents 0.63% of the state of San Luis Potosí. The population density is 18.54 Habitants/Km² in 98 localities (INEGI 2010).

In comparison to the year 2005, the population grew about 1364 persons living in 3 localities less than in 2005 (compare to Mata Cuellar 2008).

The localities with the highest habitants are the municipal capital Villa de Arriaga with 5426 habitants, El Tepetate (1367 habitants) and San Francisco (1353 habitants) El Mezquital is the eleventh biggest locality in Villa de Arriaga with 306 inhabitants (see table 25).

The demography of the municipality (see figure 25) reflects the demographic situation in the country of Mexico (see figure 26). It shows that the biggest age classes are less than 20 years old. The number of people in age classes of 20 and older has fewer members in each class. The older the age classes get, the less people are in there. The oldest age classes are presented differently in these two figures, but they show the same distribution. The median age is 22 years in Villa de Arriaga, which is younger than the Mexican (26 years) and the San Luis Potosían (25) median age.

This young median age includes that big parts of the population are younger than the economic active minimum age (12 years). This demographic distribution is related to the migration patterns in Villa de Arriaga (explained in sub chapter financial capital). The *ejidos* of Villa de Arriaga are not categorized as communities where the majority of the young people leaves the localities and migrates (INEGI 2009).

Table 25: Localities in Villa de Arriaga, ordered by Number of Habitants (own creation, based on INEGI 2009)

Name	Habitants	Rank in San Luis Potosí
Villa de Arriaga	5426	1
El Tepetate	1367	2
San Francisco	1353	3
San Antonio	940	4
Santa Rosa de Gallinas	935	5
El Mezquital	306	11

Figure 24: Demography of Villa de Arriaga in the year 2010 (Ruiz 2010).

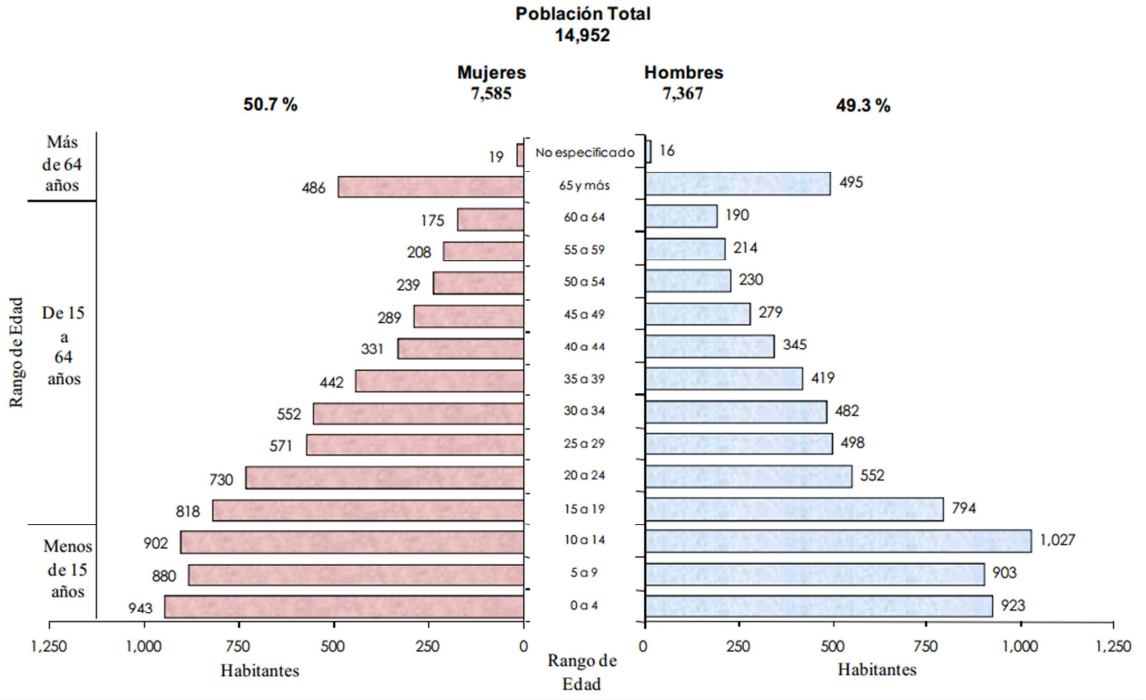
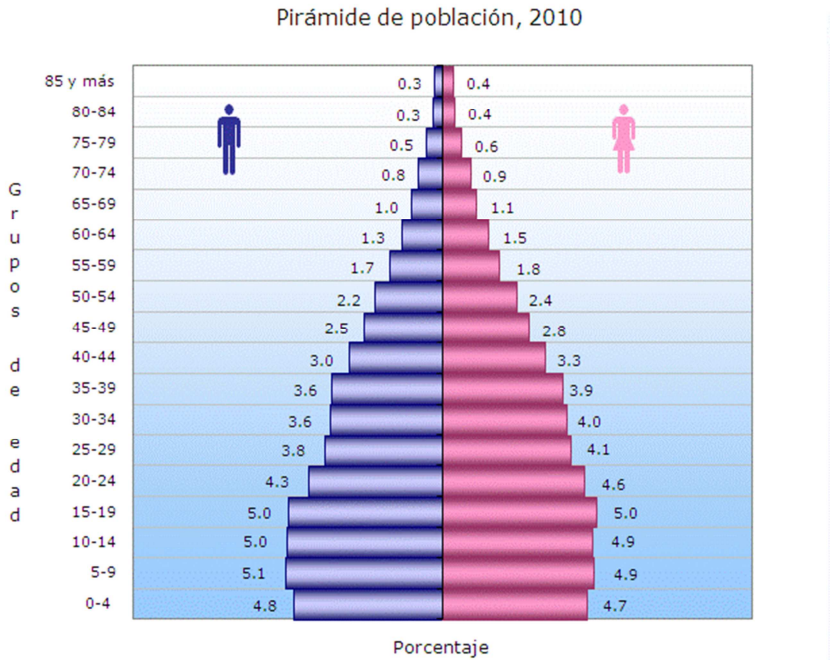


Figure 25: Distribution of Mexican population according to gender and ages (INEGI 2010)



3.6.2 Organization:

The eleven *ejidos* are the most important form of organization in Villa de Arriaga. There are 1670 *ejido* members in the municipality, which, distributed on all 3617 inhabited dwellings, means, that 46.17% of all households have one or more *ejido* members. The *ejido* area is 46,470.00 km², which is 53,8 % of the total area of Villa de Arriaga (INEGI 2009).

Most of the *ejidos* are located in the north western parts of the municipality, in the south western parts mostly private property is to be found.

In the history of the *ejidos* have been some political changes, regarding the rights and obligations of *ejidos* as described in chapter 2.

The most important responsibilities of the *ejido* assemblies are the administration and management of the *ejido* land. With the process of privatization in the 1990s the importance of the collective administration of the land shrank, even though there is still common land which requires administration. The assemblies give also possibilities to distribute information about

governmental programs, as the commissary and the vocal inform the other through this platform (Interviews farmers June 2013/ May 2014).

3.6.3 Network, trust, connectedness

Regarding the network and connectedness of the farmers, it is important to differ between horizontal and vertical relations between the people (see stakeholder analysis). According to the interviews made in May 2014 there are different opinions about trusting the governmental agencies which provide the programs. There are farmers who trust them, because they appreciate the help. Others do not trust them because they do not keep their promises. In some cases the farmers claim to receive only 50% of the programs help and they guess that the representatives of the state agencies keep the money. Others claim corruption and missing transparency of the processes are reasons for their mistrust. Some say that one program they trust is Procampo, where the assistance comes directly to the individual farmer.

The confidence in the persons who represent the state agencies in the communities[37] shows the same patterns as the trust in governmental institutions. On this more concrete level the confidence depends on the personal relations between the farmers and the representatives as well as on the experiences made in the past. Some say that they work well and some have positive experiences with those representatives due to successful applications for governmental programs. Others do not trust them because they think they lie or because they think that these representatives keep gran parts of the program supports. Others do not understand well the tasks of those representatives (Interviews May 2014). These very different opinions about the representatives show that there is no common knowledge base about the duties of the representatives.

In five out of the eleven *ejidos* in Villa de Arriaga are producer organizations, four of them only destined to agropecuarian or forestall activities (INEGI 2009). In these organizations a total number of 152 people are members, seven of them are female. Also in the *ejidos* is a minority of female members. This leads to the conclusion that women are disadvantaged in these forms of organizations. The agricultural sector is focused on men (INEGI 2009).

One form of organizations of *ejido* members is destined to artisanal production. This group consists of four male members (INEGI 2009).

The horizontal connectedness depends on trust between the farmers, but also on the necessity they feel to work together. This trust is important to organize and to express the shared interest, which gives the common concern a higher importance. The interviews in May 2013 revealed a rather pessimistic view on the organizational capacities of the agricultural producers. The farmers seem to be concentrated on their individual needs and pursue their own benefit independently of the other farmers. There is a sense for the importance of self- organization, but there is no general knowledge about the producer or livestock organization which already exist. The most important form of organization is the *ejido*, but there also occur problems.

The concentration of the farmers on their individual needs has consequences for the community, as can be seen in an example from El Mezquital. In this community is a need to build a deep well to gain a higher quality and quantity of potable water. It occurs that every farm has its own small well, which reduces the need to build a deeper well, although the water quality would be higher. The bureaucracy of applying for a deeper well would require the effort of the whole community. As the majority of the farmers have found an individual solution to access water, therefore, the willingness to support the application effort is low (Interview with Joel Solis 3.5.2014).

Causes which hinder a good organizational structure refer to inner conflicts in the *ejidos* and the fact that there are no homogenous demands of the farmers, so that there is a process of internal negotiation which also may cause conflicts (interviews may 2014).

An example of a functioning corporation is occurring regarding the agricultural catastrophic assurance. The payments which were going to reach the farmers are not the same as promised. This is a problem that affects all of the farmers which lost yields because of climatic conditions. The commissaries of all the *ejidos* united and then negotiated with the municipal presidency and SAGARPA about this problem. The representation of the needs is part of the responsibilities of a commissary. The fact that every *ejido* sent a representative to the negotiations (commissary or secretary) formed an external pressure forcing the *ejido* representatives to action (Interviews with *ejido* members in May 2014).

3.6.4 Transaction costs

The transaction costs of getting informed are based on personal relations in Villa de Arriaga. This can be seen as a barrier and an opportunity. If the institutionalization of the information infrastructure does not include officially controlled responsibilities, transactions costs are higher.

The information is based on conventions, trust and connectedness between the informant (representatives) and the individual farmers. Innovations which can improve production processes or benefit the farmers in other ways are based on individual personal relations and on the capacities of the agricultural producers.

3.6.5 Problems

According to the municipal report (Cefim 2011) the social problems are missing sport areas, derived violence and familiar disintegration as well as an increasing abuse of alcohol and drug addictions by young people. Other problems are caused by the high migrations rates into other countries or other Mexican cities (Cefim 2011).

According to the interviews, problems which affect the trust in state agencies are the prices of the representatives, the feeling that only parts of the benefits of the governmental program reach the farmers and in this context corruption. This causes are mistrust in the vertical structures.

The final evaluation of the social capital depends of the view on the farmers and the statistics. The interviewed farmers did not know about other forms of organizations of the *ejido* members, only the union of the livestock producers was known. Despite these subjective estimations the agricultural statistics show that in five out of eleven *ejidos* are other, mostly agropecuarian organizations.

In comparison to the other *ejidos* in Mexico, Villa de Arriaga has an over proportional amount of producer organizations. Based on the organizational overview by INEGI (2009) can be stated that the majority of the *ejidos* do not organize in additional producer organizations. In relation to the number of *ejidos* in other municipalities, Villa de Arriaga has the 14th highest concentration of producer organizations in Mexico (INEGI 2009).

However, the farmers do not perceive it this way and expressed a certain necessity of a better organization between the people. In the interviews, the farmer associated organization with unity, meaning that the members of an organization had to have the same opinion and not opposed positions. Therefore, they named individuality, mistrust and inner conflicts as reasons why the farmers did not organize.

In a scale from 1 to 4 the social capital of the *ejido* communities is ranked high, because the number of organizations is in comparison to all Mexican municipalities high. The observation of

the farmers, who do not perceive the amount of producer organizations, lowers the importance of the producer organizations. The organizational capacity is ranked as 3.

Although, statistically, Villa de Arriaga is classified as a municipality where the youth stays, the interviewed perceive, that a high number of young people leave the municipality for working or studying in other places. Those, who stay, become farmers as well. Again, there is a difference between the statistics and the perception of the interviewed. Therefore, it also is ranked as 3.

Regarding the trust in vertical relations was not received a clear result. There were patterns of missing transparency and personal relations and experiences influencing the trust relation. Therefore it is ranked as 2, because it is indefinite if the vertical relations are trusted or not.

Other problems of the society, like intrafamiliar violence and drug abuse lower the social capital. The government has recognized it as an official social problem and the interviews confirmed this point. Therefore the ranking will be lowered by 0.3 absolute points.

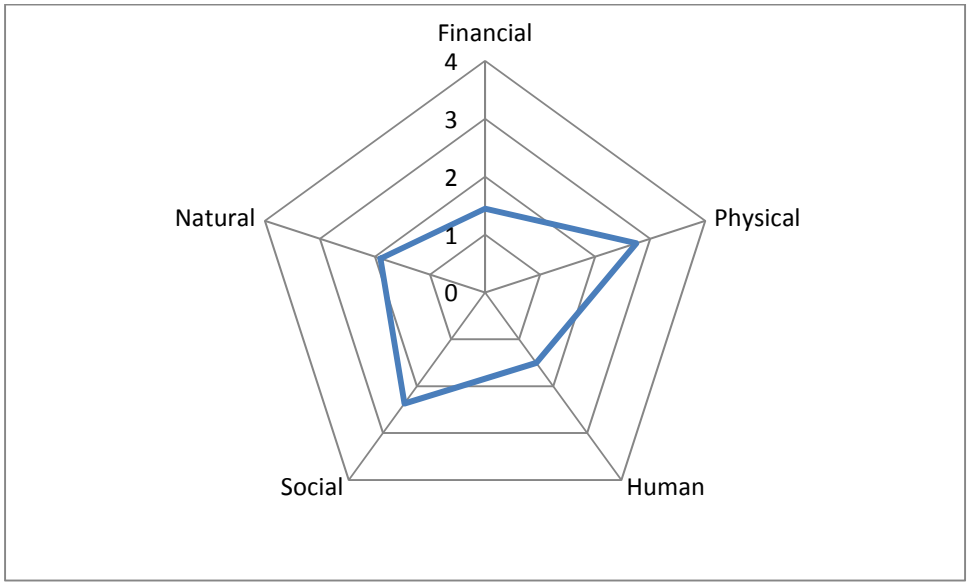
Table 26: Final Ranking of the Social Capital based on the livelihoods criteria (own creation)

Factor	Ranking (4= best, 0= worst)
Organizational capacity	3
Youth stays	3
Vertical trust	2
Violence / drug abuse	-0.3
Sum	2.37

3.7 Result

As indicated in table 19 the sustainable livelihoods capitals in Villa de Arriaga are positioned between one and three, in a scale until four. That emphasizes again the middle field position of Villa de Arriaga. The strongest capitals are the physical and the social capital, followed by the natural one. The financial capital is lowest and the human capital is between one and two.

Figure 26: Sustainable Livelihood Capitals of the agricultural producer in Villa de Arriaga



In the following part the sustainable livelihoods capitals from the population of Villa de Arriaga will be compared to the applied rural development politics in this municipality.

4. Discussion

In this chapter the demand and supply side of the agricultural policies in Villa de Arriaga will be compared.

The classification criteria and the characterization according to the sustainable livelihoods capitals have been explained in the chapters two and three. The following part refers to the specific objective number four, the discussion of the similarities and differences regarding the needs of the farmers and the policies.

Figure 27: Classification of agricultural policies based on number of beneficiaries per category

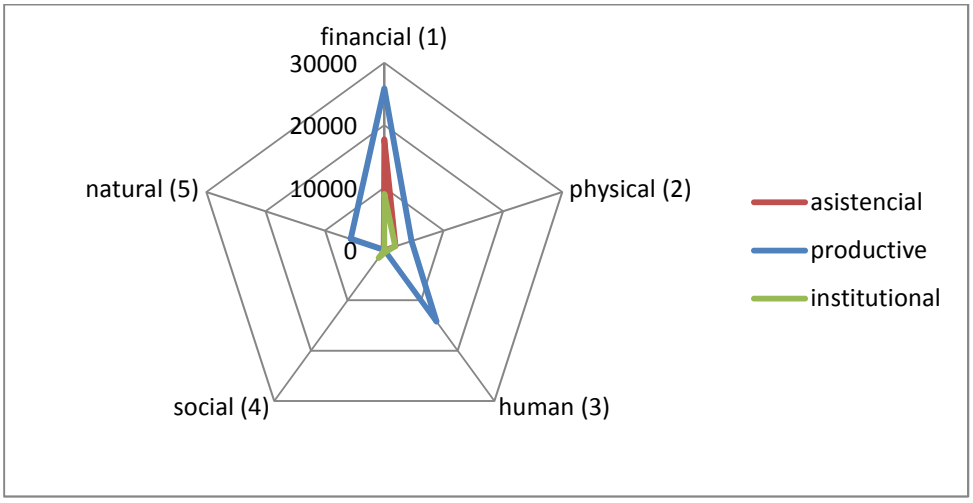
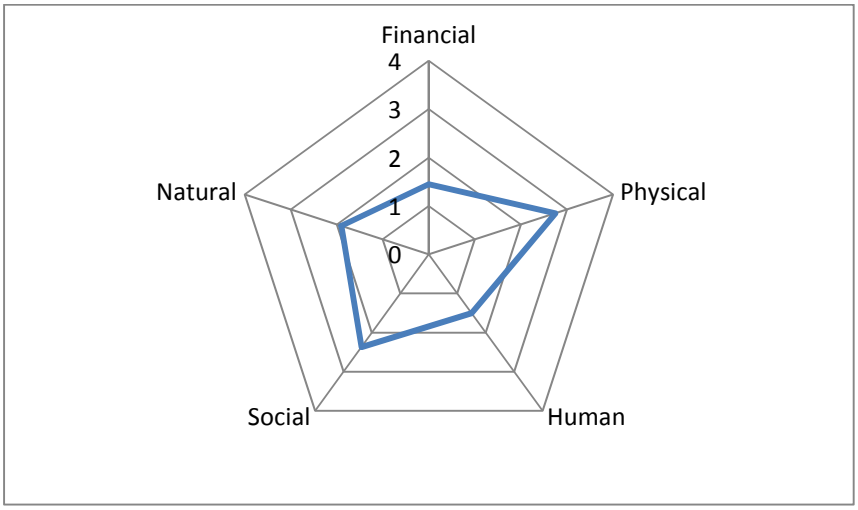


Figure 28: Sustainable Livelihood Capitals of the agricultural producer in Villa de Arriaga



In Villa de Arriaga the most supported capital is the financial one, which on the demand side is one of the weaker ones. In comparison with the financial capital, there are relatively fewer beneficiaries supported in their physical capital as in the financial one. This goes along with the calculation that the physical capital is the strongest of the five on the demand side. The human capital is strengthened through productive policies, which improve the knowledge base of the farmers. Support for human health improvement is not included there. The social capital is one of the stronger ones in Villa de Arriaga. The society is organized but does not recognize its power and possibilities sufficiently to use them in their favor. If public policies really can improve the social capital of the society, or if the society itself has to evolve it, is another discussion. The natural capital is poorly supported by public policies. The focus of the farmers and the agricultural policies

is more to improve the productivity than on improving the ecosystem functions. Farmer benefit directly from good natural conditions, but in this comparison there is still room for improvement.

In general can be stated, that the weaker capitals in Villa de Arriaga get more support than the stronger ones. An exception is the social capital, which could get more support.

There are more people benefitting from productive policies than assistential ones. Given, that most productive policies relate to livestock and agricultural productivity, these income fields should gain importance as income source for the municipal population. Nevertheless, people state that they had the necessity to work in other occupations far away from Villa de Arriaga because they could not sufficiently sustain from their agricultural and livestock production activities.

These comparison shows, that the policies have the right objectives to improve the livelihoods of the farmers, but according to the farmers and the statistics there is only a slow improvement of the situation and bigger development steps, like a more adapted production method like greenhouses are not applied because of formal restrictions.

There are other kinds of barriers, which hinder a successful implementation process of these policies. For the purpose of identifying the barriers in the implementation process, this procedure itself will be explained in the following.

4.1 The implementation processes

Explaining the implementation processes from part of the “transforming structures and processes” of the sustainable livelihoods framework.

In the implementation processes of policies are different steps necessary. The best example for a policy implementation process it the agricultural catastrophic insurance (see chapter 3.6.3). This specific process is interesting because the different perspectives of the official state agency (Sedarh) and the agricultural producers I asked about it show some aspects of the process inherent barriers. It is rated as an assistential financial capital.

Following a Bottom Up approach, the first question is how the agricultural producers get the information about the policies they could apply for in the first place. The Stakeholder Analysis shows, that there are three common ways of information: through the *ejido*-leaders, through vocals or through the agency representatives in the field. Generally, a big part of the information is

accessible in the websites of the state agencies, but to access this information the necessary infrastructure is missing.

Most farmers said that they got the assistance from the insurance automatically after a catastrophic event like the drought. For them the process starts when the drought occurs.

According to the director of rural development districts of the Sedarh, Marco Monroy, the insurance process starts before seeding, because every producer has to register the areas and the crop types he has planned to seed. This is the base to calculate the areas which are covered by the insurance. There is a catalog of crop types included in the insurance, so that not every seeded parcel will be included in the calculation.

When a catastrophe occurs, the *ejidos* or the municipal presidency have to report the damages to the Sedarh, with the CADER as the local representation of Sedarh. Sedarh then informs the insurance company who then sends a delegation into the *ejido* lands to evaluate the damage. These delegations are supposed to be accompanied by some employees of Sedarh, but sometimes there are not sufficient persons available, so that the damage evaluation is not supervised.

The insurance will be paid out to the Sedarh according to the results of the field visits evaluation. Sedarh then calculates the sum per individual based on the seeded crops and area. The payments are made by individual, not transferable cheques.

The interviewed producers did not understand this process in all its details and steps. Some new the processes explained above quiet detailed, other new parts of it and one ejido secretary had no idea how this works, but he does not trust it. There were other voices also claiming that this support was a broken promise.

Table 27: Procedure payments catastrophic insurance

Stakeholder	Task
Sedarh insurance ⇔ ompany	- Negotiate terms for insurance → Insurance paid by area and crop type, not individually
Individual farmer ⇔ CADER/ Sedarh	- Producer registers area and crop type he plans to seed
Catastrophe	
Individual farmer/ejido ⇔ CADER/Sedarh	- Report damages
Insurance Company, CADER/ Sedarh	- Evaluate area/crop types seeded / damages
Insurance company	- Calculates sum of compensation for the damaged area
CADER/Sedarh	- decide, who gets how much (individually)
Individual farmer	- Recieves personal, not transferable cheque

That leads to the following conclusions:

1. There is no sufficient transparency in the process. The farmers do not always know, why they register their planned seeded crops and area sizes. Therefore, they do not necessarily seed what they registered and their damages will not be covered by the catastrophically insurance. Consequently, when insurance is paid out, they do not understand, why they do not receive any payments although they lost their harvest and therefore get angry, jealous of those who receive payments and they judge the state agencies for not doing a good job. In the end, they lose trust in this system.
2. Sedarh and CADER are responsible for informing about the procedure and the assured crop types. According to the director for the rural development districts of the Sedarh, this agency informed the presidencies of the *ejidos* three years ago. Until now, in every *ejido*

have changed this presidencies, so that the recent leading stuff is not officially informed about these processes.

In the following part, the consequences of this process will be explained more general.

4.2 Barriers

In cases when bureaucratic processes are necessary and there are various actors involved, it results in special needs, interests, hierarchies and concerns which might be conflicting. At the same time there is a tremendous need of the state assistance, as becomes clear in the analysis of not only the financial income. Different analysis (Fox et al 2010) of the agricultural policies in Mexico concluded that the development potential and the impact on the communities could be strengthened especially for small and middle scale farmers, as there still are a lot of possibilities for modernization of the production and market inclusion. This is the main opportunity the agricultural policy programs have, especially under the circumstances in Villa de Arriaga.

In the implication processes barriers can be found regarding transparency, information structure, stakeholders, policy inefficiency and bureaucracy (see table 20).

Concerning transparency there are high transaction costs for acquiring the knowledge about the governmental programs. This information is given through the representatives of the state agencies, who most likely inform about programs which could acquire the most financial resources, but must not be the most productive ones in comparison to other programs. Their income relays on their application success for the programs and most times is related to the financial volume the producer could receive. This is one type of transaction costs, the other ways of information relay on the good relation the responsible *ejido* member (commissary or vocal) has with the state agencies and the municipal presidency. In their case the costs are the transport and the time to meet the informants.

The information, after “arriving” in the community, is not distributed equally between the *ejido* members. The representatives work, depending on the program, on an individual level with the producers. The other informants are supposed to share their knowledge in *ejido* assemblies, but, as explained in the social capital, these assemblies do not always take place or there do not always assist all *ejido* members.

The distribution of the information about governmental programs therefore is based on personal relations. This fact bears chances and barriers at the same time, as some profit from this relations more than others, always depending on a good relation.

Additionally, the *ejido* members do not necessarily trust the government, because it does not always keep promises. This influences the personal relations necessary for the interchange of information.

The government does not always provide the information in time or it does not explain the reasons for changes of program conditions. For example, in case of the agricultural insurance in 2014 only was paid for some crop types seeded in Villa de Arriaga. The information did not reach the farmers before they seeded, because it was revealed too late by the responsible agencies. The reasons for the decision could not be explained by the producer (interviews May 2014). This in transparency leads to more mistrust in government agencies.

An opportunity here would be to improve the internet access of the communities to give every farmers the same easy access to the official information directly from the responsible agencies.

Regarding the stakeholders exists a different set of barriers.

