

Local perceptions of degradation in rangelands from a livestock farming community in Chiapas, Mexico

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The farmer's perception was analyzed about degradation of pastures in the Francisco Villa I community, Jiquipilas municipality, Chiapas. The community is located in the nearby area of the biosphere reservation La Sepultura. The study was conducted between December 2008 and July 2009. The approach was related to agricultural anthropology and ethnography. Semi-structured interviews were carried out, and three communitarian workshops were organized. The information was systematized in tables and figures of tendencies for its analysis according to three times: past, present, and future of communitarian livestock rearing. The farmers were characterized by having rangelands and livestock, living in the community permanently, and willing to be involved in the process of analysis of this research. The results showed that farmers perceive the current degradation of their rangelands as an aspect intrinsic to the practice of the livestock system with diverse impacts. However, in regards to the past, they did not perceive relevant or significant changes in their rangelands. Farmers were optimistic in regards to the future, because they perceived that their rangelands were little degraded. The reason was the presence of operating elements supporting communitarian livestock rearing. They considered as very relevant the implementation of "less harming" practices, although they showed that the lack of technical advising and economic resources was an important limitation. It was concluded that, in Francisco Villa I, there are differences in the perceptions of degradation, but basically from the productive perspective. The individual experience as to livestock management, the family income, the availability of economic resources to be invested, and the level of environmental consciousness are the causes for the differences in the perception of rangeland degradation.

Key words: *natural protected areas, farmer's knowledge, environmental degradation, local analysis.*

Worldwide, the topic of deforestation, as a result from human activities, has been subject to debate in the last thirty years, due to its repercussions in the natural ecosystems and in the climatic change (Sepulveda and Ibrahim 2009). In tropical areas, particularly in Latin America, deforestation was increased in the eighties in the last century, when the total elimination of forest areas was encouraged to accelerate their productive-economic process (Kaimowitz 1996 y Guevara 2007).

Due to deforestation, the loss of plant cover brings about, as a consequence, a very variable process of economic and environmental implications, known as environmental degradation. The consequences of this phenomenon are the decline in the productive capacity of the soils, the increment in the release of gases contributing to global warming, the advance of the agricultural and livestock rearing borders, the poor water availability and quality, and the loss of biodiversity in affected areas, among others (Leff and Carabias 1998, Szott *et al.* 2000 and Naranjo 2003). The activities of greatest impact are the opening of new areas for agricultural and livestock uses, mainly for feed production, and the increase and establishment of rangelands for extensive livestock rearing. Despite all this, livestock

rearing activity, primarily the extensive, depending on the grazing, is conducted in areas with little livestock interests. In spite of the situation, this is a factor contributing to environmental degradation (FAO 2000 and Sepulveda and Ibrahim 2009). Particularly, due to the socio-productive implications of this research, emphasis is made on the degradation of rangelands.

Natural protected areas in Mexico have not been exempt from this anthropologic aspect. There is constant pressure by society –stemmed from beyond the local sphere – in regards to forests. Specifically, new productive areas are intended to be opened on the existing rangelands, for increasing meat and milk production. Undoubtedly, this increases the environmental degradation and, at the same time, provokes the degradation of rangelands (Merino 2004, Cruz and Negrete 2007 and Gómez *et al.* 2010).

In Mexico, pastures cover 21.8 million hectares. Out of them, 73.9 % are degraded. The Chiapas state has an area of pastures of 1, 876, 569 ha, and, approximately, 10 % are degraded, and the rest in the process of degradation. Besides, the harm is from 20 to 30 % in forest areas, due to the pressure exerted by the agricultural activities, mainly those referred to production systems

with schemes of migratory agriculture and extensive livestock rearing (Alemán *et al.* 2007).

On the whole, degradation of rangelands is not a factor considered as relevant by the farmers working in the livestock production systems. The reasons can be many: a) systems frequently understood from a merely economic or productive perspective; b) the farmer does not know the extent of the degradation impacts; c) no resources are devoted to halt deterioration (Sepulveda and Ibrahim 2009 and Gómez *et al.* 2010). These conditions evidence that the environmental and social aspects involved in the livestock production systems are underestimated to a second rank.

In view of this reality, it is necessary to analyze scientifically the implications of livestock activities, in a way that the transformations of soils due to their intensive use can be known. Studies could not only be focused on economy or techques, but also on social and environmental aspects. Most of all, the identification and construction of local indicators should be considered, stemming from the insights of the farmers, who are directly involved in production systems (Estrella *et al.* 2000 and Cruz 2009).

