Social vulnerability and community capitals in two localities of the Comitec plateau, Chiapas, Mexico

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Abstract: Objective of this work was to analyze the social vulnerability and the community capital in two localities of the municipality of Comitán de Domínguez, Chiapas, México. The information was obtained through the application of a questionnaire and interviews with community leaders and local residents. These instruments were designed using the methodological approach of the Community Capitals Framework (MCF) in a sample of 115 informants. The results showed high vulnerability in the financial, social and political capitals of the studied communities, while the natural, physical, human and social capitals presented medium vulnerability. The resources counted on by the interviewees allow them to generate their source of livelihood as well as being able to depend on the existing community organization to help them to improve their capacities, skills and establish agreements to settle the community problems. In the perception of the interviewees, the main problems of the communities are due to the absence of markets, the absence of diversification of strategies for livelihood, contamination, and illnesses. Additionally, the current structural changes that favor the securing of basic services and communication are factors that might alter negatively the living conditions of the studied communities.

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PUBLIC INTEREST STATEMENT
Social vulnerability to climate change is high in poor rural locations and where the possibilities, skills, and capacities of the community are low. Chiapas, Mexico is a state of the south with high marginalization, poverty, and environmental deterioration. The research was conducted through a survey and interviews with community leaders and local residents, with the methodological approach of the Community Capital Framework (CCF) in a sample of 117 informants. The results showed a high vulnerability to the effects of climate change on financial, social and political capital, while natural, physical, human and social capitals presented a category of medium vulnerability. The main problems of the communities are the lack of market, the lack of diversification of livelihoods, pollution, infectious diseases, and food insecurity. The structural changes of development are not always favorable for the living conditions, social organization and sustainability of communities in social and environmental risk such as population studied.
1. Introduction

In Mexico, the topic of the vulnerability has been tackled from different approaches, principally, from the social perspective, which often has been used in matters of health of vulnerable people such as older adults, children and women’s work situations (Juárez-Ramírez et al., 2014; Horbath & Gracia, 2014; Lara-Valencia, Álvarez-Hernández, Harlow, Denman, & García-Pérez, 2012). Although the absence of a general parameter for its analysis is recognized, where all the approaches, from the natural sciences, the applied sciences and social sciences, can be considered together, an understanding of vulnerability is needed from the perspective of perceptions, attitudes and motivations of the persons, homes and communities specific to determined time and places. The dimensions and types of vulnerability are the physical, economic, social, educational, political, institutional, environmental, cultural and ideological (Cardona, 2001); nevertheless, social vulnerability is a wider dimension that contains all the types or dimensions of vulnerability.

The construction of the concept of social vulnerability integrates elements of sociology, economics, political sciences and anthropology, and being a concept that journeys between the borders of disciplines, it represents an advance in the attempt to construct new analysis categories in order to understand and to explain the causes and symptoms of the social consequences of the disasters (Martín, 2015; Montoya-Arce, Román-Sánchez, Gaxiola-Robles, & Montes-de Oca, 2016). Social vulnerability is defined as the incapability of a person or of a home to make use of the available opportunities in different socioeconomic settings, to improve its situation of well-being or to prevent its deterioration “that is to say, that for increased well-being there must exist the aptitude to gain access and to use resources and assets” (Katzman, 2000).

In 2015, the Program of the United Nations for Development recognized the state of Chiapas as one of the Mexican entities with unfavorable conditions for its socio-economic development, given that in 2012, this entity presented the lowest indexes of Human Development (IDH) with 0.667 followed by Guerrero and Oaxaca with 0.679 and 0.681, respectively, in contrast to other states such as the Federal District (0.830), Nuevo León (0.790) and Sonora (0.779). In education, Chiapas was positioned with the lowest achievements with 0.528, as well as in the area of revenue threshold (0.700) with levels the lowest range of the national index along with, Guerrero (0.711) and Oaxaca (0.730), Numbers which contribute to establishing a difference of 11.9% between the value of Chiapas and the national average of 0.746.

This state consists of 15 regions with half of the population living in localities with less than 2,500 inhabitants, and a third of the population being indigenous. The category of education lags with 6.7% of the population with the first year of junior high education in relation to the national average of 8.6% and illiteracy is at 18.4% (INEGI, 2010). The majority of the population devotes itself to agriculture, predominantly subsistence, with the need to generate income through the sale of their labor.