One important obstacle is the wide range of actors involved in the application of policy programs. That makes the process of policy implication more intransparent and slow. The responsibilities are well distributed so that it is difficult to understand the concrete steps between the agency which provides the government programs and the farmer who benefits. At the same time, it generates more possibilities of corruption. According to Forbes Mexico (2014) San Luis Potosí is the most corrupt state in Mexico. Mostly, the corruption is generated at the completion of paperwork, service requests and other contacts with public servants (Forbes 2014). This fact underlines the assumption of a high potential of corruption also on municipal level in Villa de Arriaga. Some interviewed producers mentioned it indirectly, when they stated, that “only half of the aids reach the community” or “there everything remains” (regarding the representatives of the agencies) (interviews with farmers May 2014).

The third category of barriers relates to the inefficiency of policies. These problems are mainly structural, because of erroneous planning. For example there was an access road maintained by getting a new pavement by a federal program. In total, this road was paved two times in one year.

That makes it a case of bad planning. In another case the representatives of the governmental "Oportunidades" visited San Francisco to assess the new needs of the population by personal interviews. The representatives came when there was a local holiday and most of the people were not at home celebrating in a public space. These are two examples for the missuse of public resources because of missplanning.

The bureaucracy related barriers refer to an intransparent application process (as explained above) and complicated requirements. Every application process requires specific requisites, which sometimes are difficult to fulfill. For example for the assistance in construction of greenhouses an own, proper registered water source is necessary. In this case the infrastructural conditions do not permit this registered water sources. As a consequence these producers are not able to modernize and adapt their production systems within this program, because the technical requirements are not given. Additionally, it is not profitable for the farmers to register their water sources because the costs would be higher than the benefits.

These barriers have to be seen and interpreted in the cultural context of Mexico and in its political system. An extensive analysis of mainly the Mexican beaurocratic and political context is "Understanding Development Bureaucracies: A Case Study of Mexico's Rural Development Policy" by Macedo Castillejo (2014). His basic conclusions are, that policy implementation processes are important for the achieving of policy objectives. This also is a result of the chapters two and three of the present analysis. Furthermore, in his analysis, Macedo Castillejo states that the political actors should not be seen as "black boxes" who just act and have no personal interests, relations and history. In his examples, Macedo Castillejo states as a results, that in different levels of policy making clientelism, *compadrazdo*[38], economic (keeping their job), cultural and political-electoral reasons are important drivers for the decision making of the bureaucrats.

[38] "*Compadrazgo* is a system of ritual fictive kinship resulting in reciprocal relationships between two families."(Macedo Castillejo 2014: 38). It refers mainly to the catholic tradition, where in baptisms and other sacraments *padrinos* are selected to support the children to live a catholic life. "In Mexico there has been a diversion of the term *compadrazgo* in the political arena, where it refers to a strong relationship created between two individuals in order to take advantage of political position to reproduce and extend their political or economic power" (Macedo Castillejo 2014: 39).

Table 28: Barriers in Policy Implementation in the Case of Villa de Arriaga

Transparency	high transaction costs
	unequal information distribution
	mistrust
Stakeholders	high number
	intransparent
	corruption
Inefficiency of Policies	erroneous planning and implementation
	structural
Bureaucracy	intransparent application process
	requirements
	information

All these influences change the objectives and procedures intended by the policymakers and the policy outcomes (ibid. 2014). This analysis refers to the federal, the state and the municipal level of evaluation.

In the case of Villa de Arriaga these uncertainties have been visible in some points on a local level. Regarding the agricultural producer, it became obvious that more "moved" persons, that is to say persons who had more contacts, had a higher social status. For example in San Francisco will be built a dam as a mayor project. In an *ejido*-assembly, there should be named a team of people from the *ejido* to supervise the construction and the financial concerns. This group, consisting of five people, everyone with a special responsibility, was proposed by the leader of the discussion, an agricultural engineer from CONAZA. A discussion followed, because not everyone wanted to agree to this procedure. Finally, exactly this committee was elected by the assembly. Afterwards, the whole committee came together for a lunch with the municipal president. It came out, that

everyone had a good connection to him and between each other. This is clearly a form of clientelism on a local level.

An example for the political electoral barriers is the relations between the Sedarh on a state level and Sagarpa on a federal level. The director of the development regions of Sedarh said that these levels of policy implementation are not working well with each other, when two different parties were heading these secretaries. According to Macedo Castillejo, these parties want to establish their own circle of influent beneficiaries for gaining their voices in the elections (ibid. 2014).

Bearing in mind these difficulties and different ways to follow political interests, the structure of policy implementation, with this high number of stakeholders involved (individual farmer, *ejido* commissary, vocal, agricultural engineer, CADER, Sedarh and other governmental agencies etc.) open a lot of possibilities to change the policy objectives initially intended by the policymakers. A deeper analysis of the relationships between the stakeholders on local, municipal and state level might have revealed more of this kind of relationships and motives, but this was not the objective of this analysis and the possibilities therefore are limited.

There have been attempts to weaken these personal influences by the *ley de desarrollo sustentable* (sustainable development law) in 2001, but after ten years of trying to implement a democratization and decentralization of this system the attempts did not achieve their goals (Macedo Castillejo 2014).

5. Recommendations

As this policy analysis is divided in two parts, the recommendations also will be. First, there will be addressed the response side and then the demand side of the policies.

On the response side, there are the employees of the state agencies responsible for the implementation of policies and the decision maker on different political levels.

First of all was stated out, that the general policies who reach Villa de Arriaga are conclusive regarding the sustainable livelihoods capacities of Villa de Arriaga. The agricultural productive potential of Villa de Arriaga is addressed, although the social and natural capital could be strengthened more through assistential projects, which raise the awareness and importance of these capitals.

The really important part of the agricultural policies in Villa de Arriaga is the implementation process. These processes finally decide who gets what and which projects will be realized. The policy outcomes are based on personal decisions of different stakeholders in a long decision chain explained in the example of the agricultural catastrophe insurance in chapter 4. These processes how the policies reach die individual farmer should more be adapted to the politic reality of the bureaucratic system of Mexico.

Objectification of decision criteria could be a start for separating the support decision from the personal uncertainties of the state agency employee. In the case of the agricultural catastrophic insurance explained above it would be an option to modernize the evaluation process of the agricultural production and the damages with satellite images and remote sensing techniques. By using this kind of techniques the evaluation of the damages would be objectified and less dependent on the decision making of single individuals.

The way of implementing the policies should be made more transparent for the farmers and every other participant to follow it. At the moment, not every participant in this process has the same opinion about the different steps of how the policies are reaching the beneficiaries. The agricultural small and middle scale producers in Villa de Arriaga are a target group of the agricultural policies and, at the same time, do not know the panorama of possibilities they theoretically have. This is partly in the responsibility of the policy implementation processes which do not sufficiently recognize a structured and well known information procedure, which is applicable in a rural context, where the information technology is not very developed. There might be information accessible in the internet, but the technology is in the localities of Villa de Arriaga not accessible for most of the inhabitants.

The access of agricultural producers to education programs and institutions should be improved. Currently, the education of the farmers is low; many did not finish primary school. For a better understanding of agricultural technology and market structures there should be implemented more education institutions on a municipal level, also for farmers, who are yet older.

On the demand side, which is composed by primarily the beneficiates of the public policies, are some possibilities for improvement. It was mentioned in the interviews that the social and cultural structure of the localities is not supportive for the organization of the farmers. Most producers are *ejido* members, but this form of organization loses importance, at least in the perception of their

members. On local level also apply different uncertainties regarding clientelism and *compadrazgo* like explained in before. Apart from the mistrust in the horizontal relations on a local level there is a potential of a better organization of the agricultural and livestock producer. In an organized form, the defense of rights and demands has more political impact, when claimed by a group of people than by an individual person.

On the local level, there are hardly any projects organized by the people without agricultural policies who encourage the effort. Everyone cares for himself and the family individually. In a more organized society, there would be potentially more projects which improve the situation of a wider range of people. The political weight of an organized society speaking with one voice is potentially higher than an individual demand.

As analyzed before, the information structure on a local level does not work equally well for everybody. There is an opportunity to improve policy implementation processes when the local producers know about their opportunities and how to apply for them. In the example of the catastrophic insurance, the Sedarh employee stated that they had informed the *ejido* leader in 2011 about the procedure in case of a catastrophic event. But in this time until now the leadership has changes in almost all *ejidos* in Villa de Arriaga, so that for example the Secretary of the *ejido* in El Tepetate did not know how this implementation works. Therefore, an appropriate information infrastructure must be developed. Also, within the *ejidos* the information structure must be improved. For example the information interchange between different generations of *ejido* leaders is one field of improvement.

6. Limits and open questions

The Villa de Arriaga case study concentrates on the development opportunities and barriers based on sustainable livelihood capitals of the localities in Villa de Arriaga and the support of the public policy framework. The different capitals were analyzed as equally important, with a focus on the agricultural and livestock production capacities. Finally, it was stated that the implementation processes of agricultural policies are important for the outcome of public policies.

In this regard a limit of this analysis is the red of personal relation, clientelism and *Compadrazgo* on a municipal and local level in Villa de Arriaga. This is important for various reasons. First, the organizational capacity was stated out as a development potential in Villa de Arriaga. In the

perception of the farmers there are some barriers for the organization, like mistrust and envy. With a deeper analysis of the social relations in the present and the past with anthropological and social science theories of society organization there could be improved this opportunity of development. Second, a deeper analysis of clientelism and *Compadrazgo* as a factor in the implementation process of public policies can develop possibilities of improvement of these processes. Based on such an analysis there can be found possibilities to adapt the institutional setting and the way policies are implemented adapted to the cultural reality.

Another limit of this work is that the policy analysis is qualitative rather than quantitative. The local, horizontal and probably also vertical inequalities in state support are interesting to analyze, as it shows in more details, if the original criteria of the public policies and the objectives are achieved on a local and municipal level. The allocation and distribution of money and projects would reveal other shortcomings in the implementation process also related to the societal reality in these places. As a result, again, there would be given recommendations how to better adapt the implementation processes of the public policies to the needs of the beneficiaries.

An open question related to the recent political processes in Mexicos agricultural policies would be to analyze in how far the implementation processes are recognized by the decision makers. These transformation processes in 2014 have the objective to address deficits of the agricultural policies and improve shortcomings. The implementation procedure is a shortcoming of the agricultural policies, as the original objectives of agricultural policies are changed by the individual decisions of stakeholders in this process. So the question should address political decision makers and stakeholders who negotiate the new policies.

Another question regarding the transformation processes of the agricultural policies is how participative they are. The majority of the farmers in Mexico is small and middle scale, consequently they should be represented sufficiently in these processes, as a main beneficiary group. How they are addressed and if they have real access to the negotiation processes is a question, which goes beyond the objectives of the present work, but nevertheless seems adequate to ask.

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8. Annex

8.1 Statistic Relevance of the quantitative interviews in Villa de Arriaga in June 2013

The calculation of the sample sizes of the interviews made in June 2013 in three localities in Villa de Arriaga. The calculation is based on the calculation of a probabilistic sample by Hernández Sampieri (et al. 2006). It is described as follows:

Calculation of sample size

The necessary variables are:

N = population size (total number of *ejido* members)

Se = standard error, in this case 0.5

V^2 = square of population variety, defined as se^2: square of standard error

s^2 = variance of the expressed sample

p = 0.9

n' = population size without adjustments

n = sample size

To calculate the sample size needs to be calculated:

1. $n' = \frac{s^2}{V^2}$
2. $n = \frac{n'}{1+\frac{n'}{N}}$

$s^2 = p(1 - p) = 0.9(1 – 0.9) = 0.09$

$V^2 = (0.5)^2 = 0.0025$

Standard Error

0,5 (sociologically accepted)

San Francisco:

N=267 (ejidatarios)

V^2=0,0025 (v=0,5)

s^2=0,09

n´= 0,09/0,0035 = 36

n=31,72

n=32

32 interviews necessary for a correlation coefficient of 95%

Interviews made: 51

El Tepetate:

N= 314 (ejidatarios)

n= 33

33 interviews necessary for a correlation coefficient of 95%

Interviews made: 48

El Mezquital:

N = number of ejidatarios: unknown

N´=inhabitants=306

n´=36

n=32

Interviews made: 48

In every sample the number of interviews is statistically significant regarding the population size of *ejido* members.

8.2 Qualtitative Interviews Villa de Arriaga June 2013

UNIVERSIDAD AUTONÓMA DE SAN LUIS POTOSÍ
Programa Multidisciplinario de Posgrado en Ciencias Ambientales
Encuesta sobre percepción local de la sequía en Villa de Arriaga

Nombre: _____ Edad _____
Localidad: _____

1. ¿Cuántos años tiene viviendo en el municipio?

2. ¿A qué se dedica?
   a) Agricultura b)Ganadería c)Venta de productos d)Servicios

   e) otros, ¿cuáles? _____

3. ¿De dónde proviene su principal fuente de sustento?
   a) De la agricultura b) De la ganadería c) De mi empleo d) Del dinero que me mandan mis hijo(a)s

4. ¿Cuántas hectáreas dedica para sus cultivos?
   a) 20 o más has b) 10 a 20 has c) 5 a 10 has d) 0 a 5 has

5. ¿Cuáles son los cultivos principales que siembra?
   a) Frijol b)Cebada c)Maíz d)Avena e)Trigo d)Otros_____

6. Tiene ganado, ¿De qué tipo?
   a) Vacuno b)bovino c)ovino d) porcino

7. ¿Cuántas cabezas de ganado posee?
   No. _____

8. Los productos que obtiene de su ganado, los utiliza para:
   a.) Consumo propio b.) venta local c.) comercialización estatal d.) comercialización nacional

9. ¿Pertenece a alguna asociación de ejidatarios y / o productores de pequeña propiedad?
   a) No b) Sí, a ¿cuál?
   _____

10. ¿Considera que el clima ha cambiado en los últimos 5 años?
    a)Sí b) No

11. Según su percepción, considera que en los últimos años ha llovido:
    a) Igual que hace 5 años b) menos que hace 5 años c) más que hace 10 años

12. ¿Ha tenido pérdidas en sus cultivos y / o ganado a consecuencia de la falta de lluvia?
    a) Sí b) No

    12.1. En caso de que la respuesta sea afirmativa, ¿qué tipo de pérdidas sufrió?
    a) Cultivo b) Ganado

    12.2. ¿Qué cantidad de producción perdió?
    a) Un cuarto b) la mitad c) todo

13. ¿Ha modificado su sistema de producción para adaptarse a la falta de lluvia (manejo de suelo, cultivos)?
    a) No b) Si, ¿Cómo? _____

14. ¿Considera que la falta de lluvia representa un riesgo para usted y la comunidad?
    a) Sí b) No

15. ¿Ha tenido que dedicarse a otra actividad por la pérdida o baja producción de sus cultivos y / o ganado?
    a) No b) Sí, ¿Cuál?
    _____

16. ¿Ha tenido la necesidad de irse a otro estado o país por la pérdida de sus cultivos y / o ganado?
    a) No b) Sí, A ¿dónde?_____

17. En las ocasiones que ha perdido cultivos y / o ganado, ¿ha recibido ayuda del instituciones de gobierno?
    a) No b) Sí,

    17.1. Si la respuesta fue afirmativa, ¿De qué tipo?

    a) Económica b) víveres c) semillas d) otros, ¿cuáles?_____

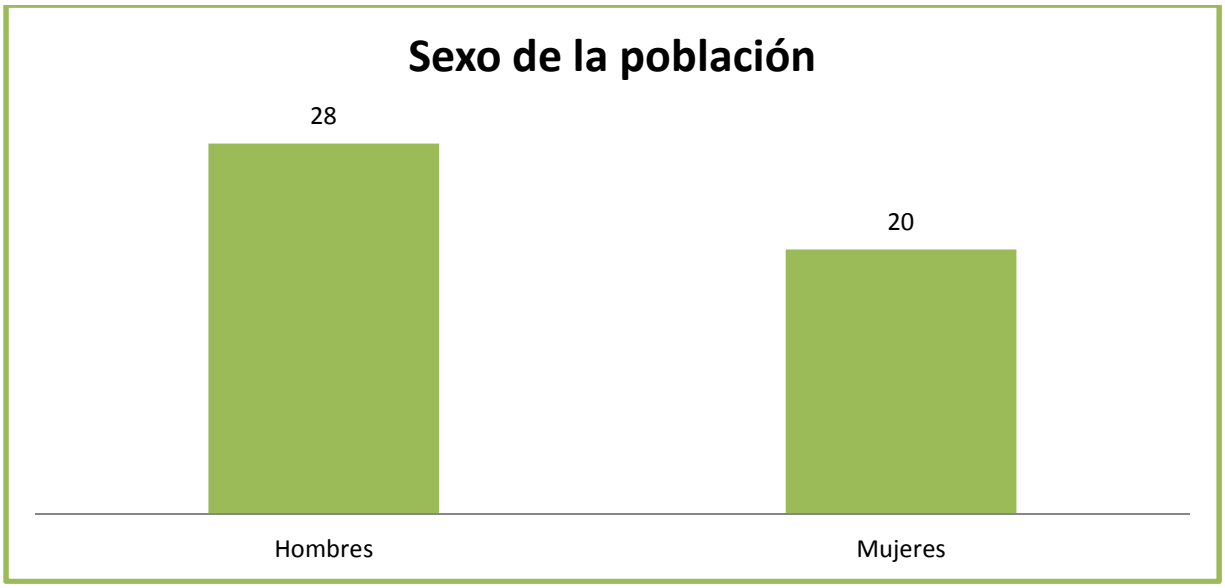
    13.2. En caso de que haya recibido apoyo, ¿qué institución se lo proporcionó?

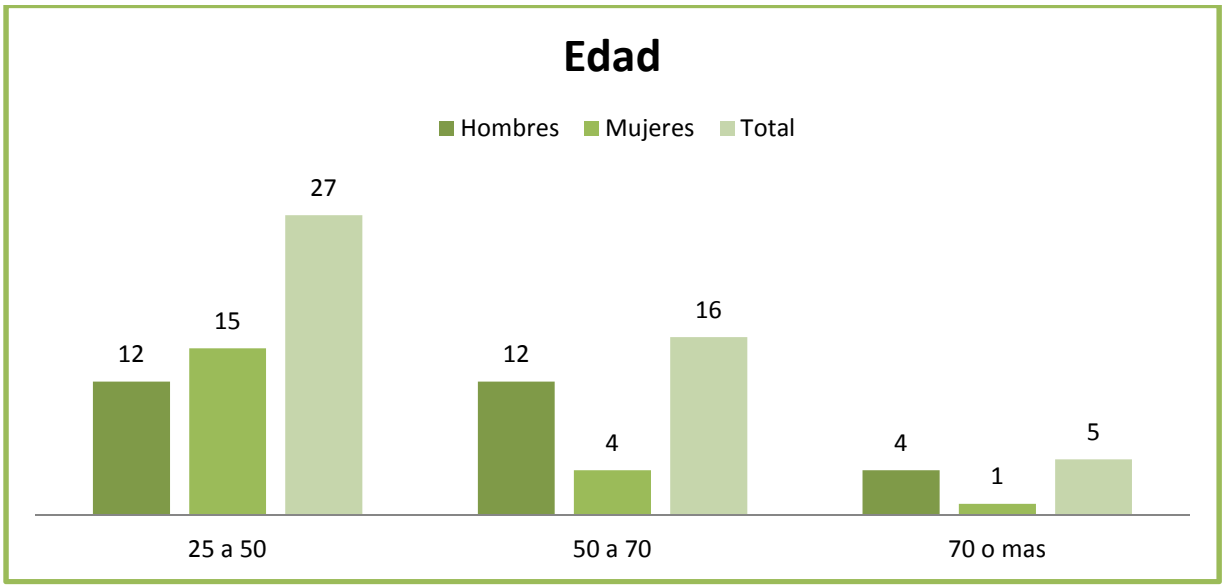
    a) PROCAMPO b) SEDESOL c) FONDEN d) otros, ¿cuál?_____

¡Gracias por su participación!

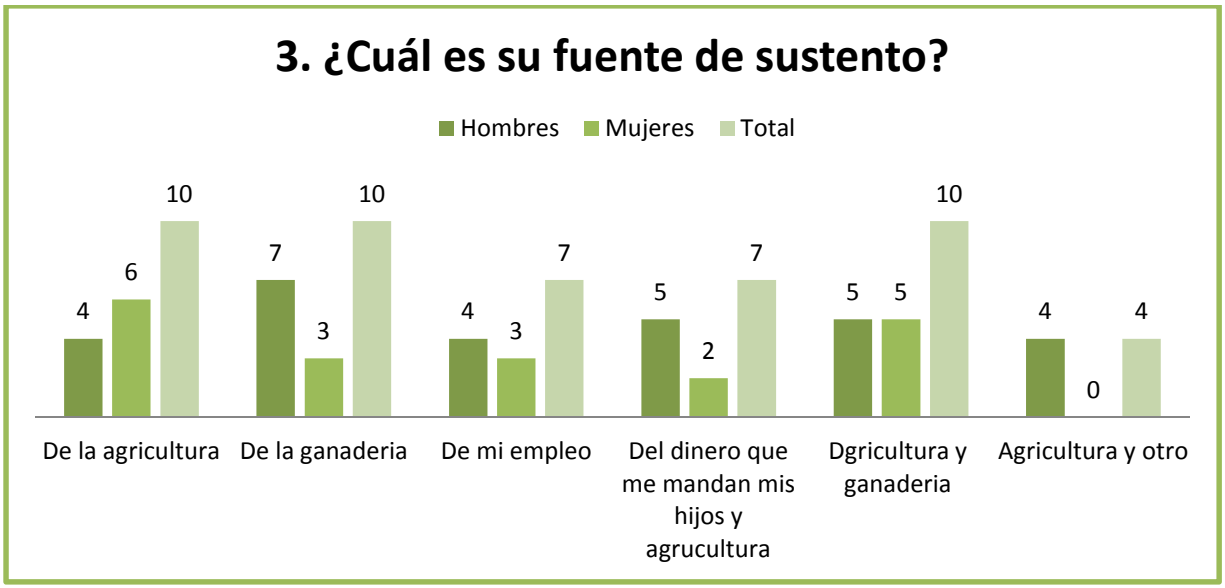
8.3 Grafic Results of the quantitative Interviews