This subject has been little discussed from an interdisciplinary perspective, due to the lack of interest, the ignorance of appropriate methods or innovative experiences as to research itself (Guevara *et al.* 2008a and Rodríguez and Guevara 2009). The degradation of rangelands could then be analyzed and understood from several perspectives, as suggested by Galdámez (2008) and Guevara *et al.* (2008b). These authors showed that the social elements are also determinant in the sustainability of the productive systems. The approaches could be multiple and diverse, the important element is the generation of trustworthy information to make more accurate decisions. Thus, the process of pasture degradation could be better understood, from an anthropogenic-productive point of view. Besides, possible modifications to the production systems could be identified, especially those addressed to define sustainable practices of local management, permitting to diminish from the start, the pressure on the soil and vegetation resources, particularly in natural protected areas (Amusan and Warren 1996, Pérez 2006 and Palma *et al.* 2011).

It is noteworthy to consider Lefebvre (1991), Arizpe and Velázquez (1993) and Padilla *et al.* (2003), who reported that the relationship between the human being and the environment is, partially, the reflection of the interpretations in certain context, where a man builds his space and implements survival mechanisms. The local perceptions imply and represent a dialectic process of construction of local knowledge, out of experience. According to Agrawal (1996) and Erol and Ferrell (2003), one of the approaches to study the anthropogenic processes, in this instance the rangeland degradation, is that stemming from the local knowledge assimilated by the farmers.

Ethnography allows reconstructing the different perceptions of the farmers about degradation and, at the same time, understanding the degree of accumulated knowledge and experience (Koppelman and French 2000). Likewise, the individual and collective view of the changes in the livestock systems and in the dynamics of the management of the local natural resources such as the soil and the vegetation is supported. Besides, it permits identifying the areas of attention through a systemic and environmentally friendly view in regards to the local resources (Isin and Yildirim 2007).

The objective of this research was to analyze the several perspectives on rangeland degradation through the opinions of the farmers and, at the same time, to know the evolution of livestock rearing in a community of the biosphere reserve La Sepultura (REBISE) through a socio-anthropologic study, out of an auto-evaluative analysis of the local livestock system components.

Materials and Methods

Area under study. The work was performed in the Francisco Villa I community, Jiquipilas municipality, Chiapas, located in the biosphere reservation La Sepultura, in the Sierra Madre of Chiapas, in the southwestern region of the state. It is at 16°00'18" and 16°29'01" North and at 93°24'34" and 94°07'35" West (Hernández 1995). It comprises part of the municipalities of Arriaga, Cintalapa, Jiquipilas, Tonalá, Villa Corzo, and Villaflores. It has a climate A (C) w2 (w), implying that it is warm sub-humid, with rainy periods, and hot in summer (CONANP 2006). The altitudes range from 1,000 up to 1,300 m.a.s.l. The annual average rainfall is of 22° C, according to Miranda and Hernández (1963).

Methods. The field research was carried out between December 2008 and July 2009. The methodology was that of Guevara (2007), Guevara *et al.* (2008 b) and Cruz (2009). It consists in reconstructing collectively and/or individually the local perceptions out of a socio-anthropologic approach through a qualitative method permitting the record or collection of the information. In this instance, it is about the pasture degradation process, closely related to the local livestock production. The field work was the basis for obtaining the information, thereby being necessary: a) facilitate three participative workshops (of half a day each) with 35 farmers from the community to deal with aspects of the past, present, and future of livestock rearing and rangeland degradation; b) apply to 35 farmers three individual interviews semi-structured to corroborate the information and know the perspectives about the degradation and livestock rearing in general; c) pay three visits to the work field in the community, at different times, to analyze physical details (landscape) and identify, in the field, signs of degradation or proper management, at least, in three rangelands/visit.