In this context, the municipality of Comitán de Domínguez located on the border region of Chiapas has a total population of 141,013 inhabitants of whom 67,691 are men and 73,322 women (Instituto Nacional de Estadística y Geografía (INEGI), 2010). Regarding education, despite the vast educational infrastructure: preschools (141), primary schools (163), junior high schools (33), high schools (44) and higher education (3), 31.5% of its population presents educational lag, so that the average grade or school level completed in this municipality is 7.27, corresponding to 7.76 for men and 6.83 for women. As for health services, this municipality counts on rural health centers and hospitals of the Workers’ Institute of Social Welfare and Services of the State (ISSSTE
in Spanish), the Workers’ Institute of Social Security of the State of Chiapas (ISSSTECH in Spanish), the Mexican Institute of Social Welfare (IMSS in Spanish) and the Secretary of Health, nevertheless, 36.5% of the population has no access to health services. This lag in education and health is present in the communities focused on for this study, where the average of years of schooling registered for Villahermosa Yalumá was 4.57 and 5.95 for Guadalupe Quistaj, and the illiterate population of 15 year-olds is more than 456 and 58, respectively (Instituto Nacional de Estadística y Geografía (INEGI), 2010).

The procedure that we propose in this investigation to explain how these localities work using the Community Capitals Framework (MCF) proposed by Flora and Fey (2004), which is based on the interaction of seven capitals or assets: human, social, cultural, political, financial and physical. The objective of this work was to analyze the social vulnerability based on the MCF in Villahermosa Yalumá and Guadalupe Quistaj, located in the municipality of Comitán de Domínguez, Chiapas, Mexico. MCF approach is intended to identify community capitals and the limitations people encounter in accessing and using existing assets in the face of climate change, disasters, and poverty.

1.1. Vulnerability and social vulnerability

The concept of vulnerability has been used by the social sciences, such as economics, demography, political science, ecology and anthropology among other related disciplines, to designate and evaluate exposure to different types of risks associated with the increase of the level of poverty (Araujo, 2015). This concept has been considered as an active area of research and an important policy approach due to its preventive implications associated with poverty (Traustadóttir & Rice, 2012). According to Osorio (2017), the vulnerability perspective might be analyzed from three levels: 1) the experiences of the everyday life as regards the risk or the risks that place to the persons in situations of vulnerability and 2) the impact of the patterns of development in the social plane and the use of resources to face the implicit risks of development. The author points out that on this level of analysis, the vulnerability perspective allows one to observe the relation between strategies and resources that the persons use to face the risk situation and 3) allows one to consider the impact that the structure of opportunities, comprised of the mobilization of the set of resources (assets) with which the persons are provided in its relation with the resources of the sociocultural framework to which it was possible or not to have access, and which makes it plausible to avoid, to reduce or in any case to overcome the damage caused by the threat.

In Mexico, the issue of vulnerability has been addressed from the social, environmental and infant mortality perspectives (Lara-Valencia et al., 2012); vulnerability in the health of older adults, indigenous people and migrants (Juárez-Ramírez et al., 2014); labor discrimination and vulnerability of women (Horbath & Gracia, 2014); social vulnerability in old age (Montoya-Arce 2016).

The notion of social vulnerability has been used extensively in multiple analysis settings in the field of the studies on inequality. This concept arose strongly in the nineties, from the social phenomena provoked by the economic instability of developing countries. Social vulnerability refers to all the factors that determine the outcome of a risk event of a given nature and seriousness; as well as the factors of social emergency that create the lack of capacity or ability to prepare, respond or recover from emergencies (Brooks, 2003; Martin, 2015), also refers to the poor population and in many cases, the need for their survival depends on public charity or state subsidies (Montoya-Arce 2016).

In accordance with Araujo (2015), social vulnerability does not refer exclusively to the situation of poverty as a lack of material resources, but also to the lack of capacity and organization necessary to improve the quality of life and access to different goods and services. This author adds that the individual is integrated into society through a double axis that corresponds to work and its world of relationships, family, and community.
1.2. **Sustainable livelihood and community capitals framework (MCF)**

The livelihood approach constitutes a tool to improve the comprehension of the resources and life strategies, particularly of the least favored populations, and was developed by the Sustainable Rural Livelihoods Advisory Committee based on earlier versions by the Institute of Development Studies, among others (DFID, 1999). The approach defines livelihood as the capacities, assets, and activities needed for the sustenance of the people. They represent assets (that include both material and social resources) and activities to make the living (Chambers & Conway, 1992). In its beginnings, the analysis of livelihood was based on four aspects: financial, social, environmental and productive for which this approach was strongly criticized for not presenting an analysis of the macrostructures that generate poverty and for the scarce historical analysis in addition to the apolitical position (Sakdapolrak, 2014). In the following years there arose a new perspective issued by Cornelia, Jan Flora and collaborators who redefined the basic aspects of the MVS and extended the capitals analyzed to seven: natural, cultural, human, social, political, financial and built, in this way giving rise to the Community Capitals Framework (MCF).