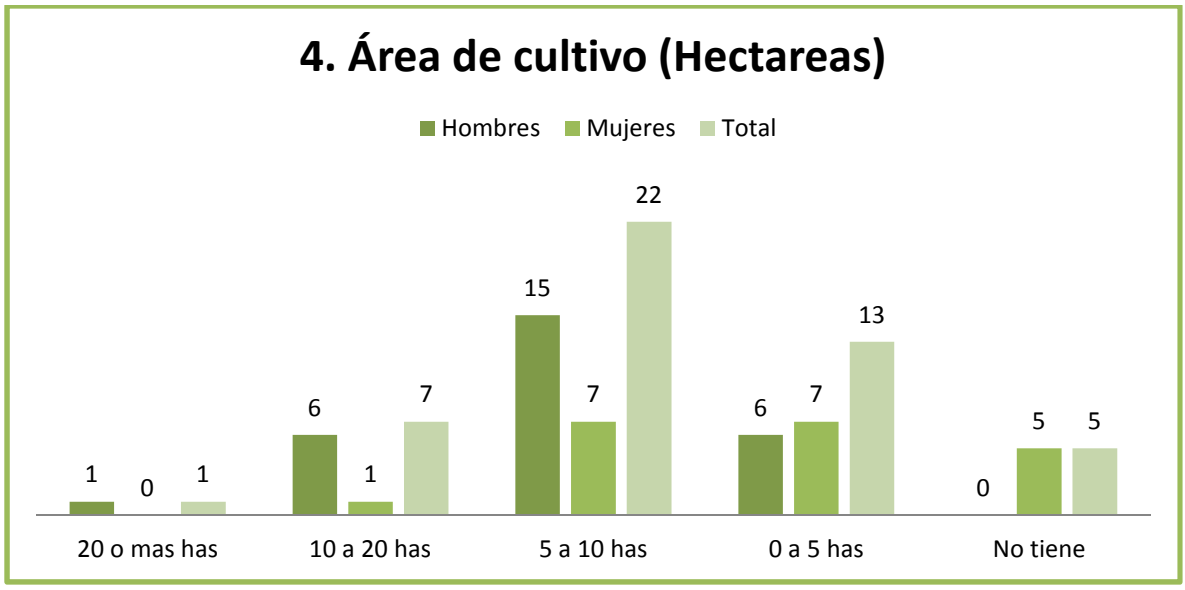
8.3.1 El Mezquital

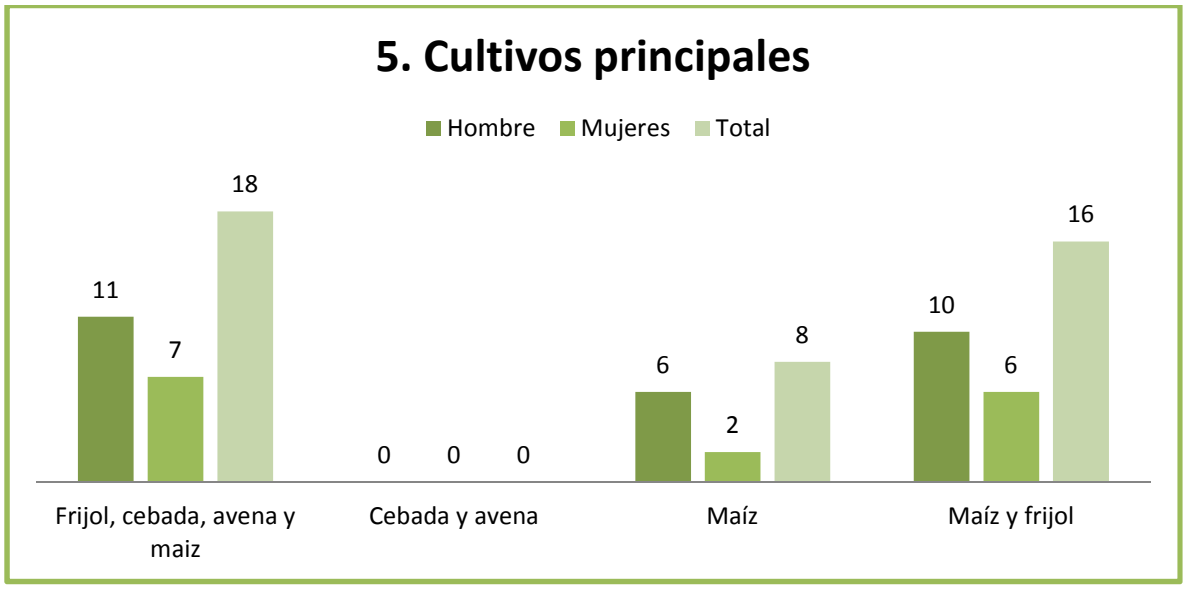


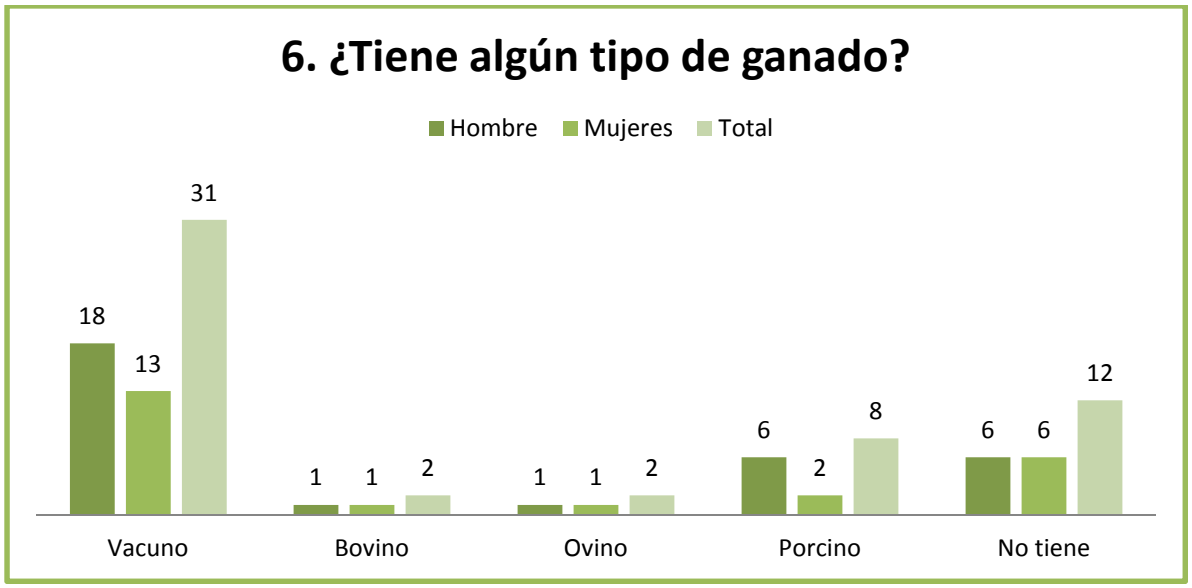


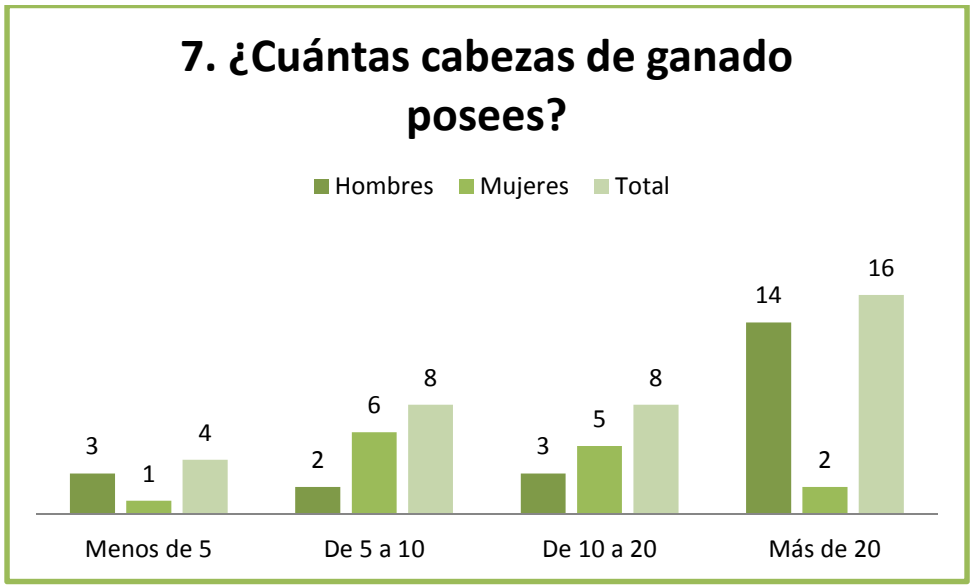

2. ¿A qué se dedica?
Hombres
Mujeres
Total
7
11
18
0
2
2
0
1
1
0
1
1
21
5
26
Agricultura
Ganadería
Venta de productos
Servicios
Agricultura y ganadería

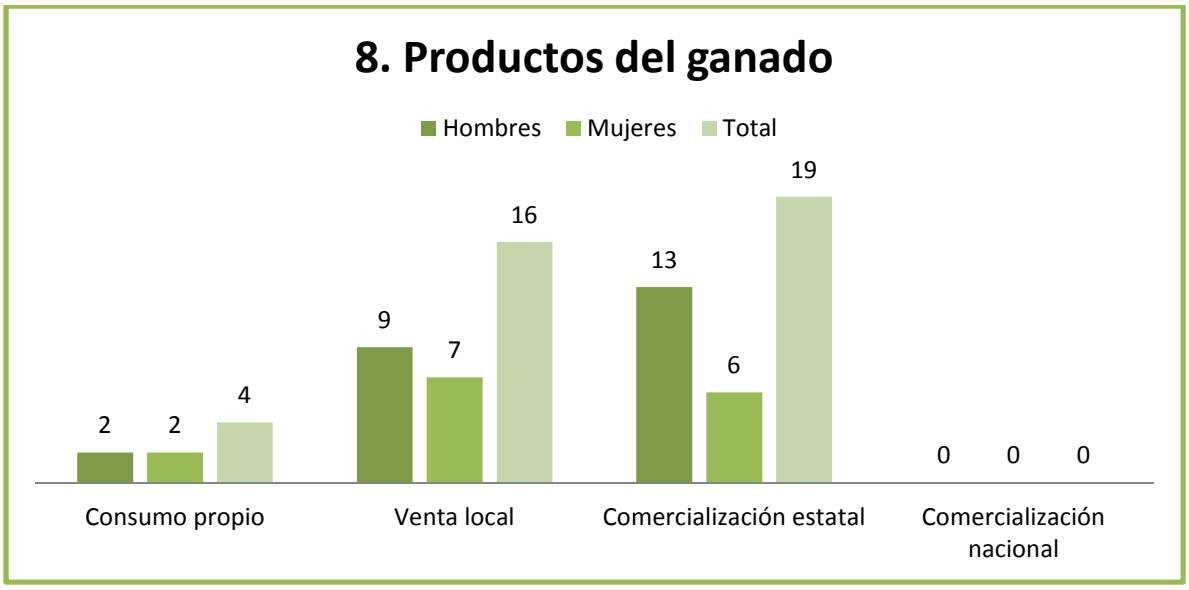

3. ¿Cuál es su fuente de sustento?
Hombres
Mujeres
Total
4
6
10
7
3
10
4
3
7
5
2
7
5
5
10
4
0
4
De la agricultura
De la ganaderia
De mi empleo
Del dinero que me mandan mis hijos y agrucultura
Dgricultura y ganaderia
Agricultura y otro

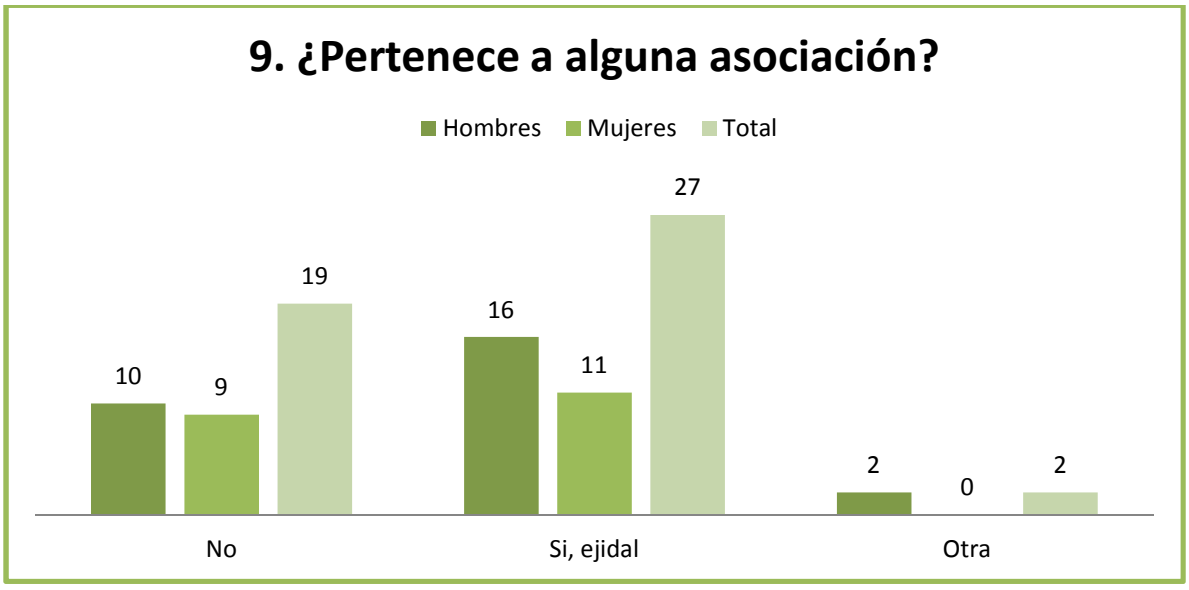

4. Área de cultivo (Hectareas)
Hombres
Mujeres
Total
1
0
1
6
1
7
15
7
22
6
7
13
0
5
5
20 o mas has
10 a 20 has
5 a 10 has
0 a 5 has
No tiene

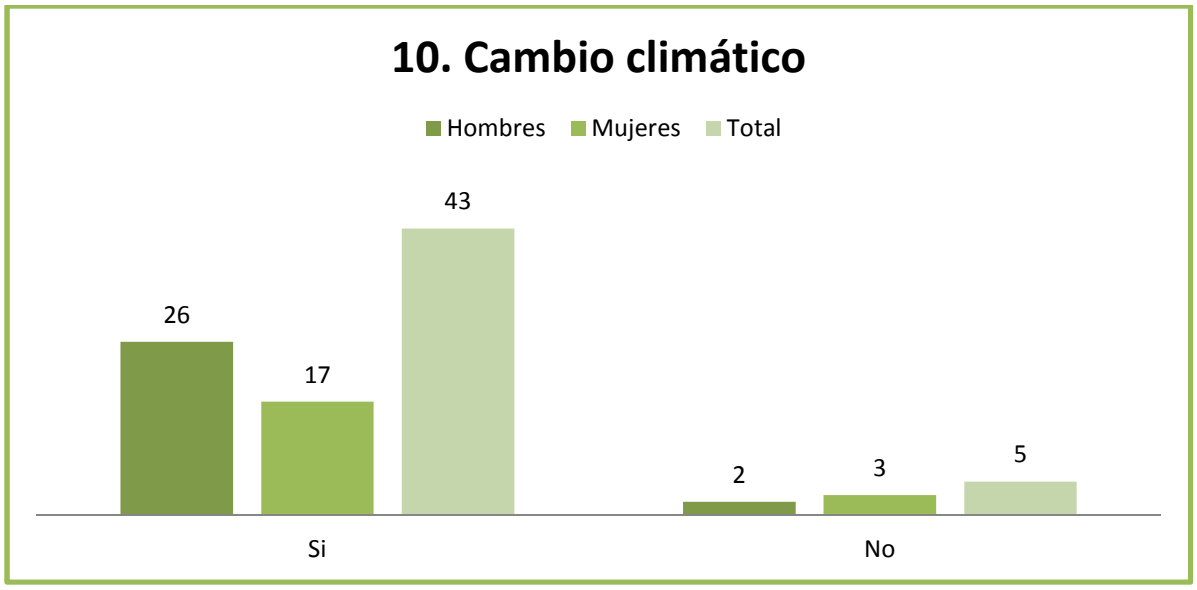

5. Cultivos principales
Hombre
Mujeres
Total
11
7
18
0
0
0
6
2
8
10
6
16
Frijol, cebada, avena y maiz
Cebada y avena
Maíz
Maíz y frijol

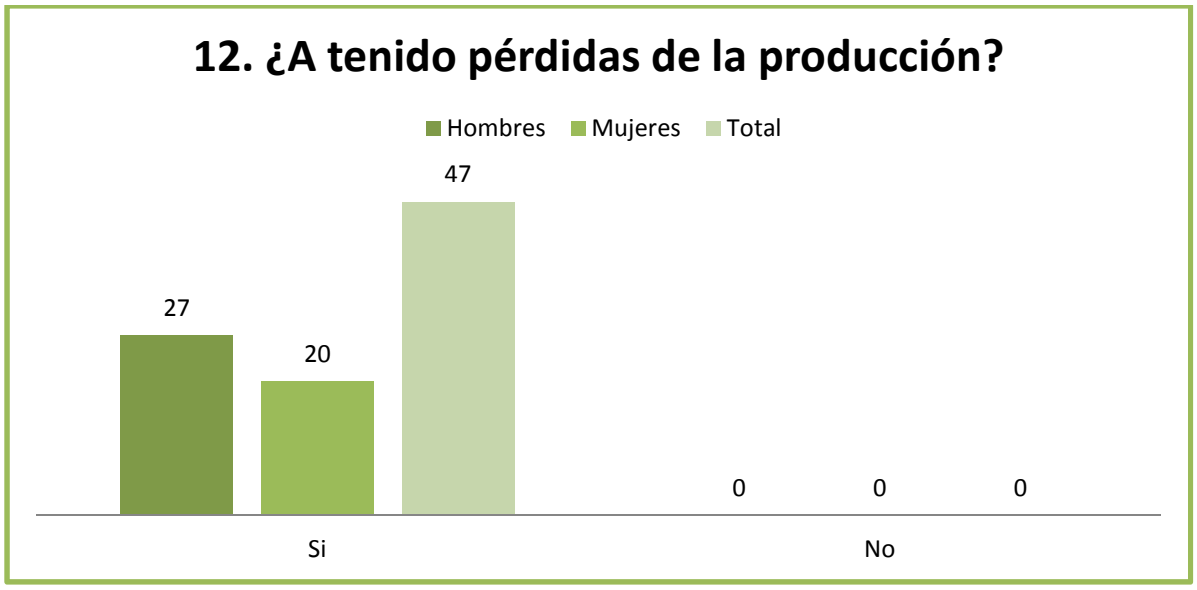

6. ¿Tiene algún tipo de ganado?
Hombre
Mujeres
Total
18
13
31
1
1
2
1
1
2
6
2
8
6
6
12
Vacuno
Bovino
Ovino
Porcino
No tiene

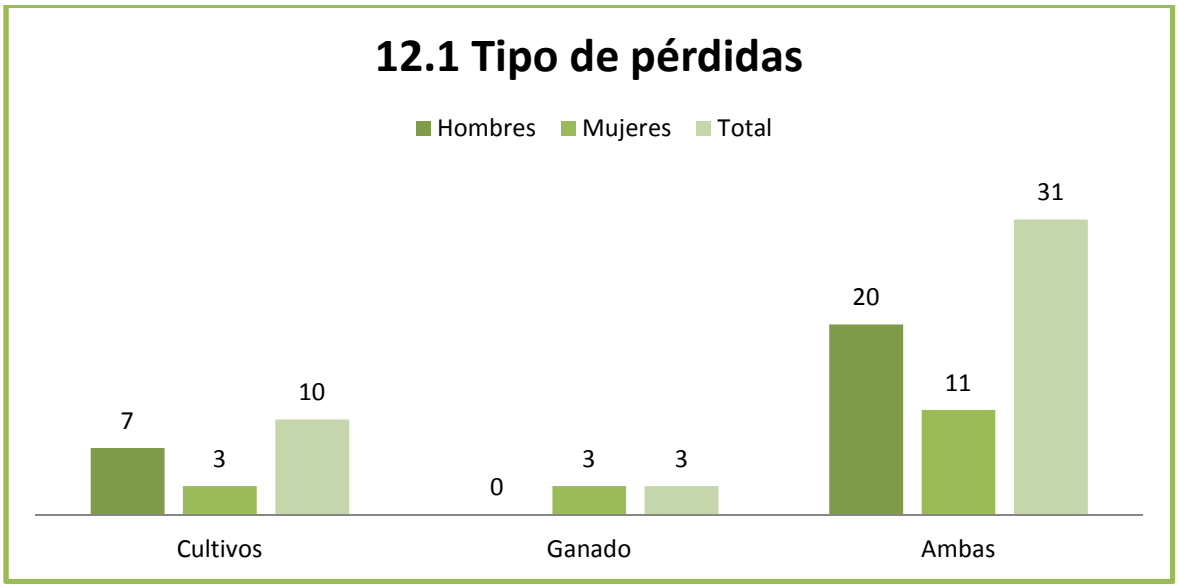

7. ¿Cuántas cabezas de ganado posees?
Hombres
Mujeres
Total
3
1
4
2
6
8
3
5
8
14
2
16
Menos de 5
De 5 a 10
De 10 a 20
Más de 20

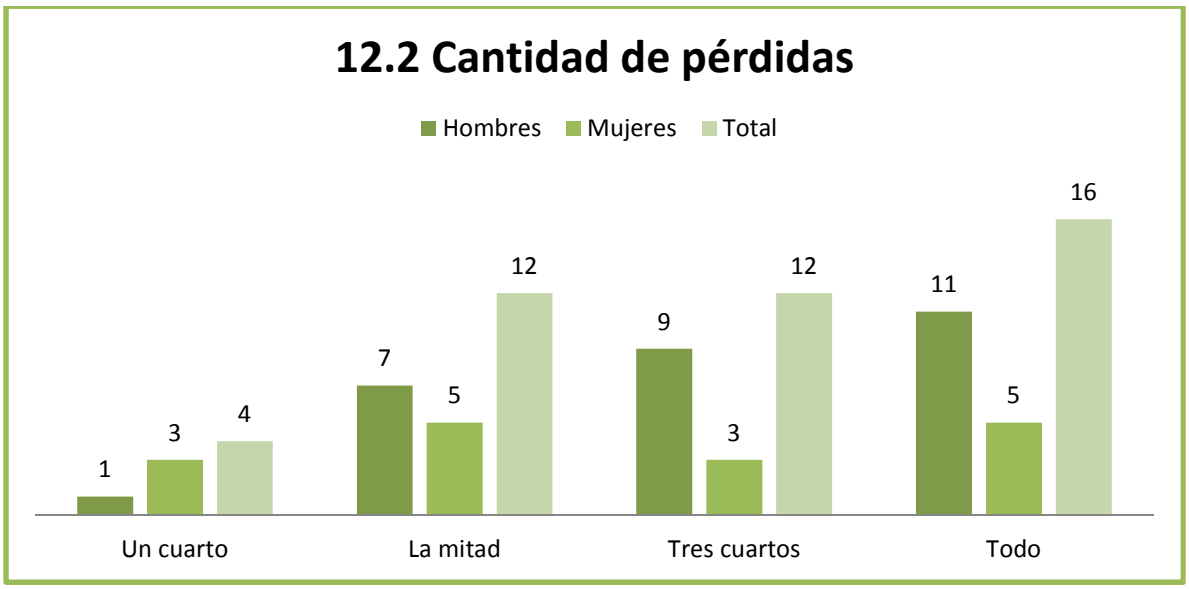

8. Productos del ganado
Hombres
Mujeres
Total
2
2
4
9
7
16
13
6
19
0
0
0
Consumo propio
Venta local
Comercialización estatal
Comercialización nacional

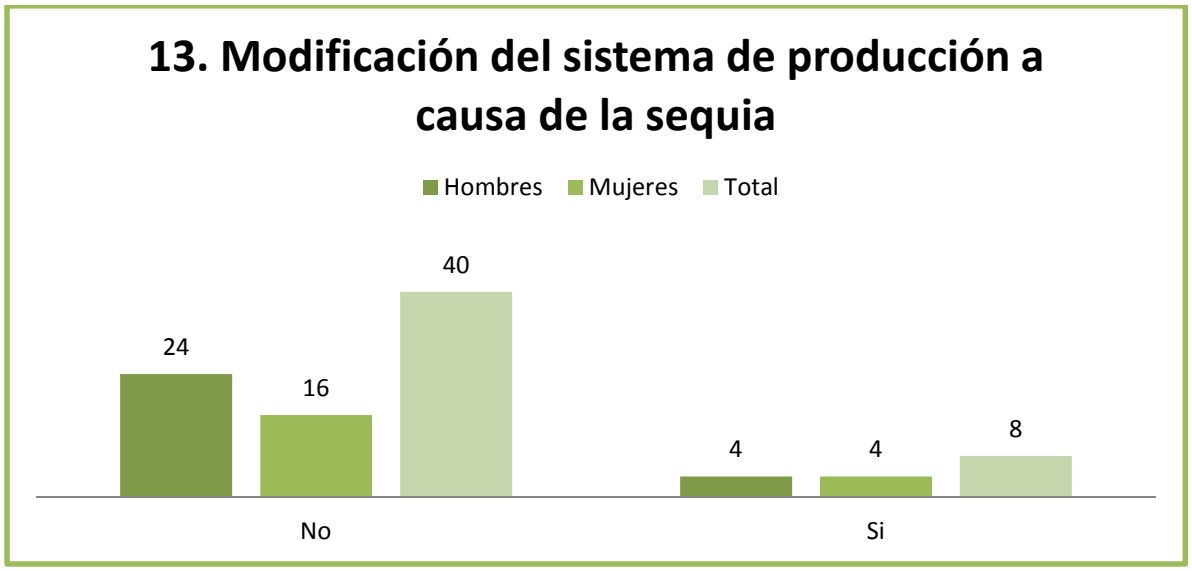

9. ¿Pertenece a alguna asociación?
Hombres
Mujeres
Total
10
9
19
16
11
27
2
0
2
No
Si, ejidal
Otra

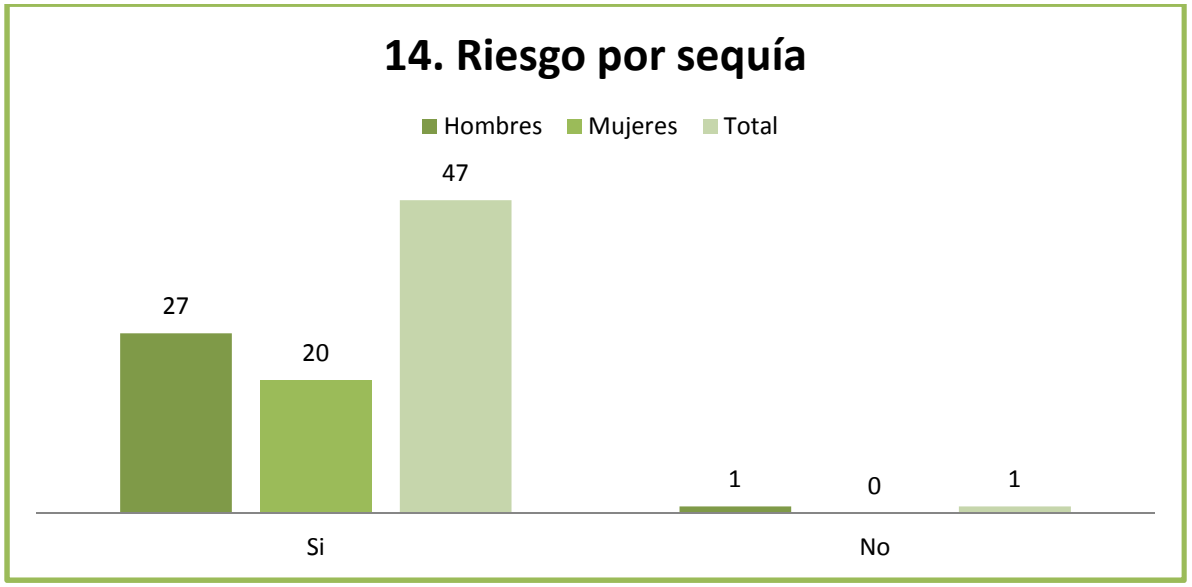

10. Cambio climático
Hombres
Mujeres
Total
26
17
43
2
3
5
Si
No

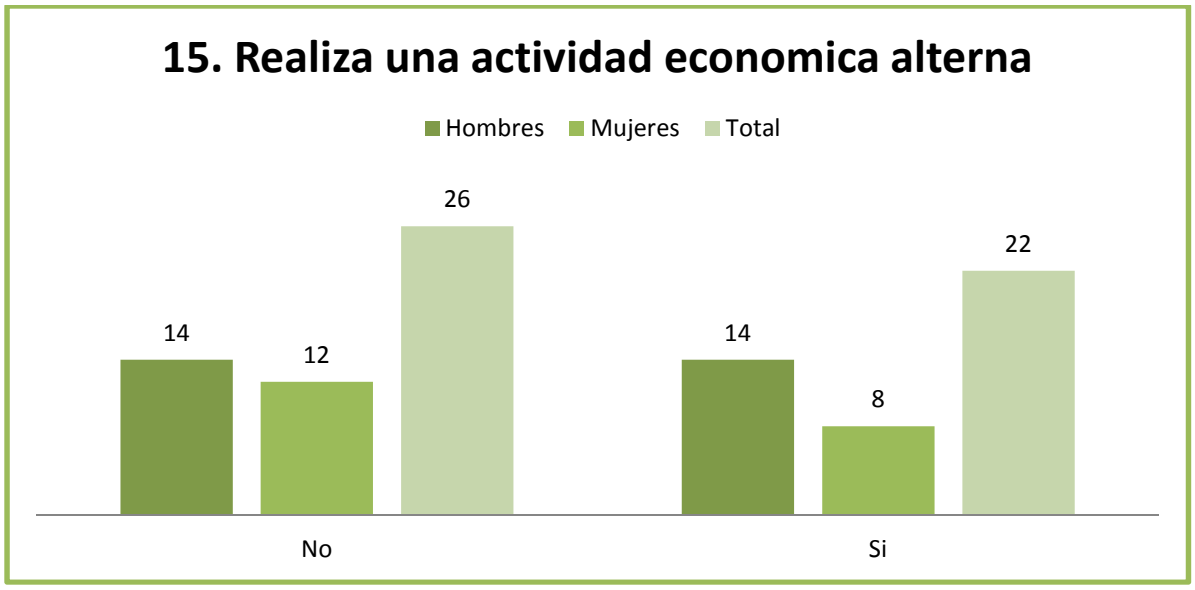

12. ¿A tenido pérdidas de la producción?
Hombres
Mujeres
Total
27
20
47
0
0
0
Si
No