During the workshops and the field visits, the farmers identified (build) a set of indicators. The assessment was

performed at the time of the interview. Thus, they were grouped into four criteria (table 1) and the responses to the interviews were codified on the basis of qualitative values, with the goal of making farmers assess each criterion or indicator (table 2).

workshops to analyze the current situation in the communitarian livestock production. The use of these indicators, as core of the semi-structured interviews, is part of the ethnographic research method. The auto-evaluation exercise had as aim at knowing the perspective of the

Table 1. Criteria and indicators identified by farmers

Criterion	Indicator
Environmental	- Pasture degradation status - Natural resources affected when building the rangelands - Consequences of overgrazing on the rangelands - Strategies to counterbalance the pasture degradation
Productive	- Forage availability in the rangeland - Production of animals in the rangeland - Pasture management
Economic	- Economic benefits from the rangeland - Economic benefits by recovering degraded pastures - Economic increments by recovering degraded pastures
Social	- Importance of livestock rearing in the community

Table 2. Scales of values for the codification of responses obtained in the semi-structured interviews

Value		P,P1,F		P,P1**	F
1	Total	Very bad	Non-important	Total	Nothing
2	Very/Much	Bad	Little important	Much/Very	Little
3	More or less	Regular	Important	More or less	More or less
4	Little	Good	Very important	Little	Much
5	Nothing	Excellent	Fundamental	Nothing	Total

* P: past, P1: present and F: future

**Fort he case of the future the fourth column is not applied, because the questions were addressed to other aspects that surpass the perspectives of the past and the present

The farmers were owners of rangelands and livestock, lived permanently in the community and were willing to participate in work sessions (workshops, interviews and field visits). At the end of the research the important subject for future actions were identified and addressed to reduce or prevent the current or future degradation of rangelands.

The analysis of the information was performed out of the codified values of the responses (table 2) and of the comparison of variables with systemic perspective. Likewise, when necessary, an ethnographic interpretation was made out of the opinions from some of the farmers through the application of the classic ethnography. It consisted in obtaining direct information from the participants, indicating the name and age of the farmer and citing literally his opinion (Ver Erol and Ferrell 2003, Guevara 2007, Guevara *et al.* 2008 b and Cruz 2009). With this analysis, the perceptions of the past, the present, and the future of livestock rearing and rangeland degradation were integrated.

The indicators were identified and negotiated with the livestock farmers of the community in participative

farmers, beyond the technical studies.

Results and Discussion

Tables 3, 4, and 5 summarize the results from the Francisco Villa I community, in regards to the perception of the farmers and the assessment of each indicator, according to the scale of values assigned (table 2). The indicators are grouped into four criteria (environmental, productive, economic, and social) to understand the difference in the perceptions and compare them in each of the times. The perception was based on view of livestock rearing twenty years age, period in which farmers identified seven indicators as total.

The Francisco Villa I community is mainly characterized by the livestock production, because it is the main source of incomes in families, besides the sowing of corn and beans for self-consumption. Traditionally, men are in charge of the care of the livestock and the rangeland. Women assume home labors, commerce and, occasionally, the production of backyard poultry for self-consumption and sale, in cases of family needs.

Table 3. Local perception and evaluation of the indicators for the past of livestock rearing in the Francisco Villa I community, Chiapas, Mexico

Criterion	Indicator	Perception of the past (15-20 ago)	F*	V**
Environmental	Pasture degradation status	-The animals were in freerange system	7	4
		-There were few animals	3	
		-There were no rangelands	3	
		-The soil was fertile	2	
	Use of natural resources	-There was deforestation	14	3
		-The rangelands were burnt	1	
Productive	Pasture management	-Lack of knowledge	11	3
		-No attention was paid to the rangeland	4	
	Technical knowledge	-Lack of knowledge	14	3
		-No care was given to the rangelands	1	
	Production quality	-The type of pasture	10	3
		-No proper management of the animals	2	
		-Livestock was in freerange system	1	
		-The type of breed	1	
		-The animals were not taken care of	1	
Economic	Economic benefits from the rangelands	-No experience in the management of the animals	8	3
		-The type of pasture	6	
		- The type of breed of the animals	1	
Social	Importance of livestock rearing	-No all had livestock	15	3
Mean			n =15	X = 3.1

*F= Frequency (number of times in which the perception of the interviewed farmers is repeated).

**V= Average evaluation (codified value of the response) (table 2)

Table 4. Local perception and evaluation of the indicators for the present of livestock farming in the Francisco Villa I community, Chiapas, Mexico

Criterion	Indicator	Perception of the present (2009)	F*	V**
Environmental	Pasture degradation status	-The pasture was of low yield	8	3
		-There are many landslides	4	
		-There are weeds	2	
	Use of natural resources	-There is deforestation	12	2
		-The pastures are burnt	1	
		-The gait of the animals makes the ground compact	1	
Overgrazing of the rangeland	-The gait of the animals makes the ground compact	11	3	
	-Fast shortage of pasture	3		
Productive	Pasture management	-Lack of knowledge	11	3
		-Lack of economic resources to be invested	3	
	Technical knowledge	-No technical knowledge	12	3
		-No technical advising	2	
	Production quality	-The pasture is of poor quality	12	3
		-The management of the animals	2	
Economic	Economic benefits from the rangeland	-The pasture is of poor yield	11	3
		-The animals are of low weight and the sale price is variable	3	
Social	Importance of livestock farming	-Livestock rearing is an important economic means and a source of employment	14	4
Mean			n =14	x = 3

*F= Frequency (number of times the perception of the interviewed farmers is repeated).