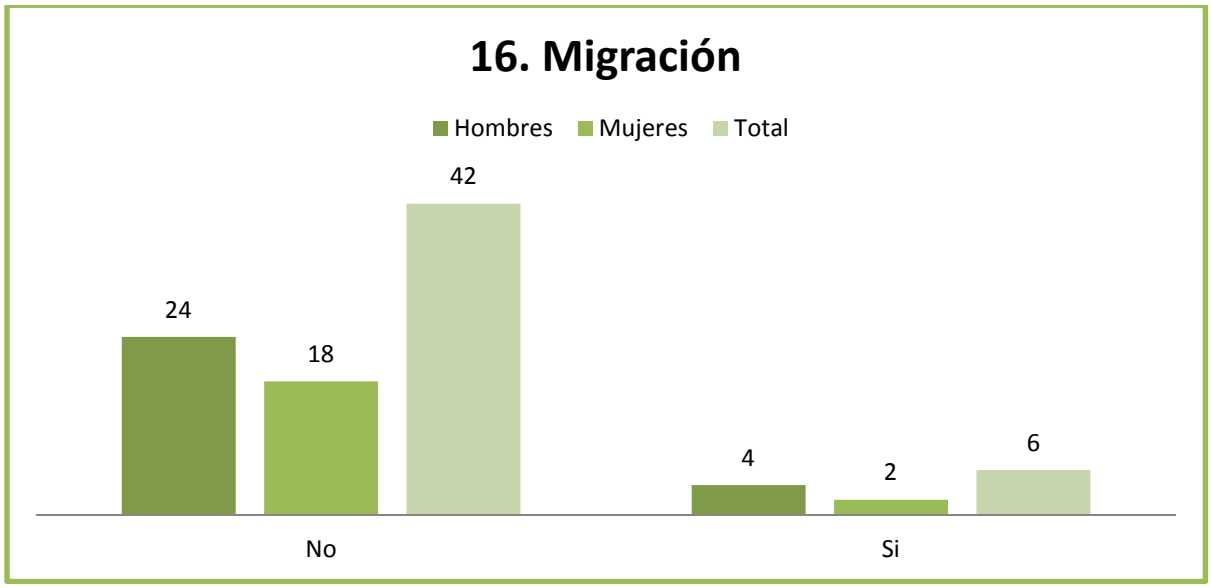

12.1 Tipo de pérdidas
Hombres
Mujeres
Total
7
3
10
0
3
3
20
11
31
Cultivos
Ganado
Ambas

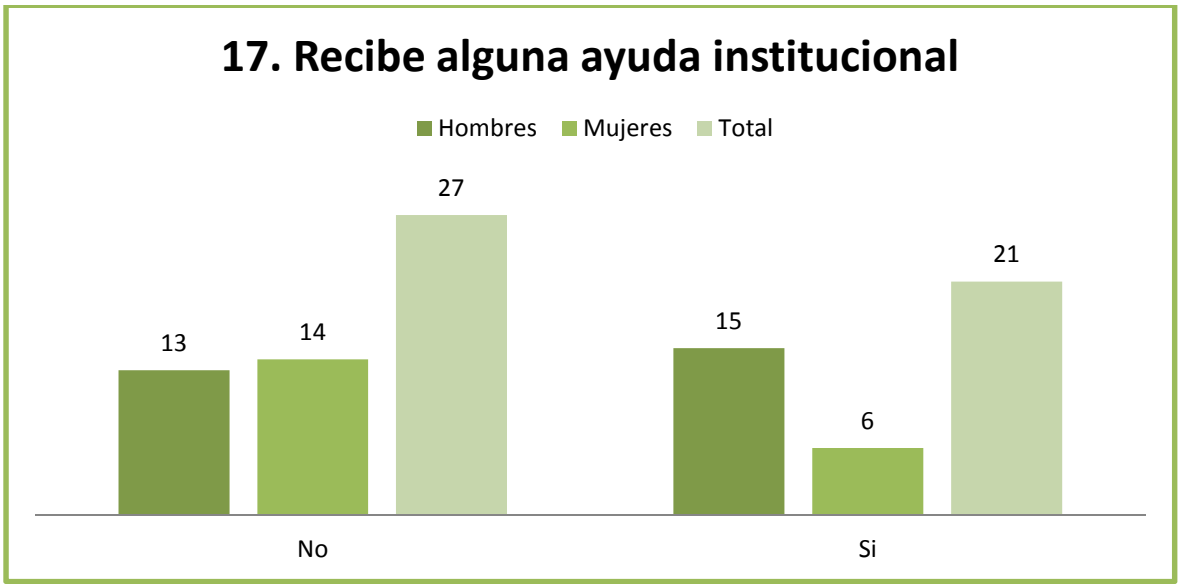

12.2 Cantidad de pérdidas
Hombres
Mujeres
Total
1
3
4
7
5
12
9
3
12
11
5
16
Un cuarto
La mitad
Tres cuartos
Todo

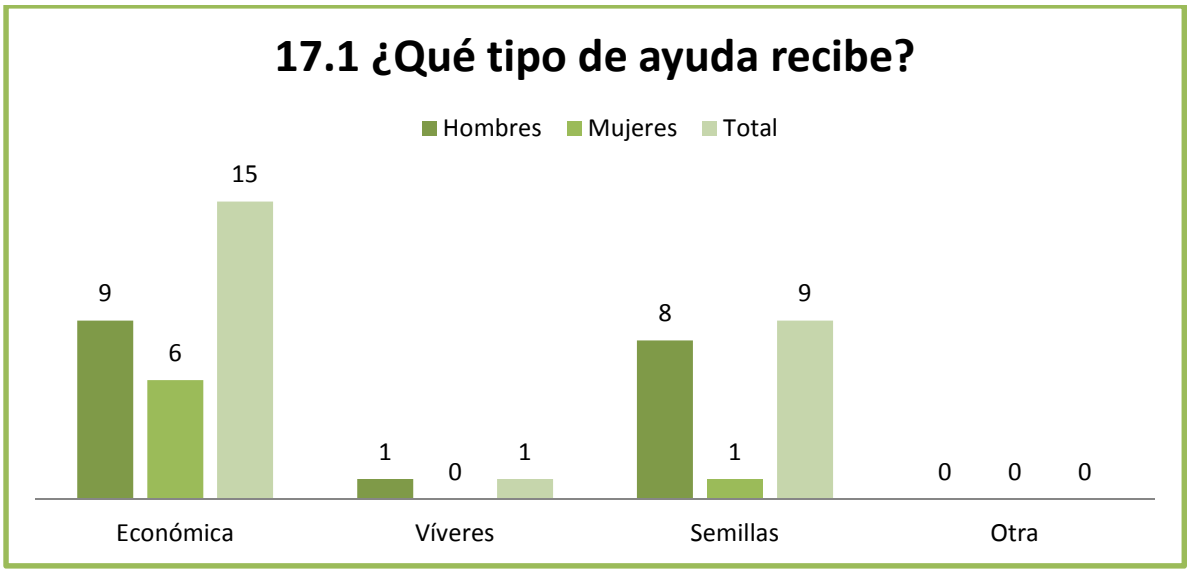

13. Modificación del sistema de producción a causa de la sequia
Hombres
Mujeres
Total
24
16
40
4
4
8
No
Si

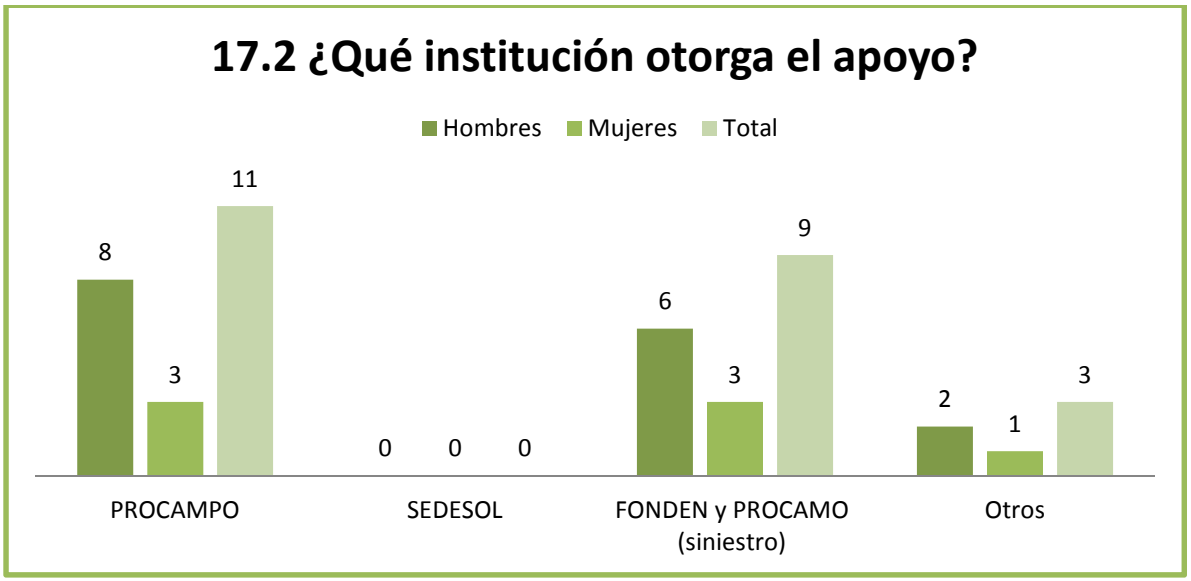

14. Riesgo por sequía
Hombres
Mujeres
Total
27
20
47
1
0
1
Si
No


15. Realiza una actividad economica alterna
Hombres
Mujeres
Total
14
12
26
14
8
22
No
Si

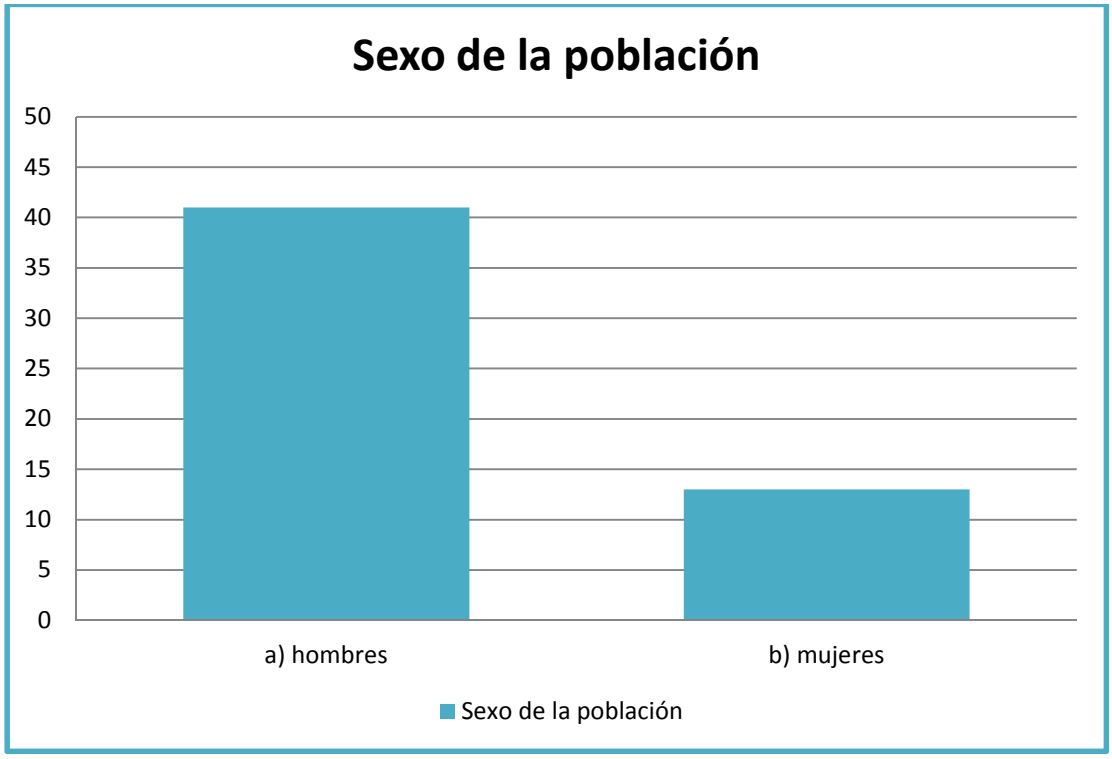

16. Migración
Hombres
Mujeres
Total
24
18
42
4
2
6
No
Si

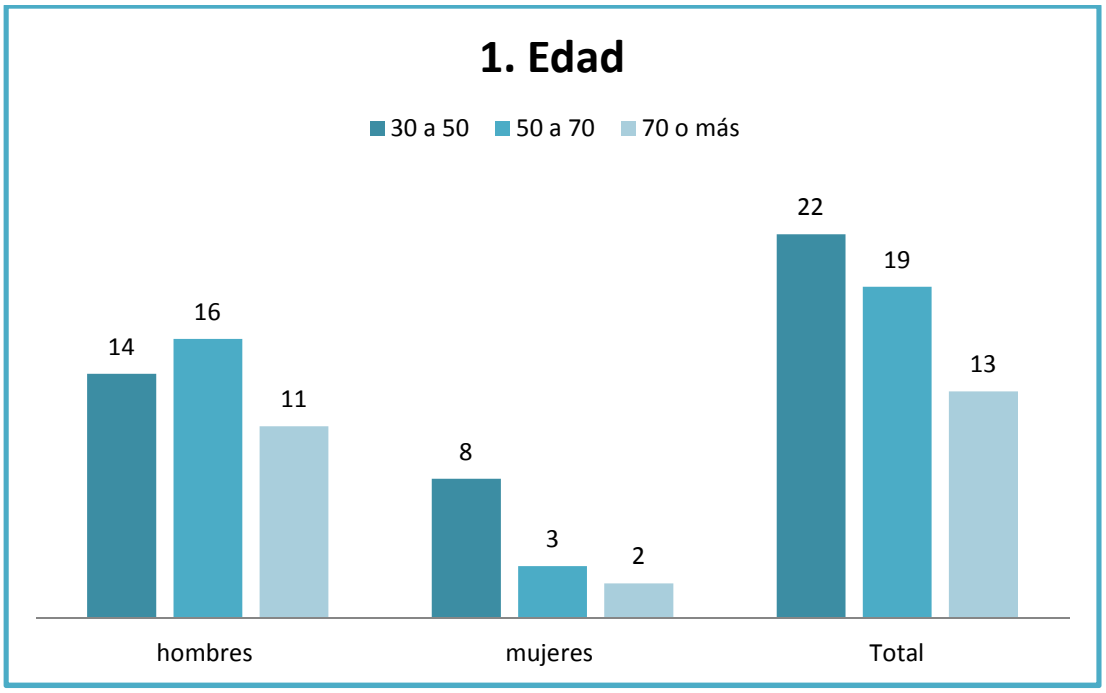

17. Recibe alguna ayuda institucional
Hombres
Mujeres
Total
13
14
27
15
6
21
No
Si

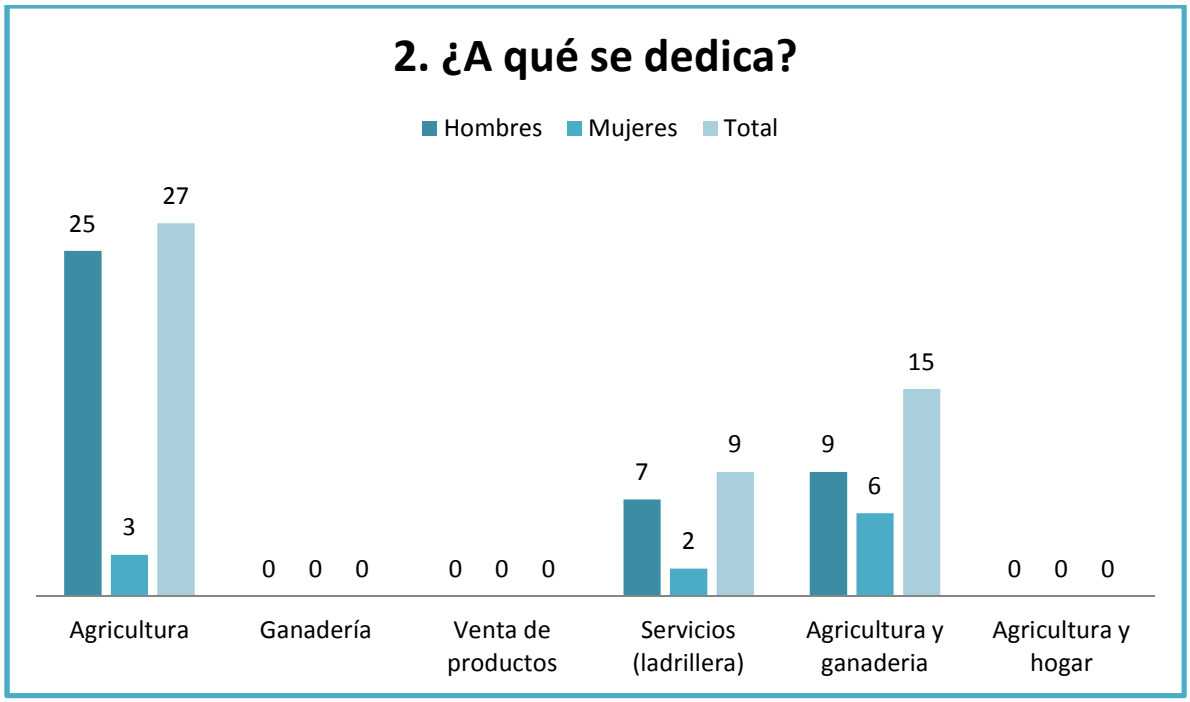

17.1 ¿Qué tipo de ayuda recibe?
Hombres
Mujeres
Total
9
6
15
1
0
1
8
1
9
0
0
0
Económica
Víveres
Semillas
Otra