**V= Average evaluation (codified value of the response) (table 2)

Table 5. Local perception and evaluation of the indicators for the future of livestock farming in the Francisco Villa I community, Chiapas, Mexico

Criterion	Indicator	Perception of the future (next 5-10 years)	F*	V**
Environmental	Pasture degradation status	-Livestock farming will increase	2	4
		-There will be more landslides	6	
		-There will be weeds and bare soil	3	
	Strategies to counterbalance the degradation	-Reforestation	7	4
		-More pasture sowings	1	
		-Lack of technical advising	1	
		-More live fences	1	
Productive	Theoretical knowledge	-Lack of technical knowledge	10	3
		-Lack of technical advising	1	
	Production quality	-Lack of technical knowledge	9	4
		-Lack of economic resources	2	
Económico	Economic impact	-Less pastures	7	3
	Availability of economic resources to recover a degraded rangeland	-The rangeland is decreasing by the increase of animals	4	
		-Lack of economic resources to recover a degraded rangeland	11	3
	Economic benefits for recovering degraded rangelands	-Higher pasture yield	9	4
		-Higher yield of animals	2	
Economic increases for recovering degraded rangelands	-Higher pasture yield	11	4	
Social	Importance of livestock farming	-Livestock farming will be the most important economic source of incomes in the community as it increases	11	4
Mean			n = 11	x = 3.7

* F= Frequency (number of times that the perception of the interviewed farmers is repeated).

**V= Average evaluation (codified value of the response (table 2))

Past. In respect of the environmental criterion (table 3 and figure 1), the degradation indicator was assessed as the highest (4), which implies little degraded, that is, the rangelands were little degraded in the past. The main reason given by farmers was that animals were in a freerange system in the forest and there were not rangelands, besides there were few animals in the communities. It is noteworthy that, in some instances, the local perception is quite valid, because farmers are informed and make decisions out of their experience and knowledge. They estimate the degree of degradation and loss of the animal productivity according to their everyday experience and the prevailing conditions (Grisley and Kellogg 1983). These results agreed with Toledo (2000) and Cruz (2009), who noted that farmers identify when the soil is exhausted and/or degraded, the loss of organic matter, the diseases, as well as the resistance to the weeds and the weaknesses in the traditional plants. These are signs that a change is needed.

The productive, economic, and social criteria were evaluated as 3. This value is interpreted as regular, that is, an intermediate point between the degradation and the adequate management, together with the indicators natural resources, pasture management, technical knowledge, pro-

duction, economy and importance of livestock rearing. The main causes were the lack of knowledge and deforestation. According to the insights provided, at that time there were few services of technical assistance. In order to confirm this, ethnographic information is used (Guevara 2007), where the opinion and the testimony of the farmers is turned into evidences permitting to support or refuse the collective information: "In the past there was no technical knowledge about livestock rearing because few people practice it and there was no technical assistance. Besides, in order to build the feedlots, many trees were cut down because they were thought to affect pasture growth and no thought was given to the harms that could be caused."

These criteria agreed with Greiner (1998) and Gómez *et al.* (2010), who mentioned that the technical knowledge is very important. It provides security to the farmer, as to the practice of certain system, according to the tasks and it is more trustworthy to take advantage of the available natural resources, with the goal of enhancing the production.