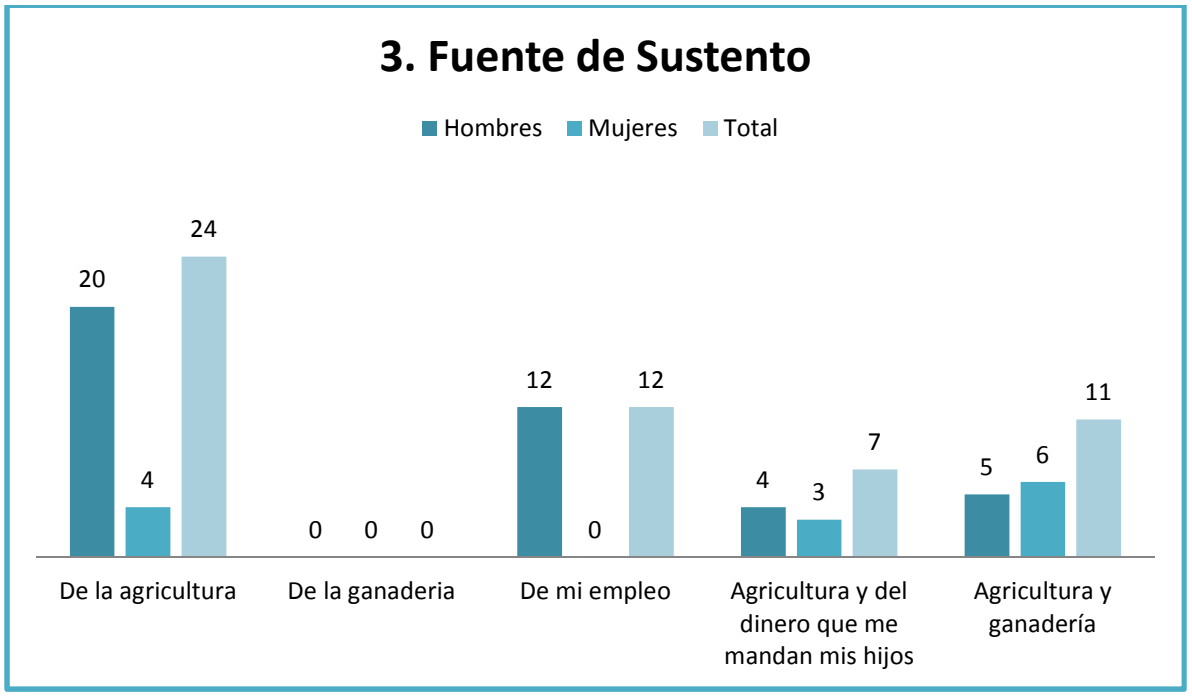


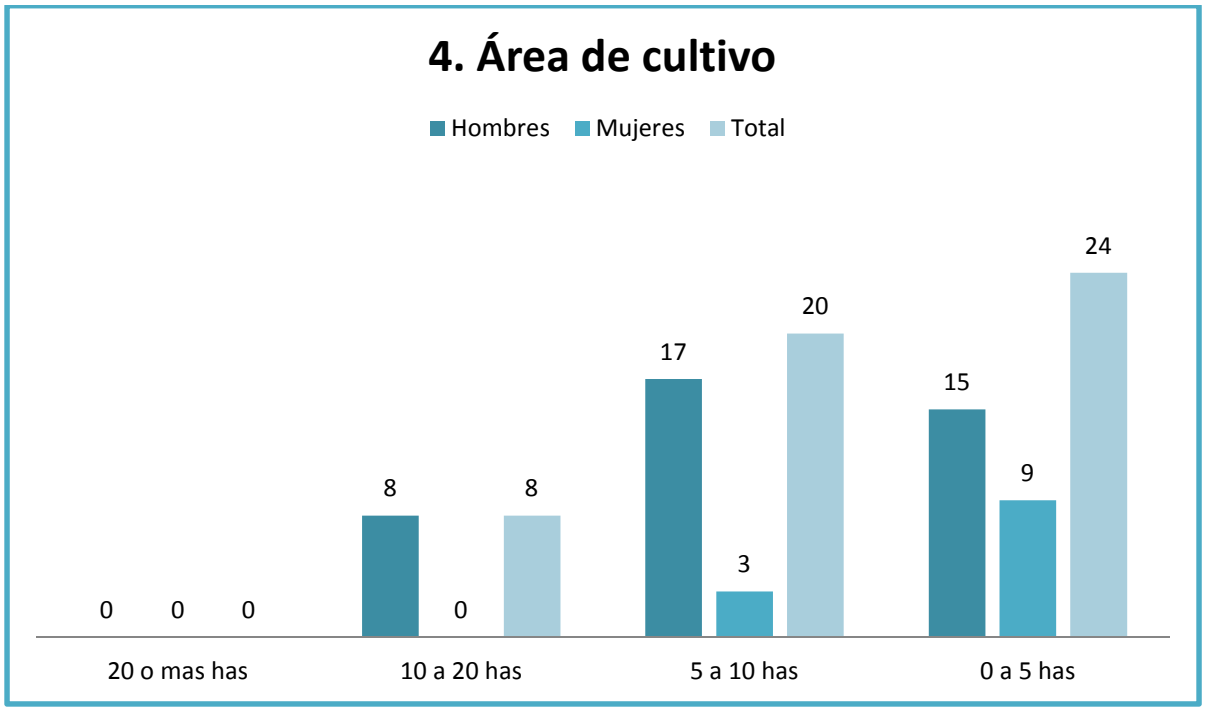
8.3.2 San Francisco

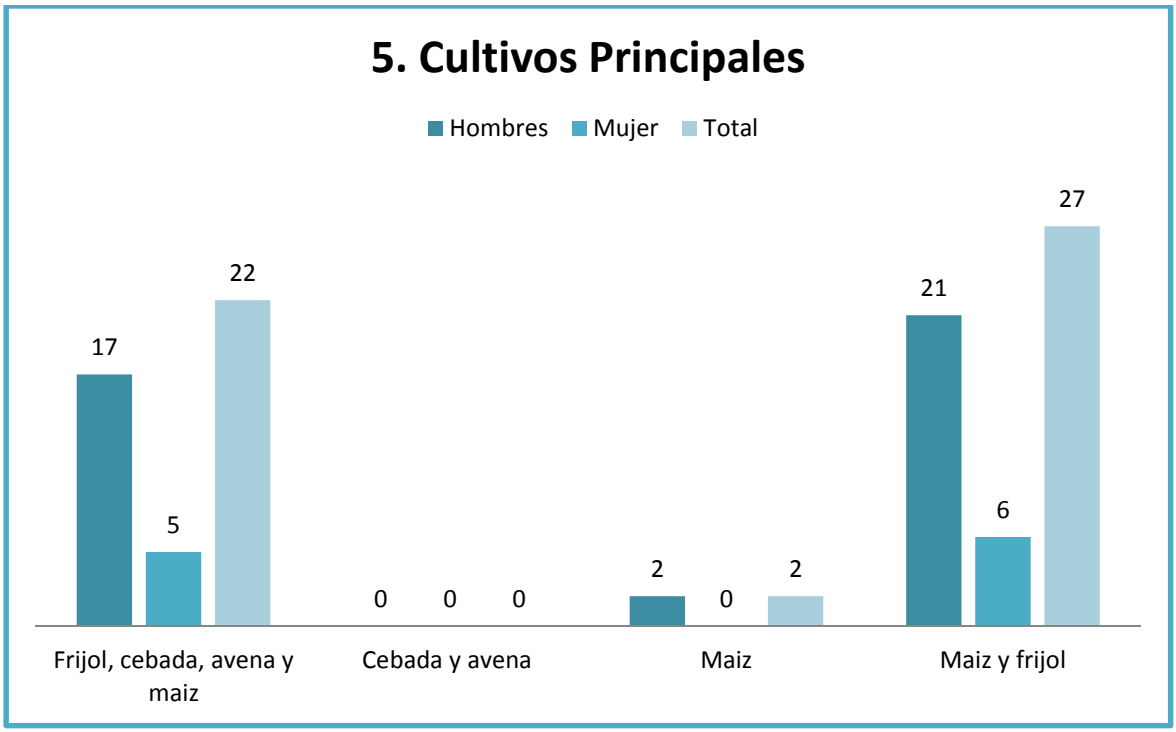


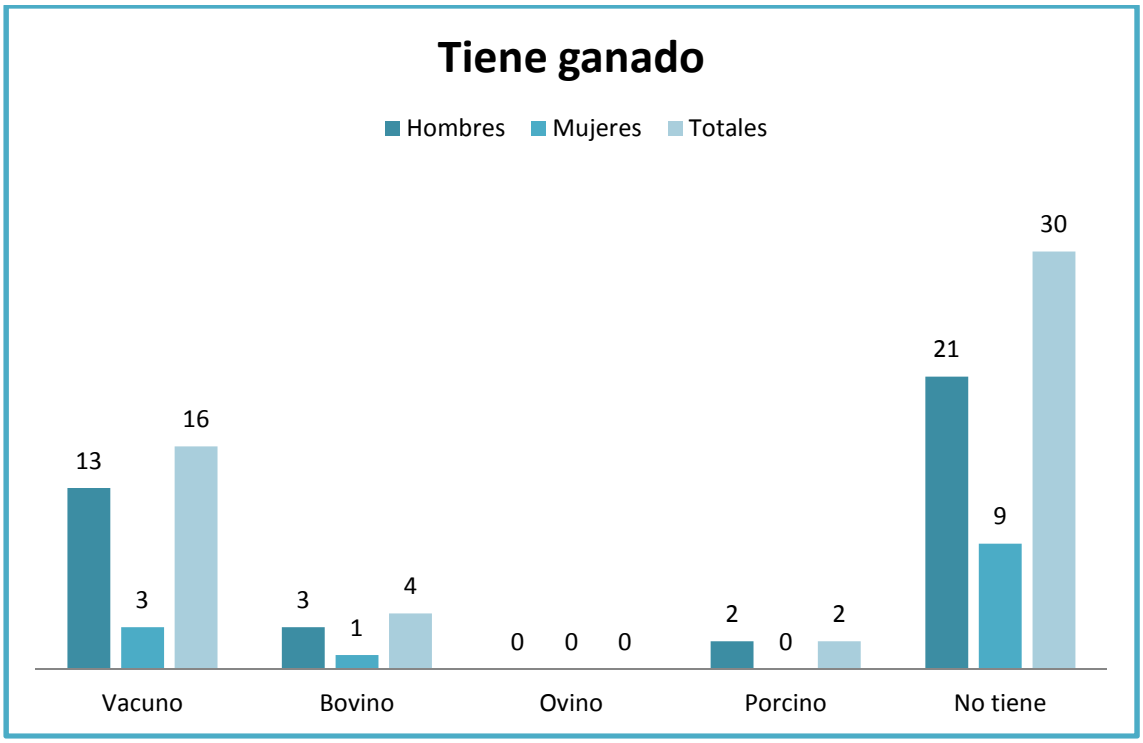

1. Edad
30 a 50
50 a 70
70 o más
14
16
11
8
3
2
22
19
13
hombres
mujeres
Total

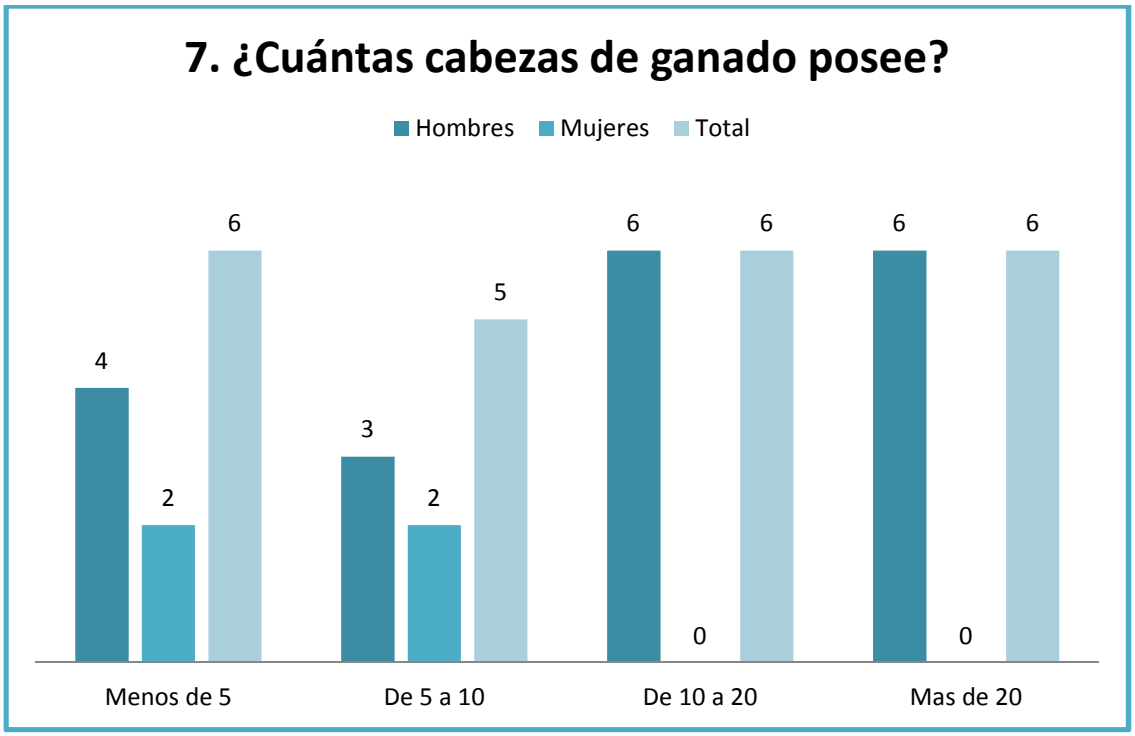

2. ¿A qué se dedica?
Hombres
Mujeres
Total
25
3
27
0 0 0
0 0 0
7
2
9
9
6
15
0 0 0
Agricultura
Ganadería
Venta de productos
Servicios (ladrillera)
Agricultura y ganaderia
Agricultura y hogar

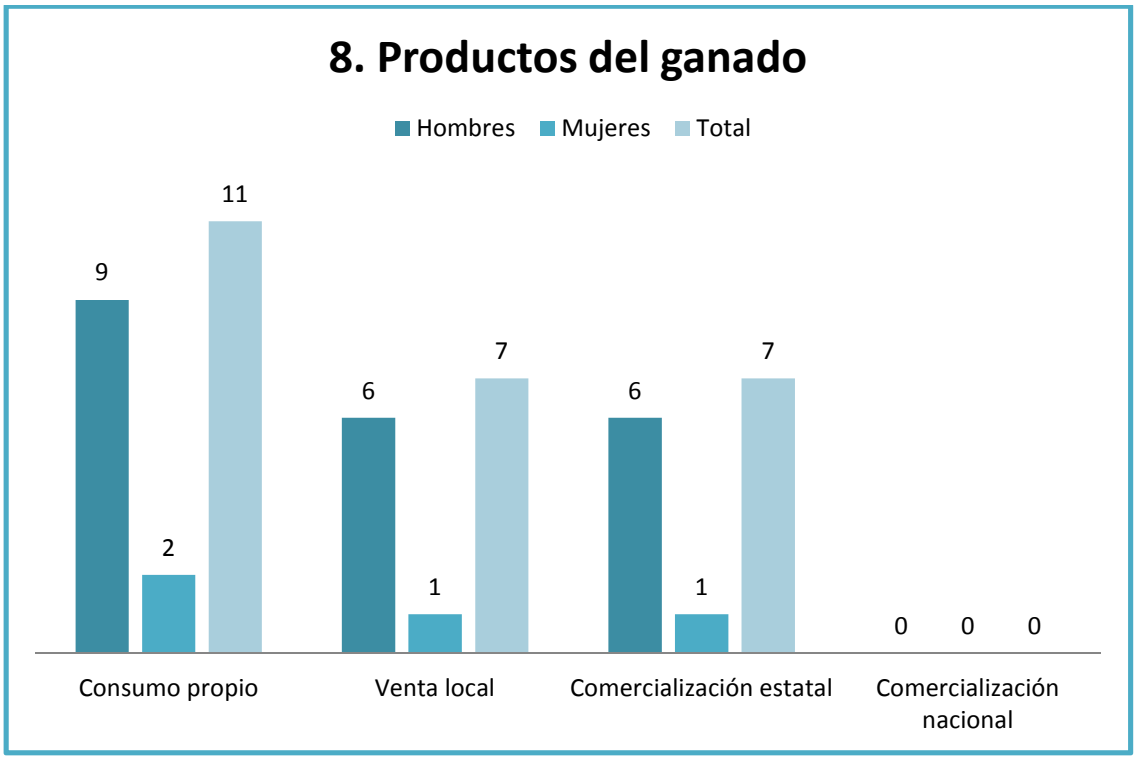

3. Fuente de Sustento
Hombres
Mujeres
Total
20
4
24
0
0
0
12
0
12
4
3
7
5
6
11
De la agricultura
De la ganaderia
De mi empleo
Agricultura y del dinero que me mandan mis hijos
Agricultura y ganadería

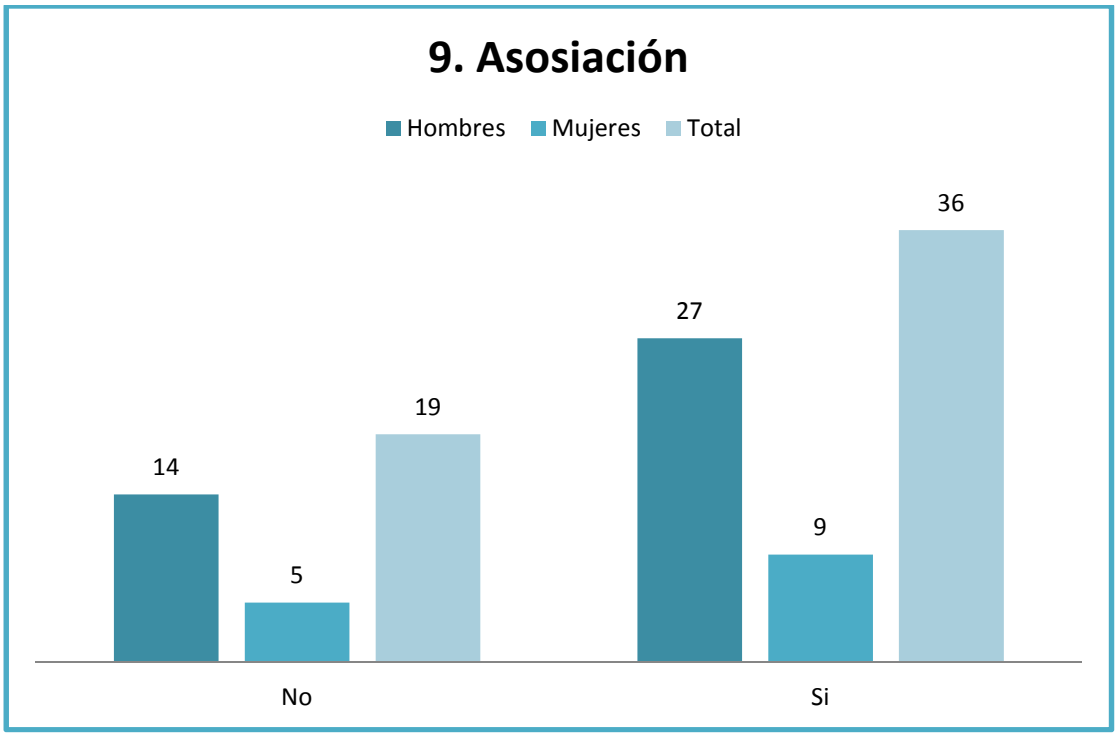

4. Área de cultivo
Hombres
Mujeres
Total
0
0
0
8
0
8
17
3
20
15
9
24
20 o mas has
10 a 20 has
5 a 10 has
0 a 5 has

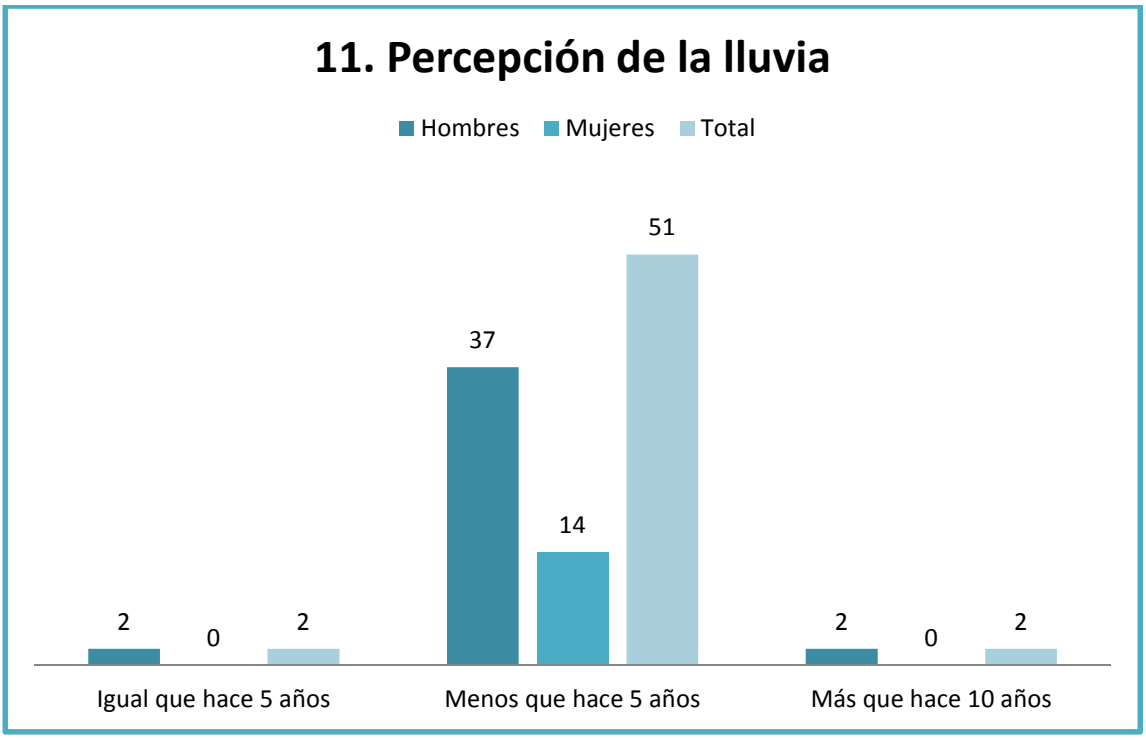

5. Cultivos Principales
Hombres
Mujer
Total
17
5
22
0
0
0
2
0
2
21
6
27
Frijol, cebada, avena y maiz
Cebada y avena
Maiz
Maiz y frijol

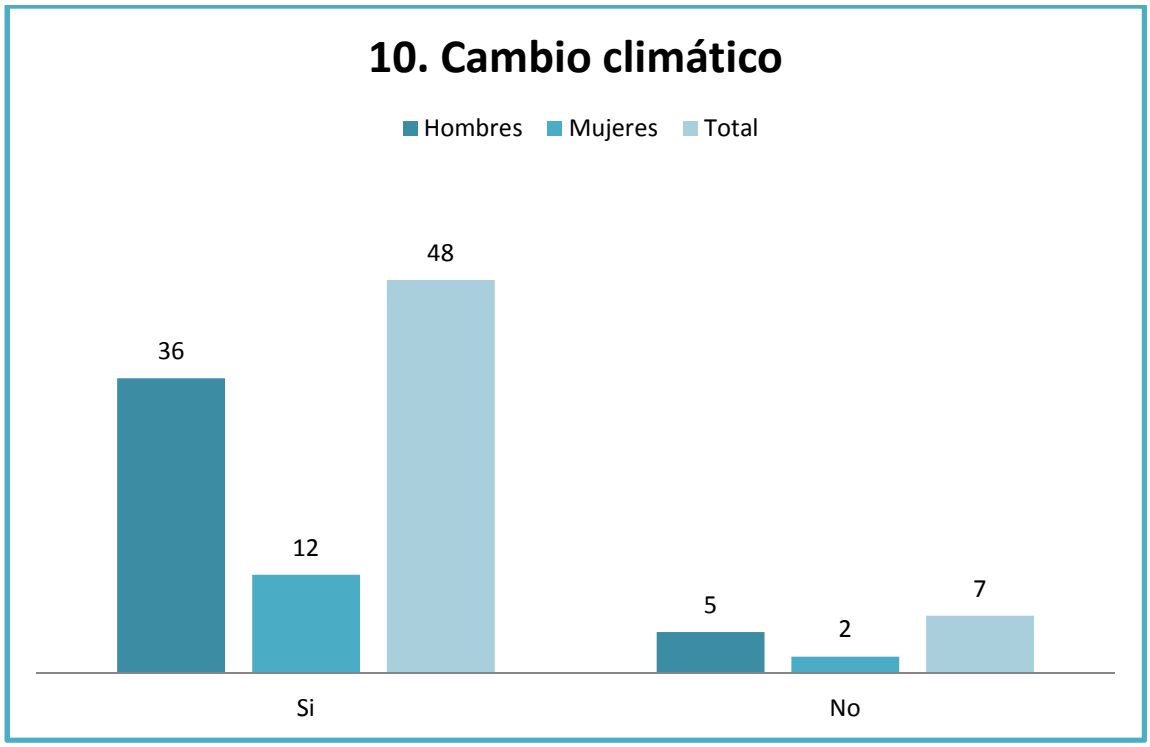

Tiene ganado
Hombres
Mujeres
Totales
13
3
16
3
1
4
0
0
0
2
0
2
21
9
30
Vacuno
Bovino
Ovino
Porcino
No tiene

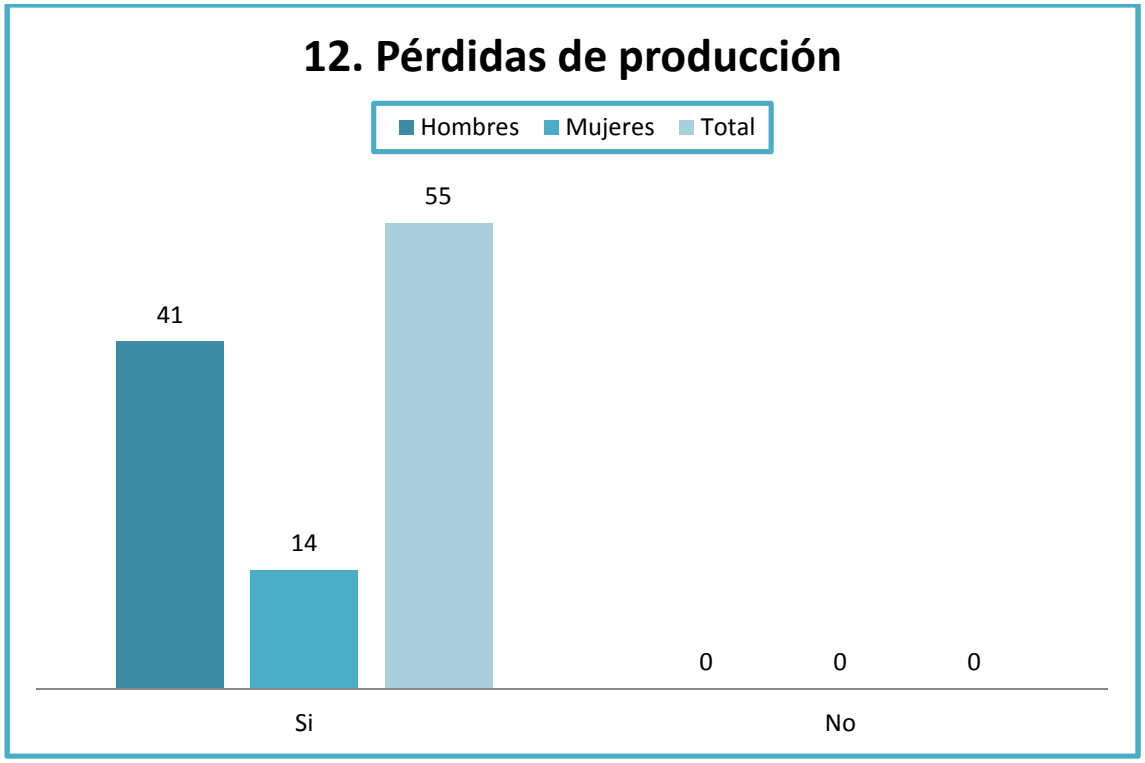

7. ¿Cuántas cabezas de ganado posee?
Hombres
Mujeres
Total
4
2
6
3
2
5
6
0
6
6
0
6
Menos de 5
De 5 a 10
De 10 a 20
Mas de 20

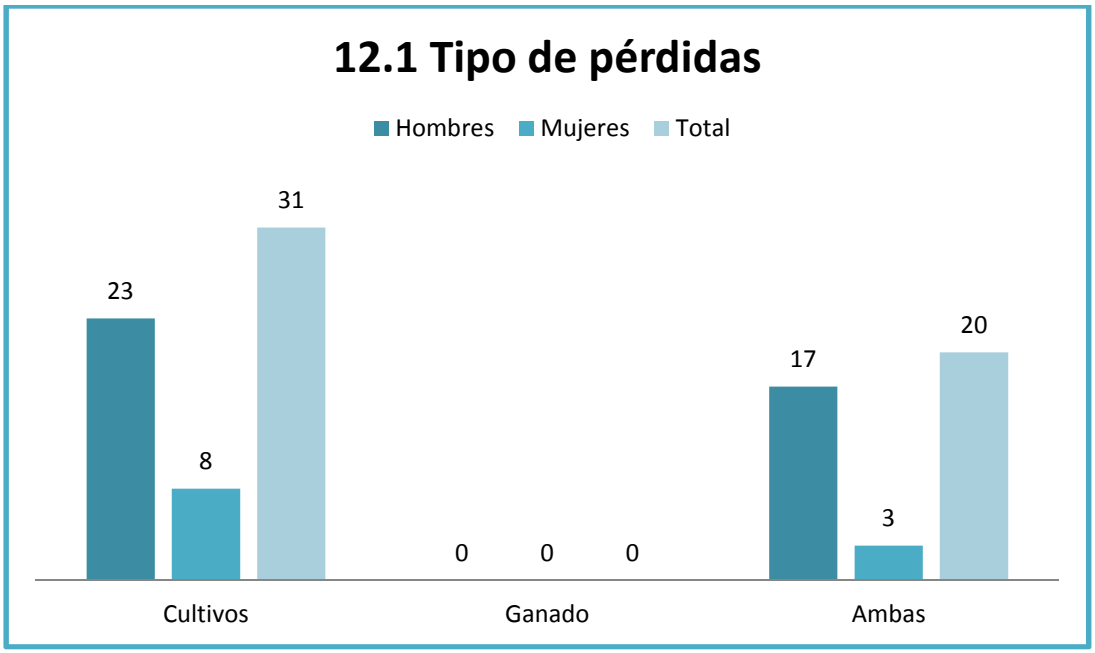

8. Productos del ganado
Hombres
Mujeres
Total
9
2
11
6
1
7
6
1
7
0
0
0
Consumo propio
Venta local
Comercialización estatal
Comercialización nacional

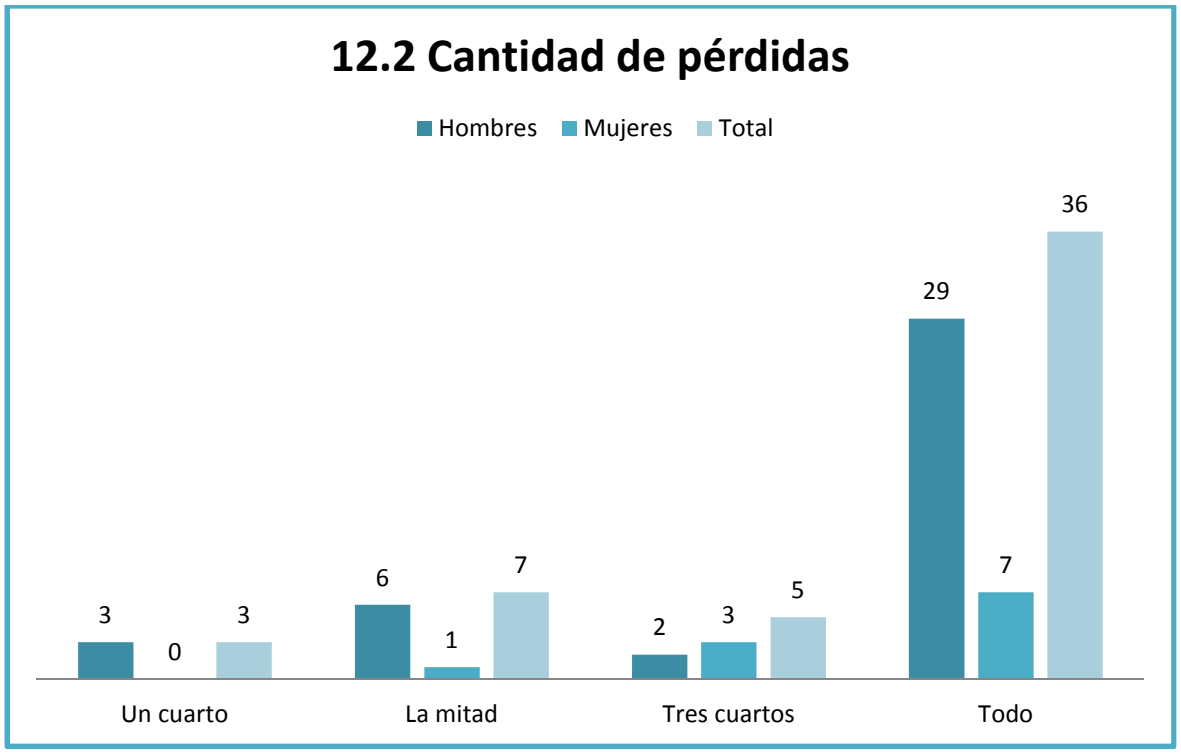

9. Asosiación
Hombres
Mujeres
Total
14
5
19
27
9
36
No
Si

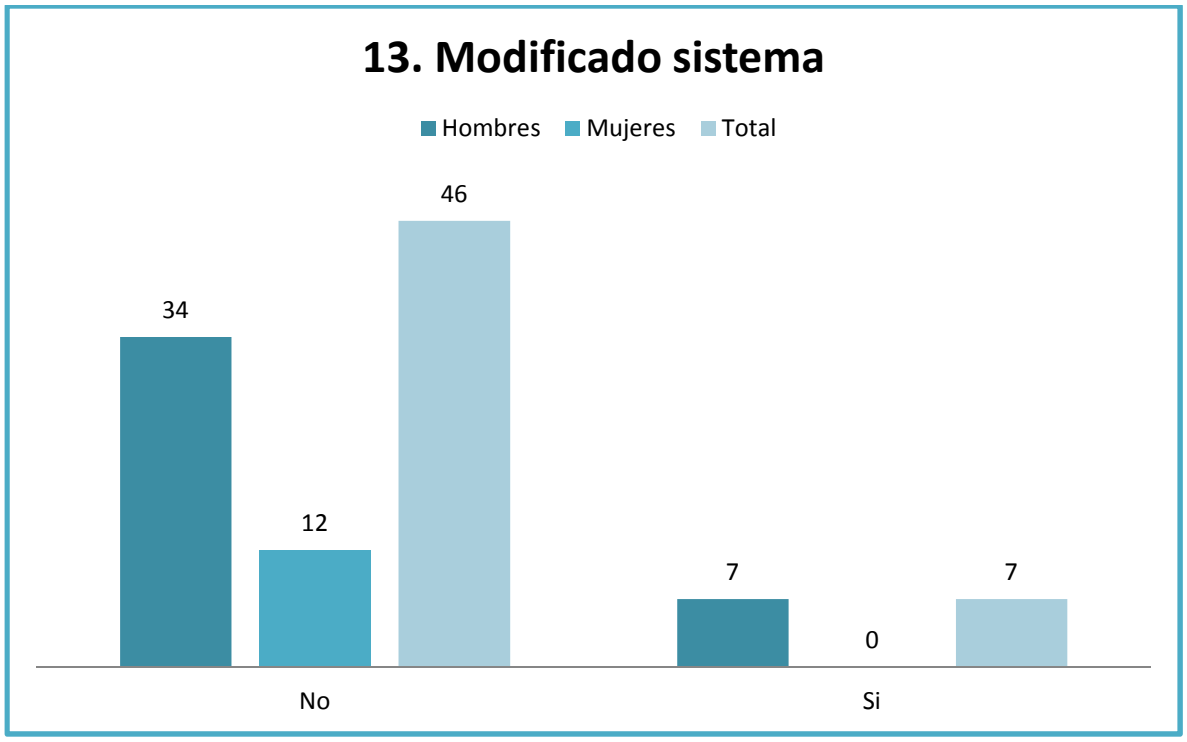

11. Percepción de la lluvia
Hombres
Mujeres
Total
2
0
2
37
14
51
2
0
2
Igual que hace 5 años
Menos que hace 5 años
Más que hace 10 años

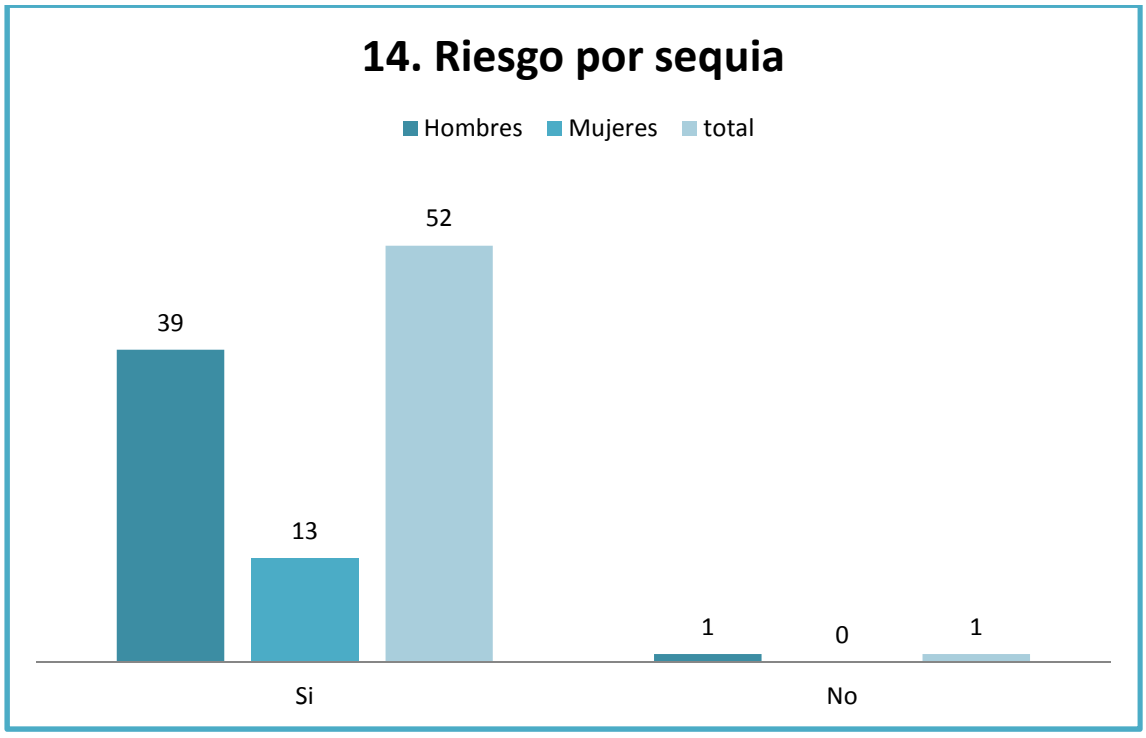

10. Cambio climático
Hombres
Mujeres
Total
36
12
48
5
2
7
Si
No

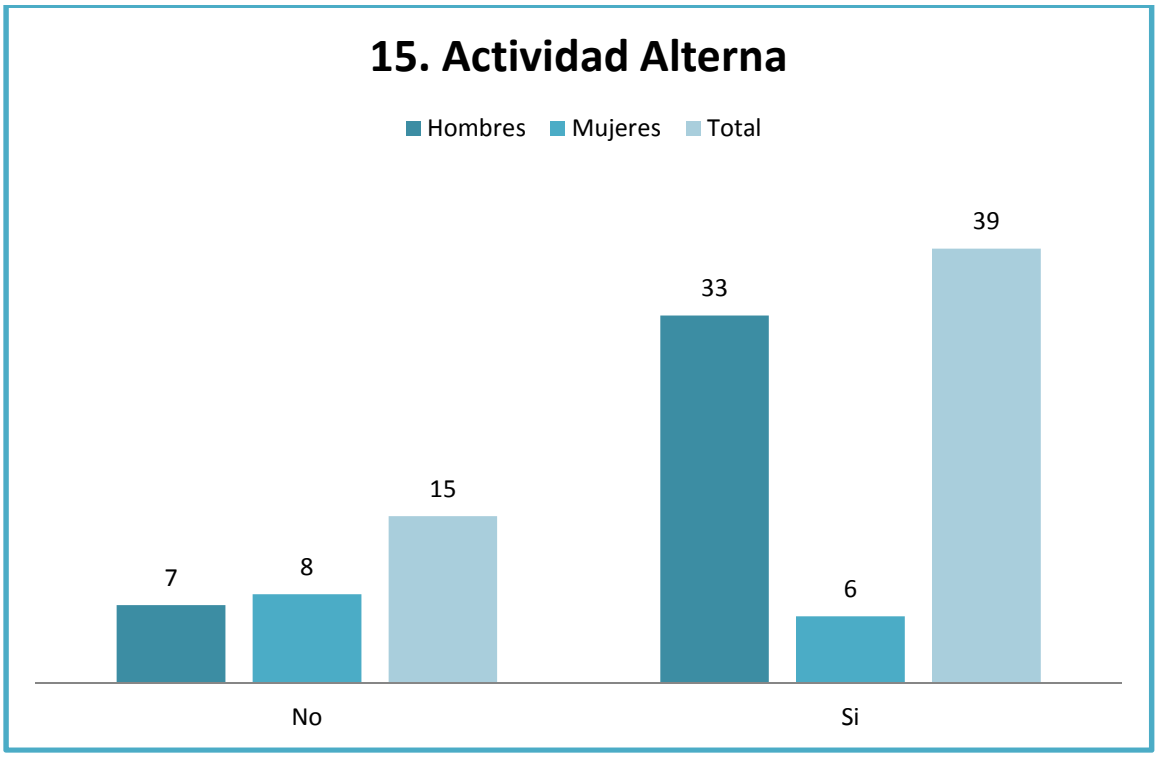

12. Pérdidas de producción
Hombres
Mujeres
Total
41
14
55
0
0
0
Si
No

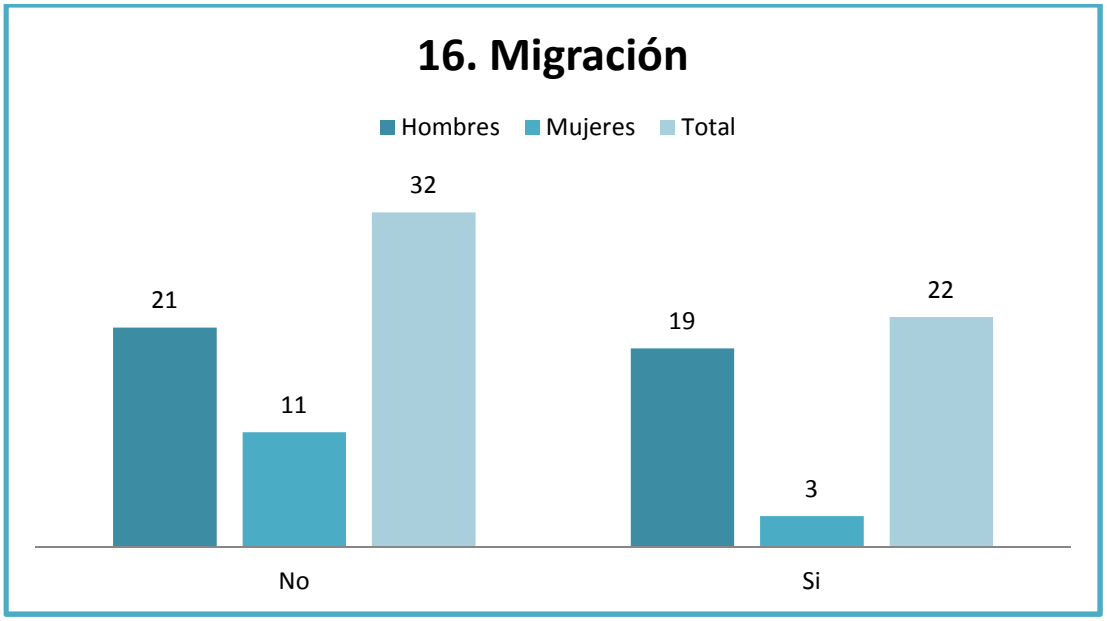

12.1 Tipo de pérdidas
Hombres
Mujeres
Total
23
8
31
0
0
0
17
3
20
Cultivos
Ganado
Ambas

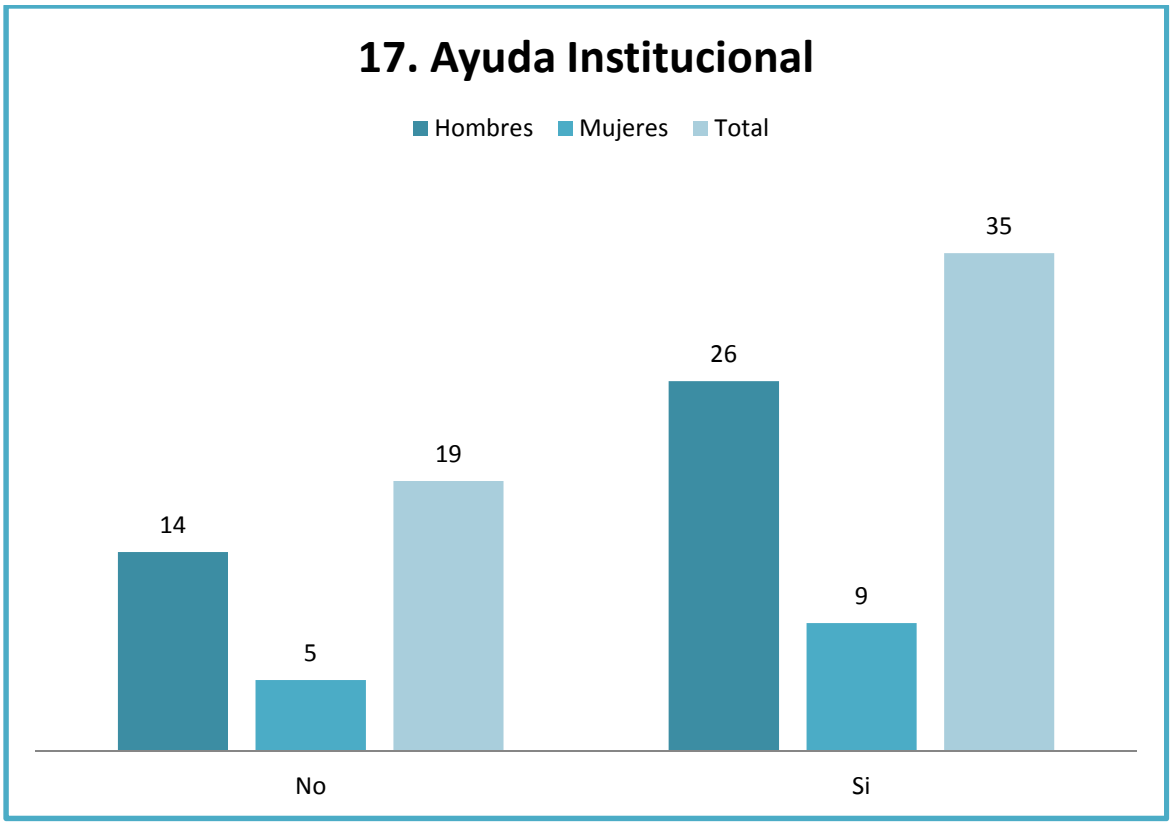

12.2 Cantidad de pérdidas
Hombres
Mujeres
Total
3
0
3
6
1
7
2
3
5
29
7
36
Un cuarto
La mitad
Tres cuartos
Todo

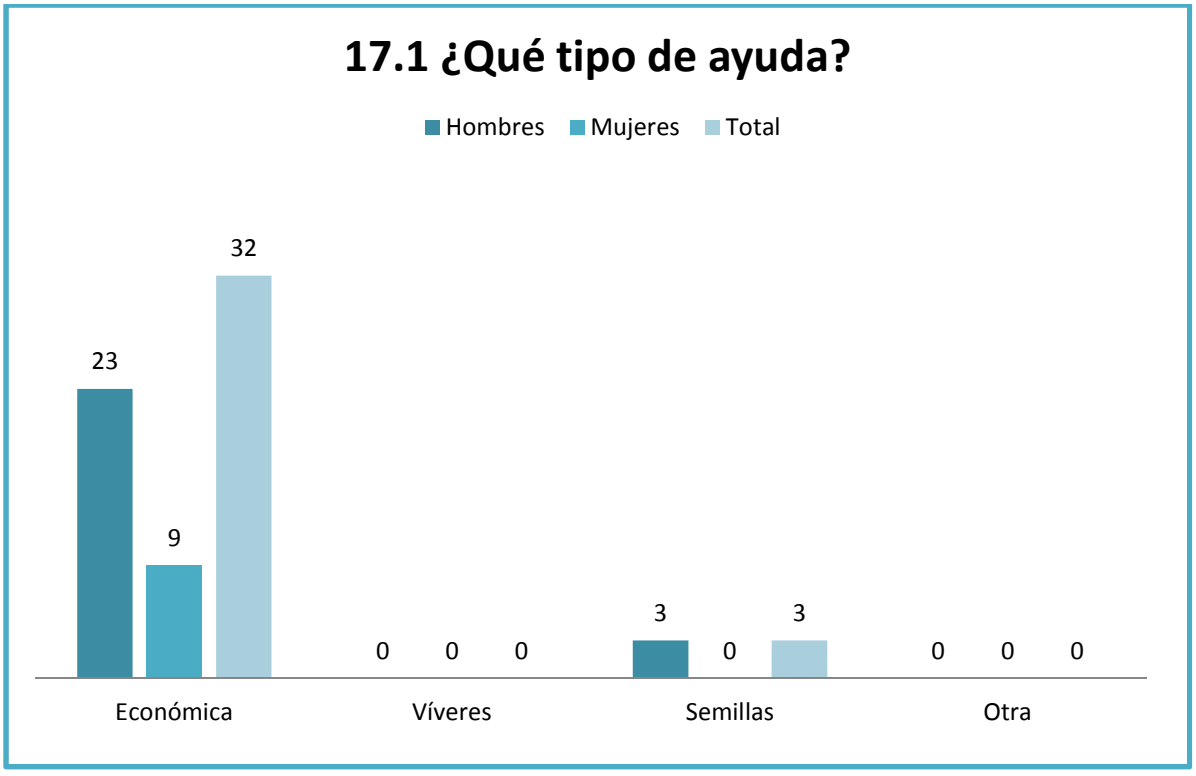

13. Modificado sistema
Hombres
Mujeres
Total
34
12
46
7
0
7
No
Si

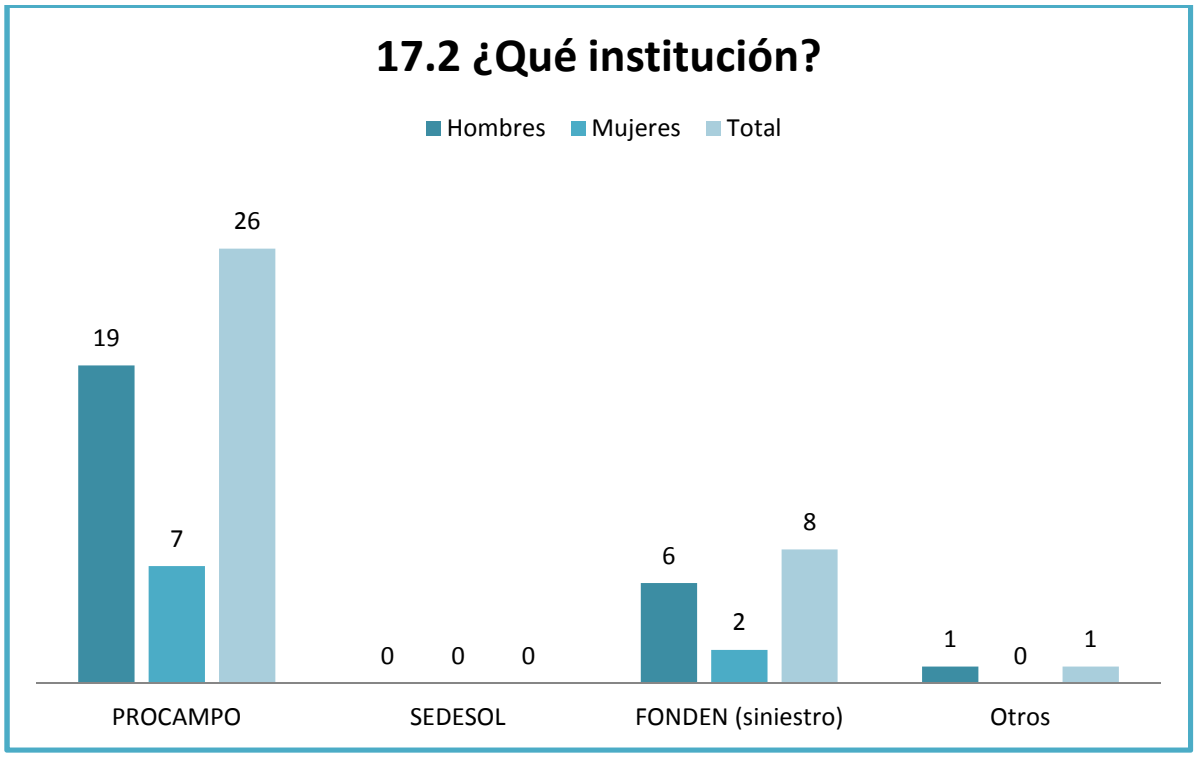

14. Riesgo por sequia
Hombres
Mujeres
total
39
13
52
1
0
1
Si
No


15. Actividad Alterna
Hombres
Mujeres
Total
7
8
15
33
6
39
No
Si

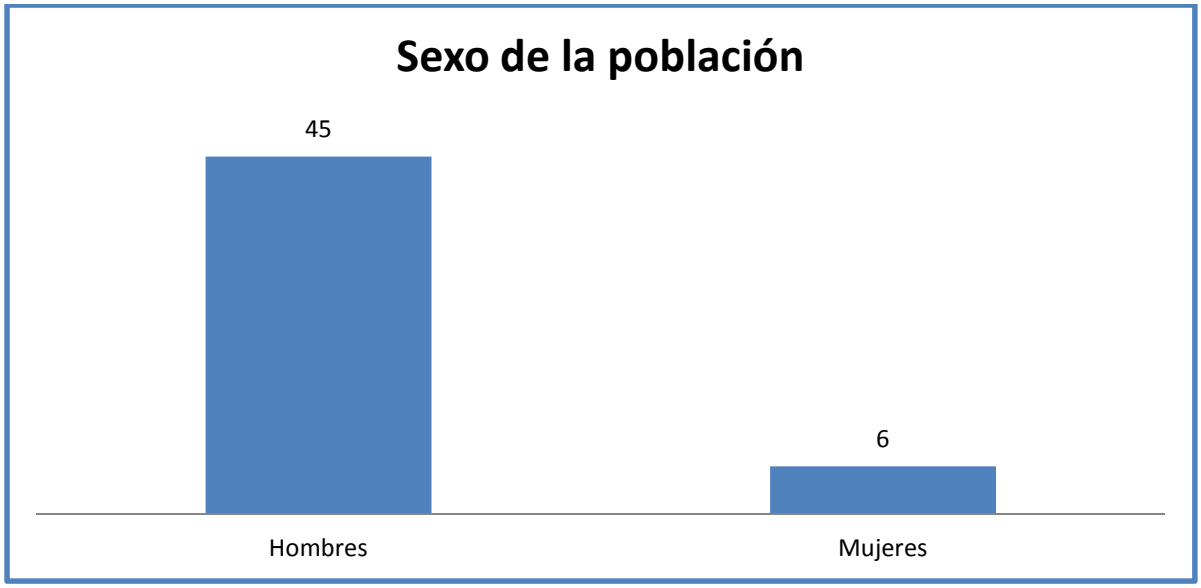

16. Migración
Hombres
Mujeres
Total
21
11
32
19
3
22
No
Si

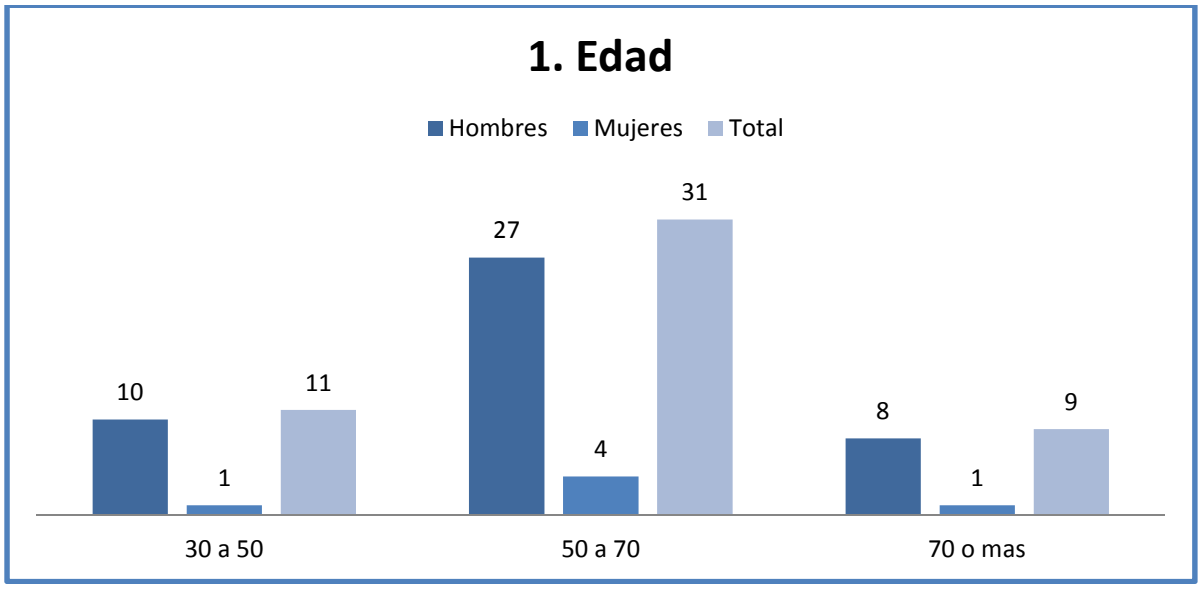

17. Ayuda Institucional
Hombres
Mujeres
Total
14
5
19
26
9
35
No
Si

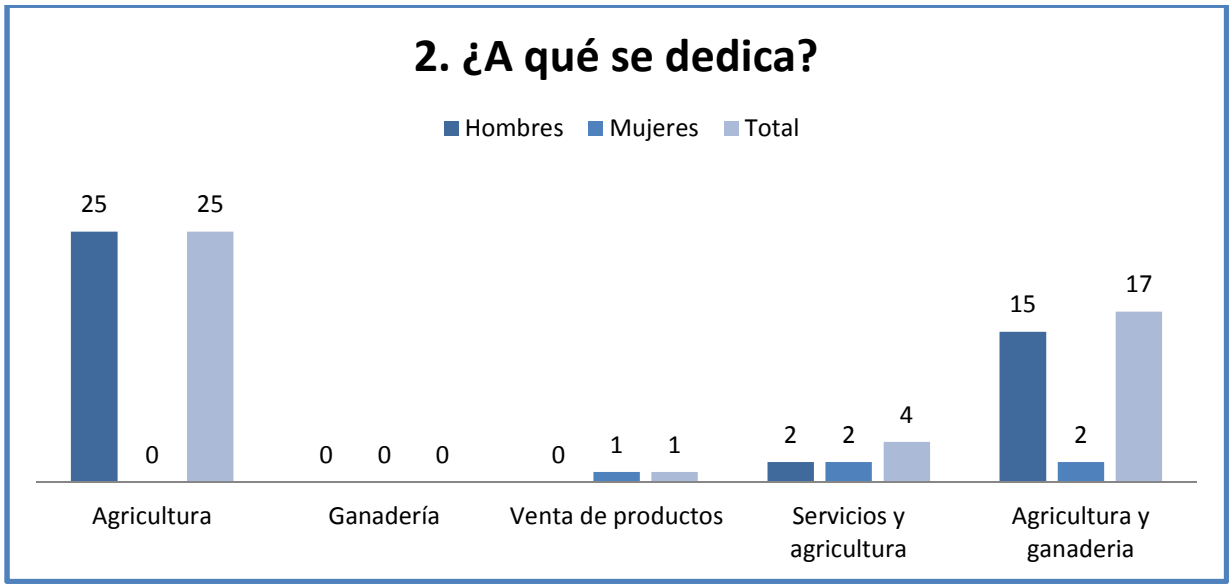

17.1 ¿Qué tipo de ayuda?
Hombres
Mujeres
Total
23
9
32
0
0
0
3
0
3
0
0
0
Económica
Víveres
Semillas
Otra