Present. The current situation in livestock farming, according to the views of the farmers, was clustered in eight indicators corresponding to four criteria. The social criterion (table 4 and figure 2) was evaluated as

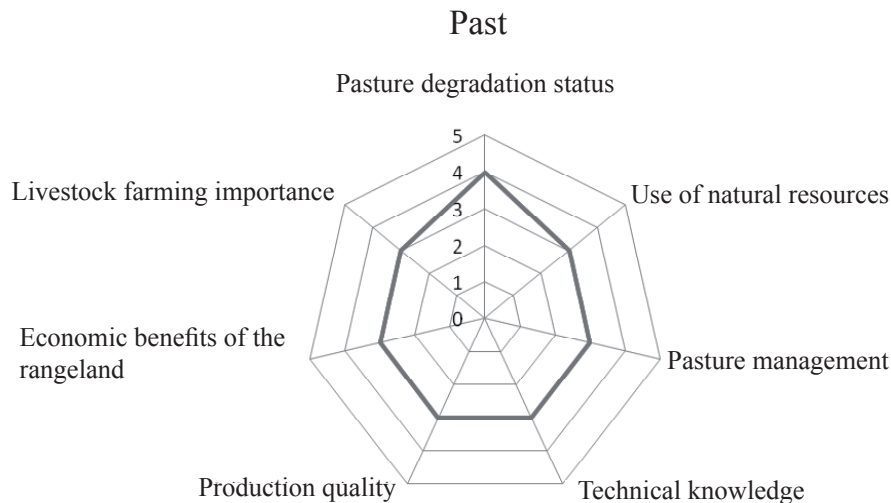


Figure 1. Average evaluation (codified responses) of indicators for the past of livestock farming in the Francisco Villa I community

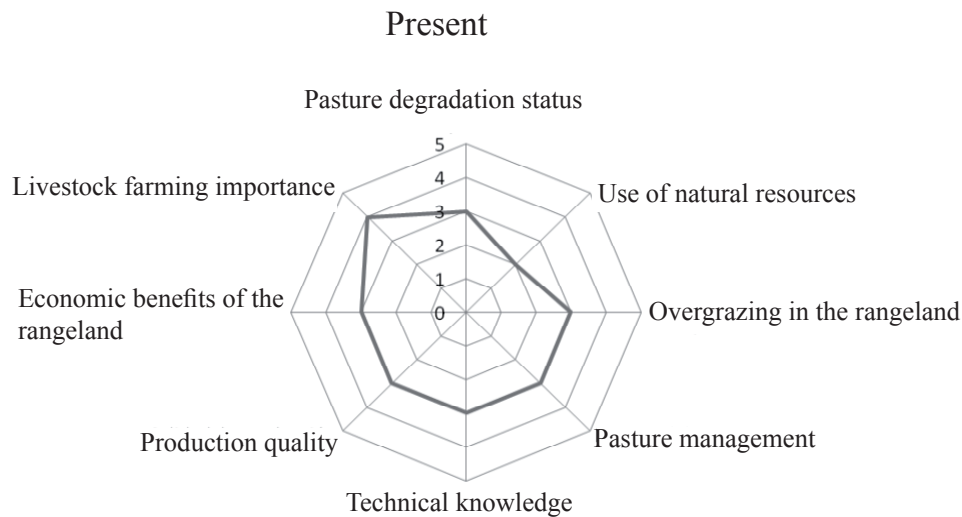


Figure 2. Average evaluation of indicators for the present of livestock farming in the Francisco Villa I community

the highest (4), meaning very important. This shows that the social aspect of livestock production is the most important at present. It has to do with the advantages represented by this productive system, by being considered in the locality as something indispensable for the economic development of the people in the community. However, Palma *et al.* (2011) noted that the social relevance of livestock farming is opposed to environmental aspects (abuse in the utilization of natural resources (figure 2), due to the increase in deforestation to open up new pasture areas. This provokes loss of biodiversity in the natural ecosystems, due as a consequence of livestock management practices, and leads to loss or reduction of the flora and fauna communities in these sites. Besides, it has to do with the decline in the fertility of the soils and, thus, with the degradation of these rangelands.

As to the environmental criterion, the indicator impairment of natural resources was evaluated with

a value of two, which means that rangelands affect a lot the natural resources (trees, water, soil), produced by the incorrect management of the animals. Farmers perceive that by making the rangelands, the deforestation affects the natural resources (trees and water): “When the feedlots were built, many trees were cut down, affecting the natural resources, causing mainly water shortage”.

Future. Farmer evaluated ten indicators, grouped into four criteria. It was observed that, within the productive criterion, the indicator technical knowledge was considered as the lowest (3) (figure 3). This means regular, that is, the farmer’s view is that the technical knowledge will be regular in the future, because from now on they demand technical advising and information on the adequate management of livestock, the rangelands, and the natural resources, in general.