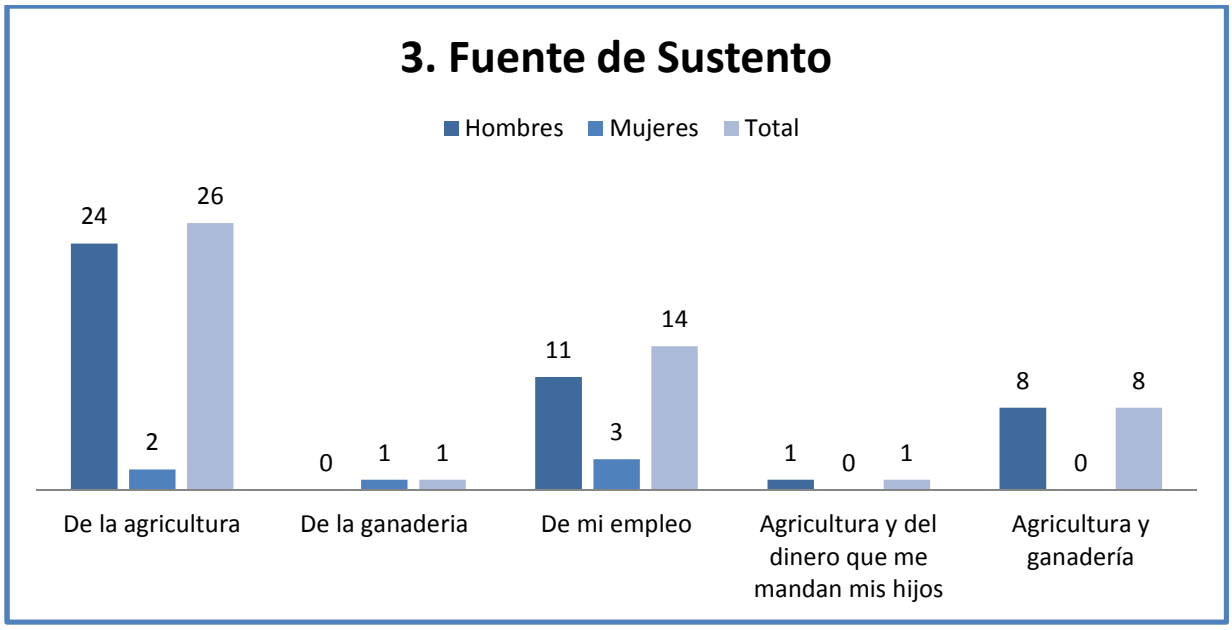


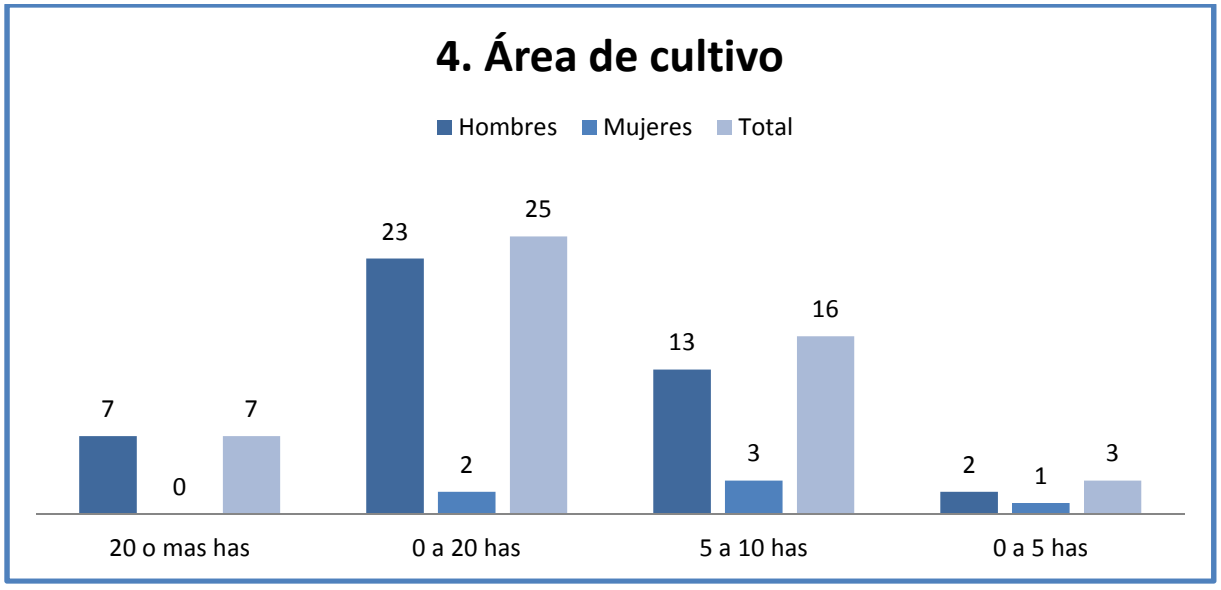
8.3.3 El Tepetate

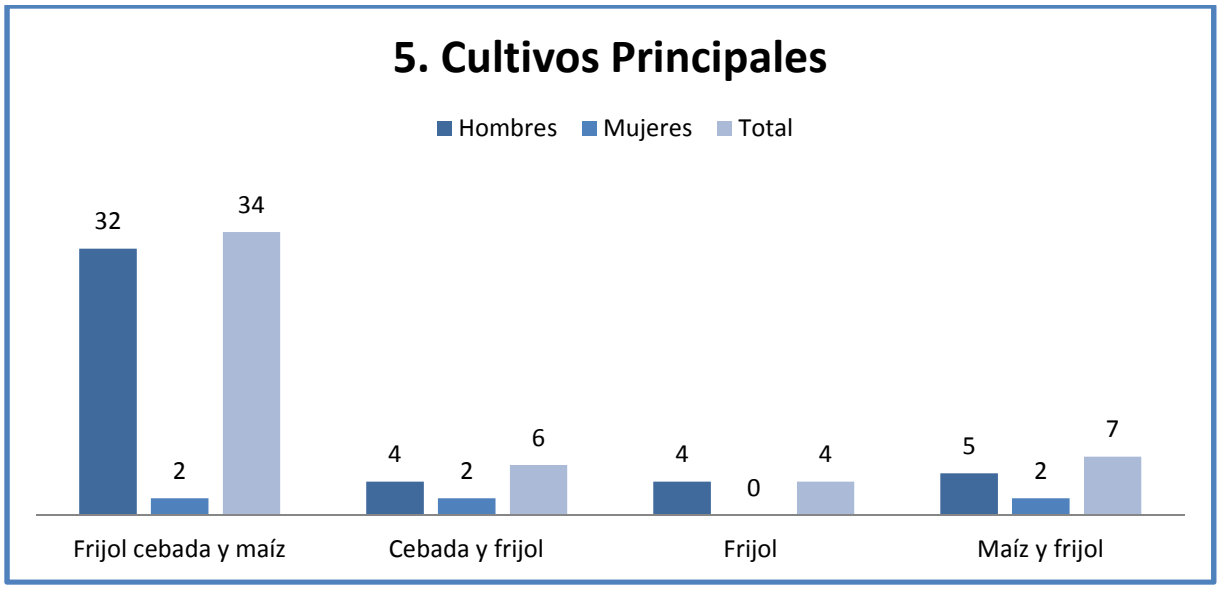


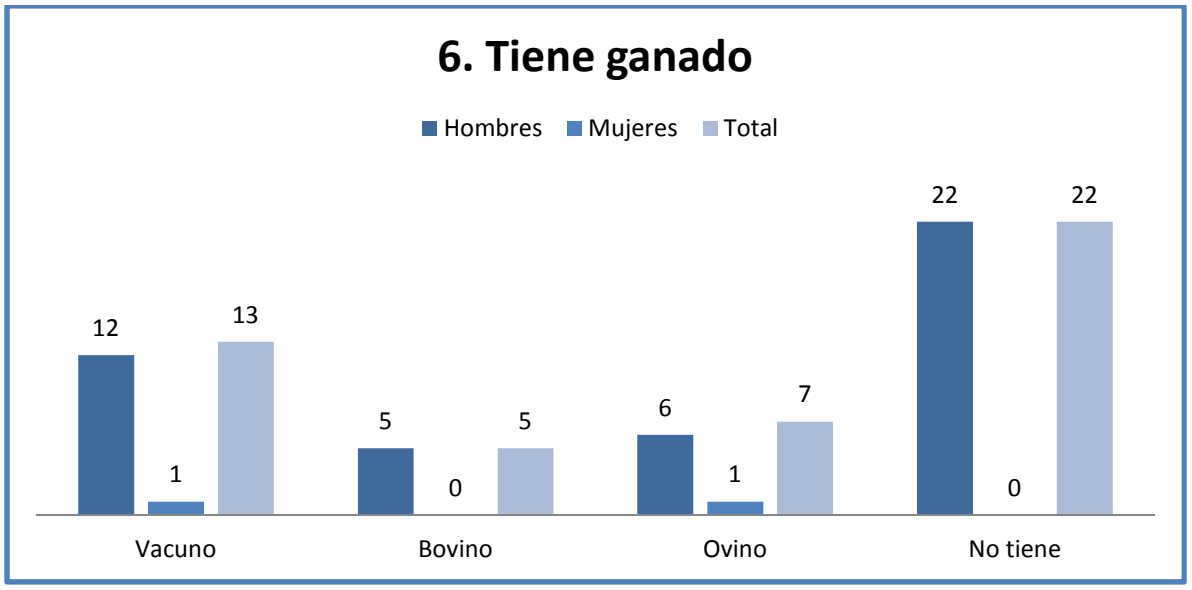

1. Edad
Hombres
Mujeres
Total
10
1
11
27
4
31
8
1
9
30 a 50
50 a 70
70 o mas

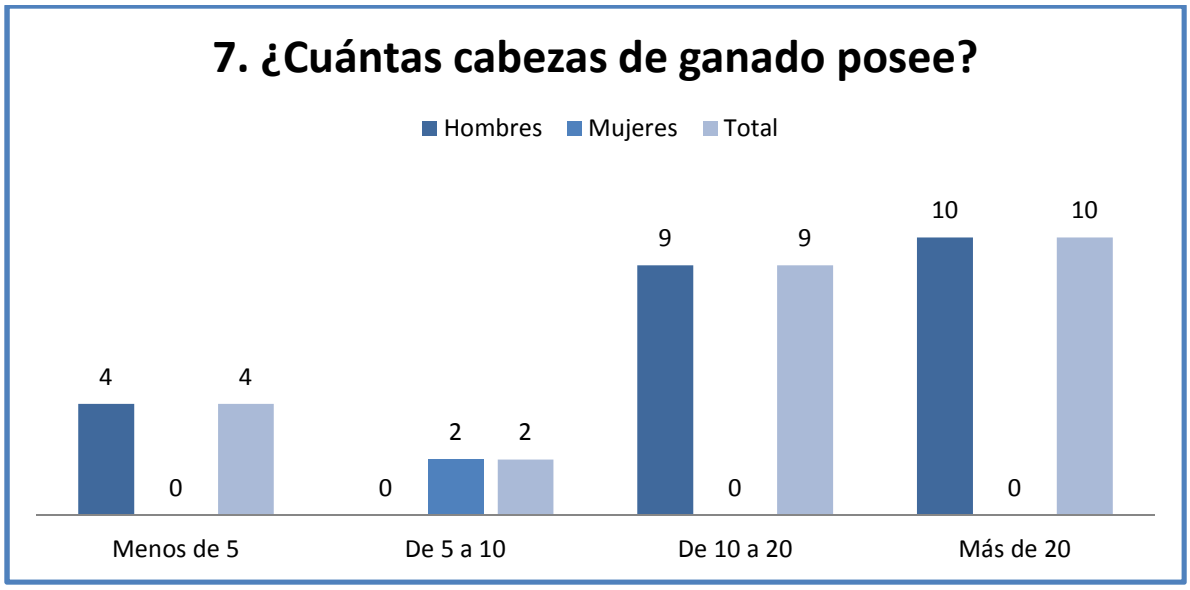

2. ¿A qué se dedica?
Hombres
Mujeres
Total
25
0
25
0
0
0
0
1
1
2
2
4
15
2
17
Agricultura
Ganadería
Venta de productos
Servicios y agricultura
Agricultura y ganaderia

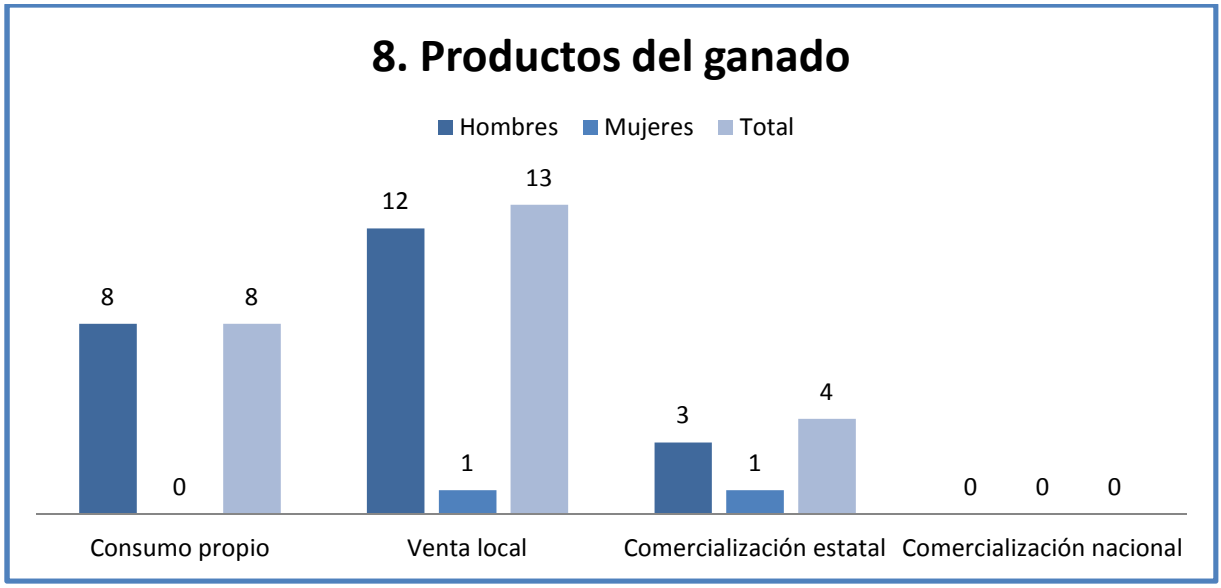

3. Fuente de Sustento
Hombres
Mujeres
Total
24
2
26
0
1
1
11
3
14
1
0
1
8
0
8
De la agricultura
De la ganaderia
De mi empleo
Agricultura y del dinero que me mandan mis hijos
Agricultura y ganadería

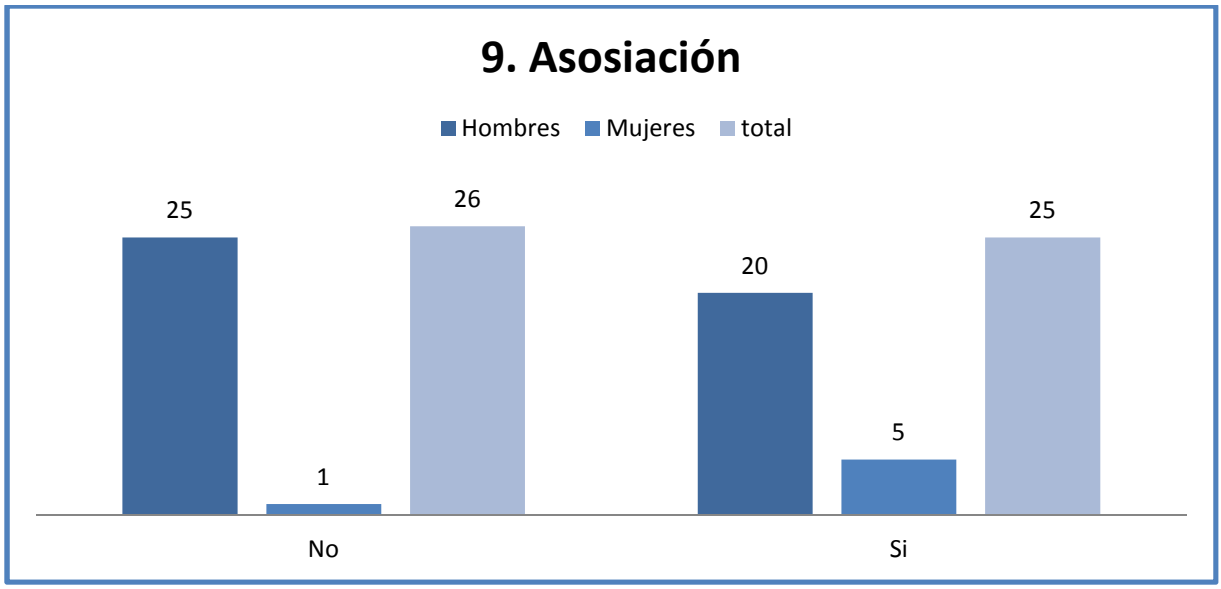

4. Área de cultivo
Hombres
Mujeres
Total
7
0
7
23
2
25
13
3
16
2
1
3
20 o mas has
0 a 20 has
5 a 10 has
0 a 5 has

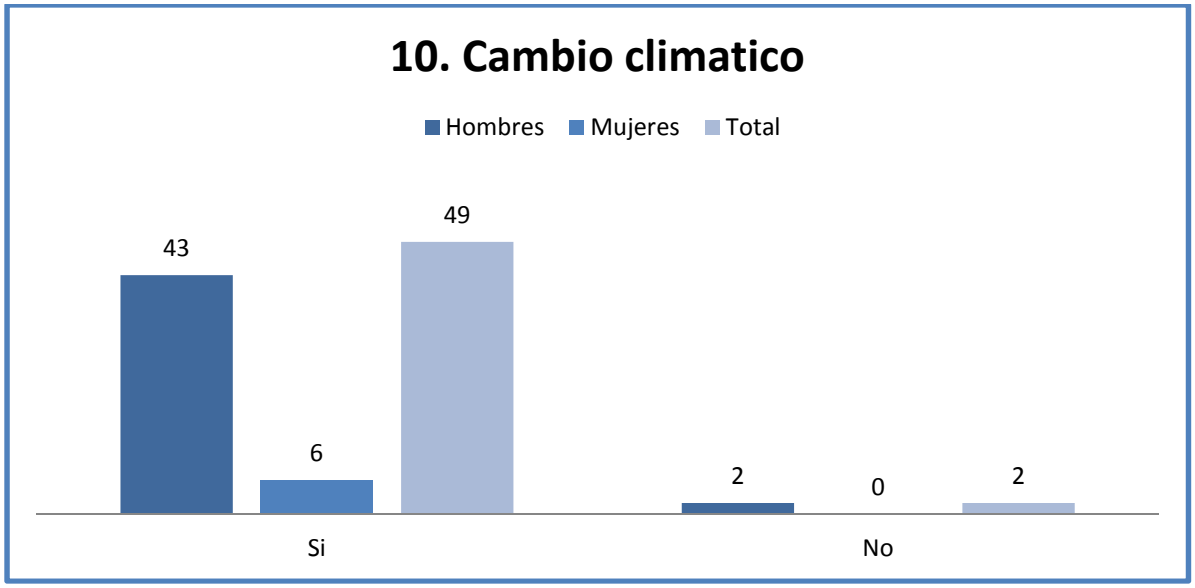

5. Cultivos Principales
Hombres
Mujeres
Total
32
2
34
4
2
6
4
0
4
5
2
7
Frijol cebada y maíz
Cebada y frijol
Frijol
Maíz y frijol

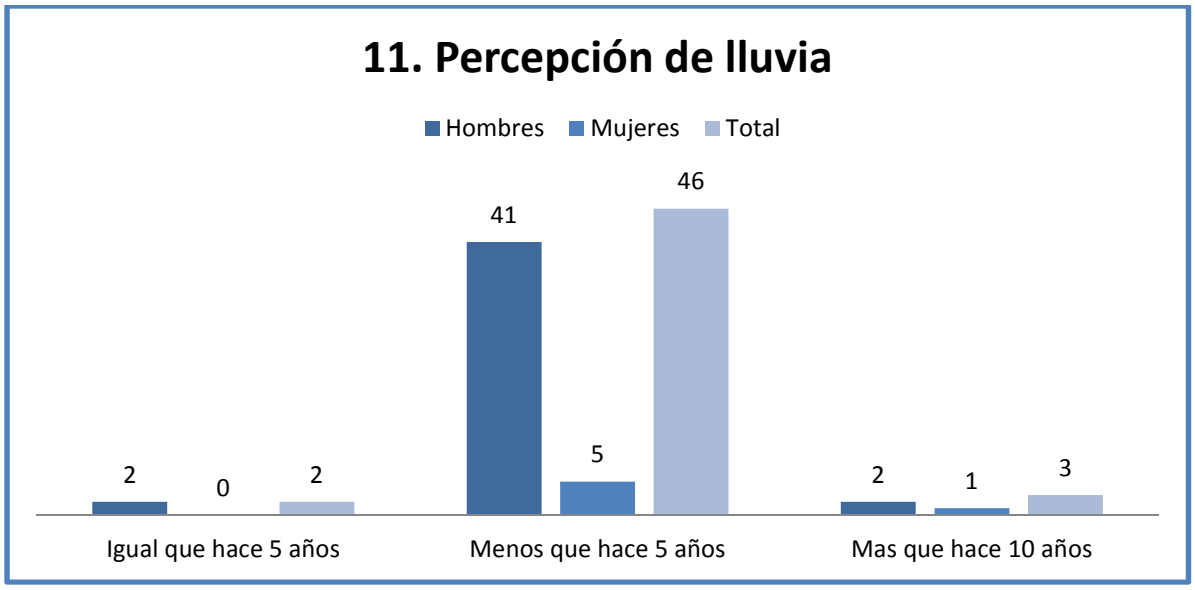

6. Tiene ganado
Hombres
Mujeres
Total
12
1
13
5
0
5
6
1
7
22
0
22
Vacuno
Bovino
Ovino
No tiene

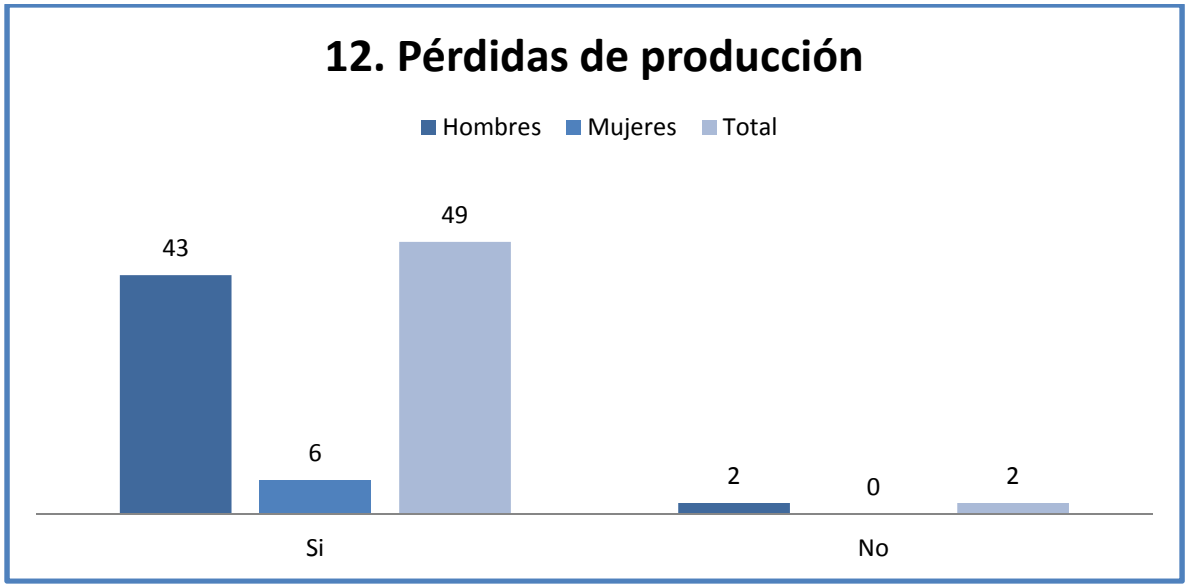

7. ¿Cuántas cabezas de ganado posee?
Hombres
Mujeres
Total
4
0
4
0
2
2
9
0
9
10
0
10
Menos de 5
De 5 a 10
De 10 a 20
Más de 20