This result contradicted the report of Gómez *et al.*

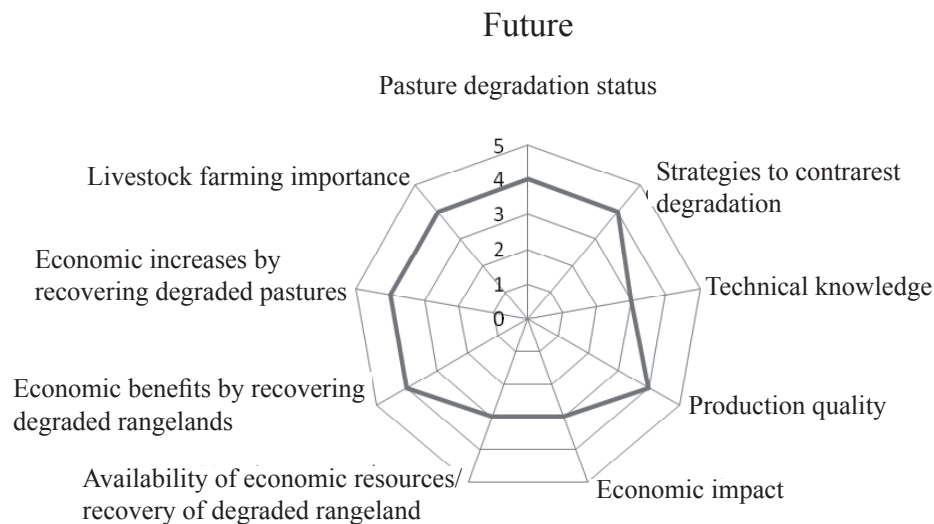


Figure 3. Average evaluation of indicators for the future of livestock farming in the Francisco Villa I community

(2010) and Palma *et al.* (2011), who mentioned that current livestock farming is considered from diverse and various approaches in different productive areas of the country, mainly in priority areas (areas of protection or of high meat or milk production). According to the authors cited, and with the criteria of Rodríguez *et al.* (2009), this reality will transform the traditional thoughts and behavior of the farmers, because most of them will have updated knowledge. The technical advising, the programs, and the governmental support will guide them toward the conception of a sustainable livestock farming, whose basis will be the integrated management of the natural resources.

The indicators economic benefit and resources to recover degraded rangelands were assessed as the lowest (3). This implies an evaluation of regular, that is, the economic situation for the future is foreseen as complicated. Koppelman and French (2000) and Nahed *et al.* (2010) corroborated this situation, when noting that the economic capacity to improve the livestock activities is essential, because the farmer should have economic resources to implement actions for advantage. However, there are few farmers with financial funds, mainly to apply actions for the conservation of natural resources.

Hagmann and Guevara (2004) and Guevara (2007) noted that the importance of the future perspective has to do with the construction of possible scenarios and with the identification of possible areas to attain sustainable livestock farming, mainly with proper integrated management use of local natural resources.

Farmers have acquired a very valuable local knowledge in regards to their environment, characterized by nature and the daily practices implicit in their livestock production system.

The relationship between the human being and the environment is, partly, the reflection of the thoughts in certain context, responding to certain environmental,

productive, social and economic medium, where man perceives his context and builds his action space.

The Francisco Villa I farmers perceive pasture degradation as a result from the livestock activity. They considered it an aspect intrinsic to the practice of the livestock system, with various impacts on the use and management of the soil and vegetation resources, regardless livestock farming in the socioeconomic sphere represents for them a crucial component in the economic and productive development.

Rangeland degradation, as induced phenomenon and that could be managed for benefits, does not represent at present, an obstacle to abandon the livestock activity in the community, because the vegetation and the soil control completely the impacts generated by livestock farming.

Strategies to mitigate these impacts are visualized in the locality. The majority has to do with alternative management practices, addressed to sustainable production. Nevertheless, farmers stated that the main problem to conduct these actions stems from the shortage of economic resources and technical advising.

In Francisco Villa I, there are differences as to the perceptions about degradation, but from a merely productive perspective. The individual experience in the management of each livestock herd, the family income, the availability of economic resources to be invested and the level of environmental consciousness are elements of analysis permitting to understand the causes of variation in the perceptions of rangeland degradation.

It is important to consider the policies and the management and conservation programmes of the natural resources, particularly the REBISE, because the conservation-management efforts, addressed to a sustainable production from the communities, could open up spaces of closer collaboration between the local or regional operating elements interested in sustainable soil, vegetation

and livestock management practices.

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