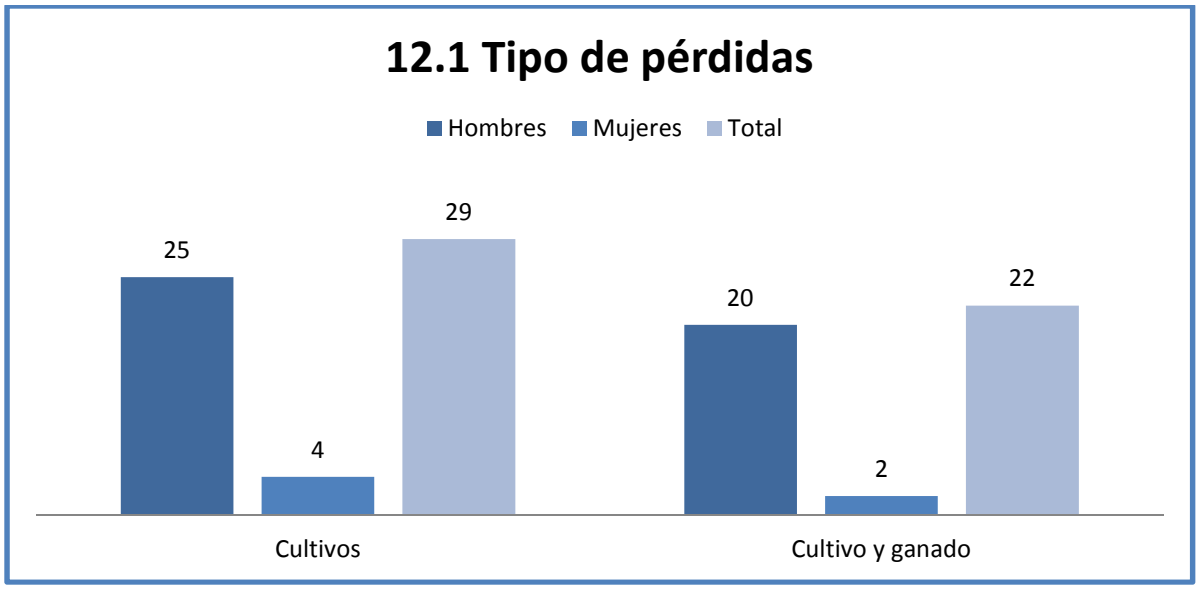

8. Productos del ganado
Hombres
Mujeres
Total
8
0
8
12
1
13
3
1
4
0
0
0
Consumo propio
Venta local
Comercialización estatal
Comercialización nacional

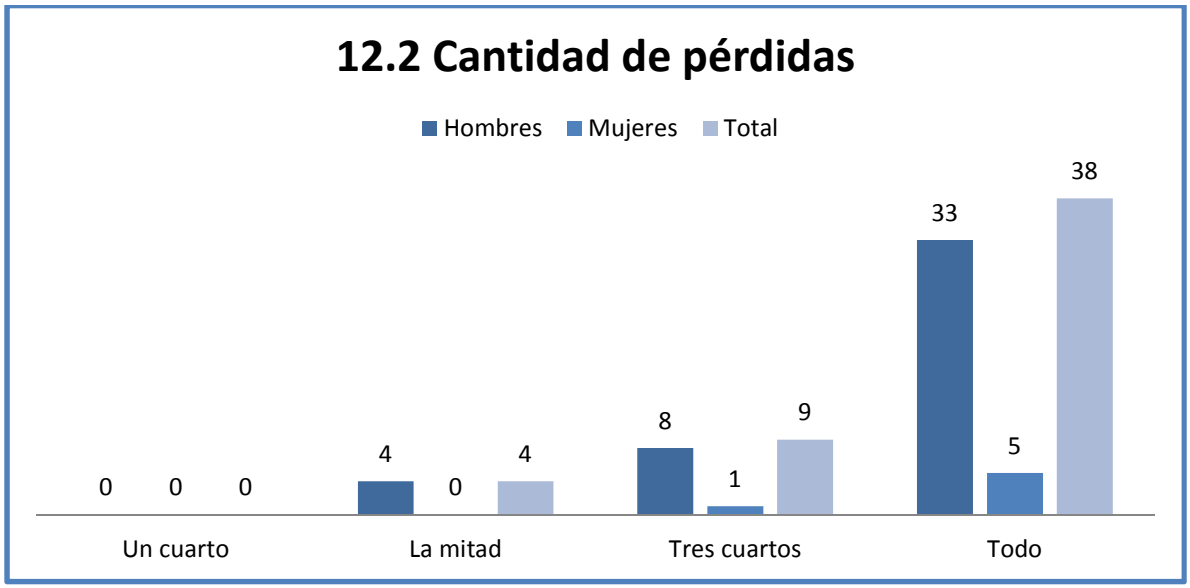

9. Asosiación
Hombres
Mujeres
total
25
1
26
20
5
25
No
Si

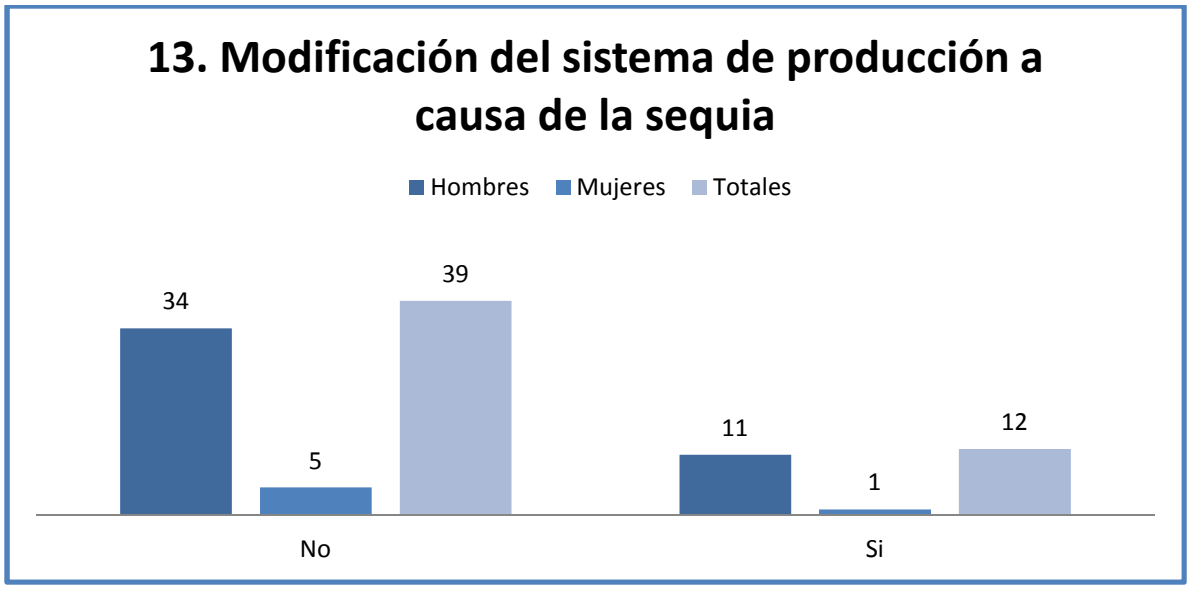

10. Cambio climatico
Hombres
Mujeres
Total
43
6
49
2
0
2
Si
No

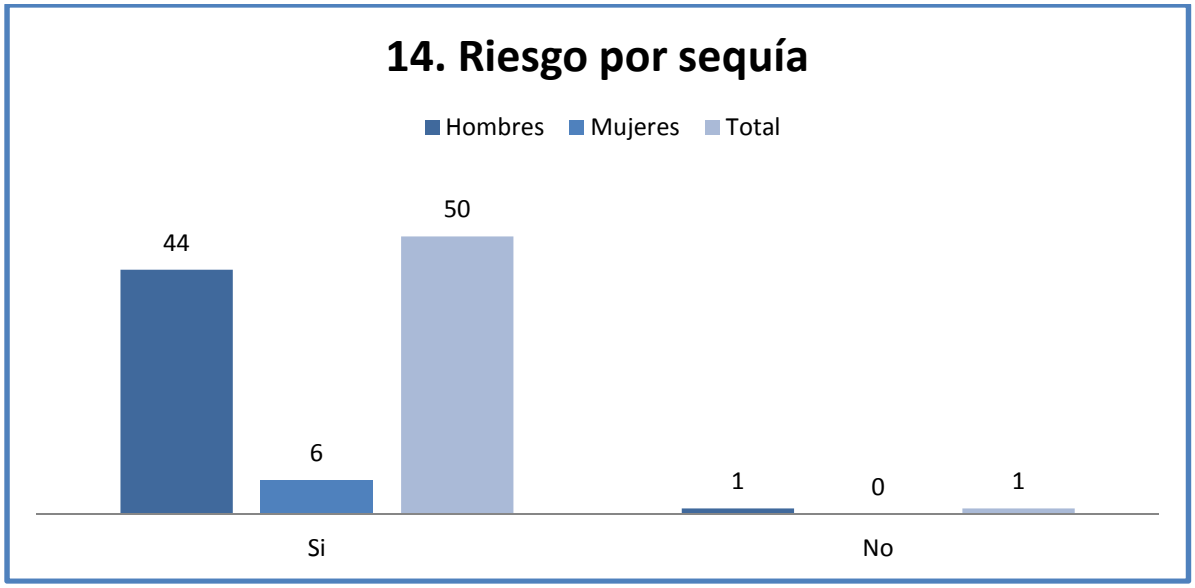

11. Percepción de lluvia
Hombres
Mujeres
Total
2
0
2
41
5
46
2
1
3
Igual que hace 5 años
Menos que hace 5 años
Mas que hace 10 años

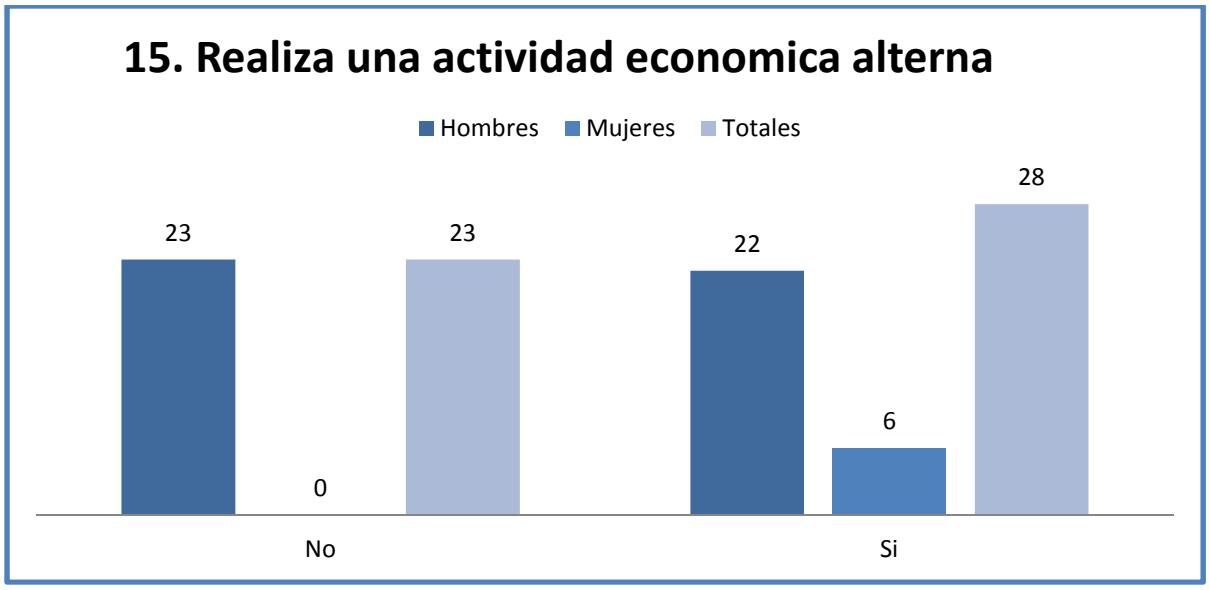

12. Pérdidas de producción
Hombres
Mujeres
Total
43
6
49
2
0
2
Si
No

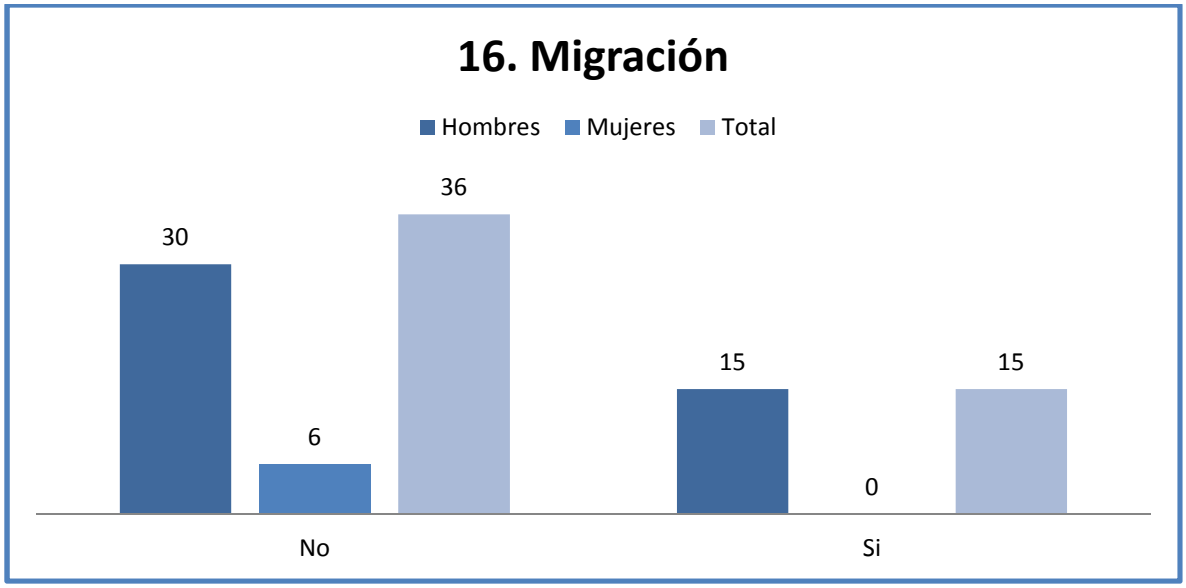

12.1 Tipo de pérdidas
Hombres
Mujeres
Total
25
4
29
20
2
22
Cultivos
Cultivo y ganado

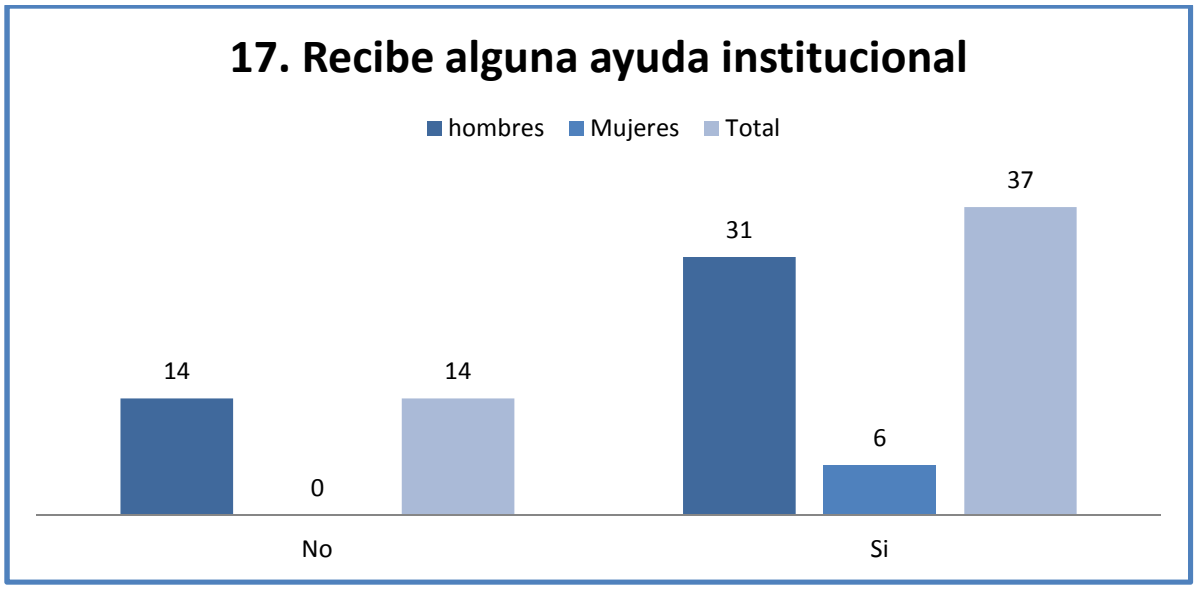

12.2 Cantidad de pérdidas
Hombres
Mujeres
Total
0
0
0
4
0
4
8
1
9
33
5
38
Un cuarto
La mitad
Tres cuartos
Todo

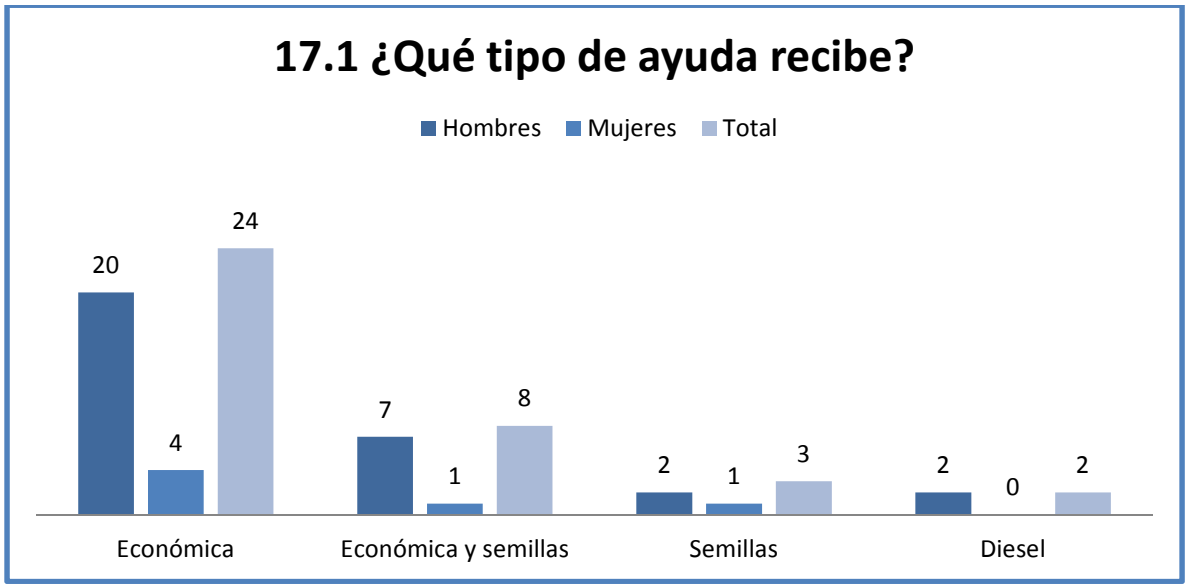

13. Modificación del sistema de producción a causa de la sequia
Hombres
Mujeres
Totales
34
5
39
11
1
12
No
Si

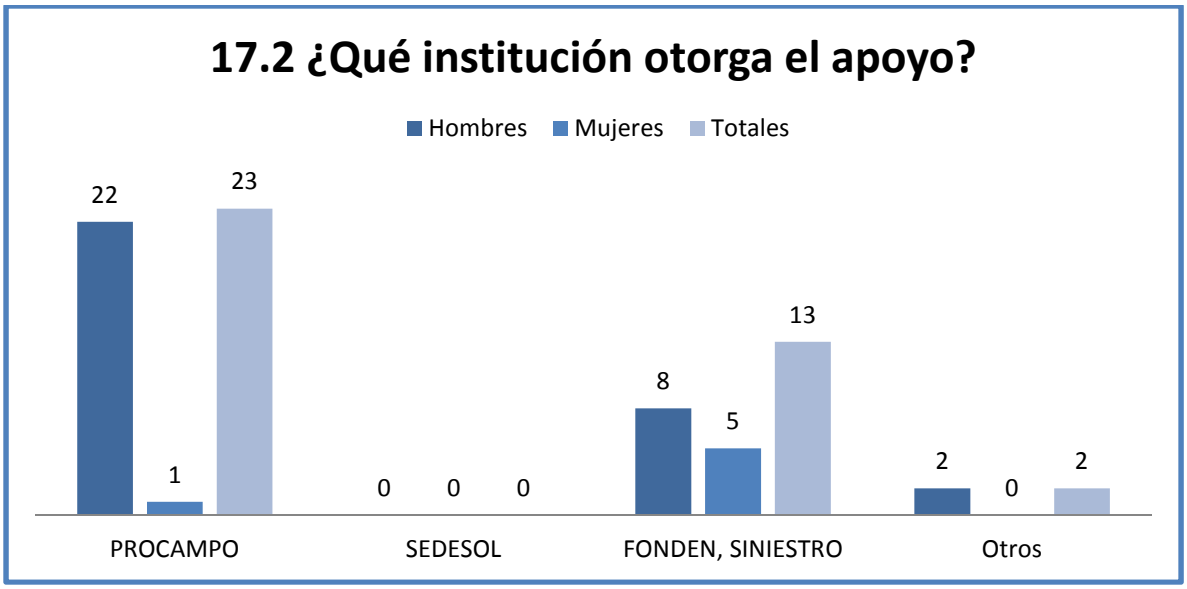

14. Riesgo por sequía
Hombres
Mujeres
Total
44
6
50
1
0
1
Si
No


15. Realiza una actividad economica alterna
Hombres
Mujeres
Totales
23
0
23
22
6
28
No
Si


16. Migración
Hombres
Mujeres
Total
30
6
36
15
0
15
No
Si


17. Recibe alguna ayuda institucional
hombres
Mujeres
Total
14
0
14
31
6
37
No
Si


17.1 ¿Qué tipo de ayuda recibe?
Hombres
Mujeres
Total
20
4
24
7
1
8
2
1
3
2
0
2
Económica
Económica y semillas
Semillas
Diesel


17.2 ¿Qué institución otorga el apoyo?
Hombres
Mujeres
Totales
22
1
23
0
0
0
8
5
13
2
0
2
PROCAMPO
SEDESOL
FONDEN, SINIESTRO
Otros

8.4 Keyperson Interview Villa de Arriaga May 2014

Fachhochschule Köln
Cologne University of Applied Sciences

Programa Multidisciplinario de Posgrado en Ciencias Ambientales

Entrevista sobre las políticas agrícolas aplicadas en Villa de Arriaga

No. Encuesta	
Fecha	
Encuestador	
Ejido	

DATOS EGO	
Nombre	
Edad	
Escolaridad	
Estado Civil	
De donde es originario	
Cargo en Mesa Ejidal	
Hace cuanto tiempo tiene este cargo	
¿Algún otro miembro de su familia ha ocupado este cargo (u otro) anteriormente en la mesa ejidal? **¿Cuantas personas dependen económicamente de usted? (edad, sexo)**	

II. DATOS GENERALES DE LA UNIDAD DOMESTICA			
¿Tiene parcela?	**SI**	**No**	**¿Cuantas hectáreas tiene?**

¿Cultiva?	**SI**	**No**	
¿Tiene ganado?	**SI**	**No**	**¿Cuántas cabezas posee?**

Indicaciones para el entrevistador:

- Si el espacio no es suficiente para responder las preguntas utiliza el otro lado de la hoja
- En medida de lo posible graba la entrevista
- Usa la hoja adicional para apuntes

A. Programas de gobierno que operan en Villa de Arriaga

1. ¿Qué programas de gobierno conoce que operan actualmente en su comunidad? *(nombre de los programas y beneficiarios)*
2. ¿Cuáles de esos programas son específicamente para la agricultura y la ganadería? *(Nombres de los programas de SAGARPA)*
3. ¿Usted conoce cuál es el proceso por el cual se pueden obtener dichos programas?

   Si, ¿Cómo? (*Diagrama de como bajan las ayudas, menciona instituciones/personas claves)*

4. ¿Usted es actualmente beneficiario de algunos de esos programas de gobierno para la agricultura y ganadería?
   (si, cual(es)..)
5. ¿Cómo gestiono o solicito los programas de gobiernos de los cuales usted es beneficiario?

A.2. Proyectos Productivos

6. ¿Usted conoce o ha escuchado que son los proyectos productivos? *(Si (donde?))*
7. ¿Conoce proyectos productivos que operen actualmente en su comunidad? *(Si, ¿Cuáles?)*
8. ¿Conoce como fue que se gestionaron e implementaron dichos o proyectos?
9. ¿En qué aspectos cree usted que dichos proyectos benefician a la comunidad?

A.3. Iniciativas de la población

10. ¿Actualmente existen proyectos agrícolas o ganaderos que provengan de la iniciativa de la comunidad? *(cuales iniciativas hay de la gente misma sin estímulos de los programas políticos)*

11. ¿Dichos proyectos actualmente son apoyados por algún tipo de institución (gubernamental, política o educativa)?

B. Instituciones/Organizaciones Políticas

12. ¿Usted confía en las instancias que están encargadas de los programas de gobierno dirigidas al campo? *(si/no, porque)*
13. ¿Usted confía en los actores (o personas) que se encargan de distribuir, gestionar y entregar los programas de gobierno a los beneficiarios? *(si/no, porque?)*

C. Problemática Producción agrícola

14. ¿Cuales considera que sean las problemáticas más urgentes que presenta la comunidad en las cuales debería existir apoyo de programas del gobierno? *(Ahondar en el cómo debería ser el apoyo de los programas de gobierno)*

15. ¿A su parecer, cual es la problemática más grave que la agricultura y la ganadería experimenta en la actualidad?

16. ¿Cómo considera usted que podrían solucionar dichos problemas? *(iniciativas propias, organización comunitaria, con o sin programas de gobierno)*

D. Acceso y Manejo de Recursos

17. ¿Usted cree que existe futuro para la ganadería y la agricultura?

18. ¿Usted identifica cambios en la manera que se siembra actualmente a la manera que sembraban las personas de antes? *(Si, cuales cambios) (Puedes ahondar en los últimos 20 años, ya que significo un cambio de leyes para ejidos).*

19. ¿Cuál cree usted que sea el futuro para el agua?

i. ¿Cómo obtienen el agua para la agricultura y la ganadería?(*lluvia, pozos, presas, riego, del cerro)*

ii. ¿Existe alguna otra posibilidad de obtenerla? *(presa nueva, tubería,…)*

iii. ¿Usted identifica que existen posibles fuentes de agua que no han sido aprovechadas? *(si)*

iv. ¿Que se necesitaría para que esas fuentes de agua puedan ser aprovechadas? *(solo en el caso que existen otras posibilidades)*

Muchas Gracias por su participación!

8.5 Livestock Production in Villa de Arriaga 2008 – 2012

In tons

8.6 Livestock Production in San Luis Potosí 2008 – 2012

In tons