The MCF offers a way of analyzing the efforts of economic and community development from a system perspective, identifying the assets in every capital (asset), the types of invested capital (flow), and the interaction between the capitals and the impacts derived from the capitals (Anglin, 2015; Emery & Flora, 2006; Pigg, Gasteyer, Martin, Keating, & Apaliyah, 2013). The capital concept is defined as any type of resource capable of producing additional resources and when these resources or assets are invested to create new resources they convert to capital (Flora & Fey, 2004). These authors classify the capitals as tangibles such as industrial parks, businesses, natural footpaths or as intangibles such as community norms related to mutual help, pride in heritage or political influence. Emery and Flora (2006) posit that an advantage of the MCF is its emphasis on the assets, instead of the needs and deficits, as well as being focused on investments. These authors define capitals as:

1. **Natural capital**: referring to the assets that reside in a particular place, including climate, geographical isolation, natural resources, services, and natural beauty;
2. **Cultural capital**: reflects the form in which the persons “know the world” and how they act in it, as well as its traditions and language.
3. **Human capital**: includes the skills of the persons to develop and to improve their resources and to gain access to external resources and bodies of knowledge in order to increase comprehension, as well as identify promising practices and information for community building.
4. **Social capital**: refers to the connections between persons and to organizations to make positive or negative things happen. Social capital connection refers to these redundant bonds that construct community cohesion.
5. **Political capital**: reflects access to power, organizations, and the connections to agents of power.
6. **Financial capital**: includes much more than cash flow; it is a matter of the available resources as savings or net assets such as cattle, as well as pensions, remittances, and other financial transfers.
7. **Physical capital**: includes the infrastructure that supports these activities.

Another advantage of the MCF is the fact that it allows the analysis of assets that the poor possess more than what they lack, since it takes into consideration that the diverse situations related to poverty respond to different ways in which the homes administer their assets portfolios with a system perspective (Jacobs, 2011; Mattos, 2015; Zekeri, 2013). The assets are defined as the set of goods, resources or attributes (material or intangible) that can be administered to improve the well-being level or to overcome adverse situations. From this point of view, the individuals or poor families are more vulnerable than others in accordance with the possession and use that they make of the distinct social assets (Moser, 1998).
Several authors have used MCF to identify capitals, their contribution to community economic development, the empirical relationship of capital and the development of community leadership, especially in developed countries (Anglin, 2015; Flora & Fey, 2004; Jacobs, 2011; Mattos, 2015; Moser, 1998; Pigg et al., 2013; Zekeri, 2013).

According to Moser (1998) assets can be in three areas: a) in the persons themselves, whether in physical or spiritual form; b) in legislation or traditions, which allows people to acquire rights and gain access to services and; c) in social networks established within the community and with the institutions. Moser counsels that its study is of great importance when investigating the resources, strategies, and opportunities of the individuals and vulnerable groups to reduce their vulnerability and to face the external risks (natural and social), making possible both enhanced combat against poverty and improved well-being.

2. Methodology

2.1. Study area
The area of study is located in the communities of Villahermosa Yalumá and Guadalupe Quistaj, both placed in the municipality of Comitán de Domínguez, Chiapas, Mexico. This municipality has a territorial extension of 967.05 km² which represents 8.15% of the Frontier region and 1.38% of the area of the state. Its geographical coordinates are 16°15’ N and 92° 08’ W, its altitude is 1,600 mamsl. It is bordered to the north by the municipalities of Amatenango del Valle and Chanal, to the east by Las Margaritas and La Independencia, to the south by La Trinitaria and Tzimol and to the west by Socotlengan and Las Rosas. It is characterized not only by a semi-flat relief with some outstanding elevations in the north and south, but also for being one of the most populated municipalities in the region with 34% of the population, with regard to the regional whole (Instituto Nacional de Estadística y Geografía (INEGI), 2010) and having the most concentrated number of persons (36,867) dedicated to service industries (INEGI, 2014). The predominant climate is temperate sub-humid with rains in summer, being slightly warmer towards the Central Depression. The annual average temperature is 18°C with a rain precipitation of 1,020 millimeters yearly. The predominant vegetation is pine-oak forest (Instituto Nacional de Estadística y Geografía (INEGI), 2010).

2.2. Characteristics of the communities of study

2.2.1. Villahermosa yalumá
This community is constituted by 2,368 inhabitants (Instituto Nacional de Estadística y Geografía (INEGI), 2010). According to the residents, this locality was private property and therefore the streets and the houses are dispersed. For 40 years this locality was declared as common land (Ejido), and immediately after this, the community authorities brokered its enlargement, first of Yalumá and later of other nearby towns like Santa Inés y San Isidro. In this community, the settlers realize diverse productive activities for family sustenance, standing out among these the cultivation of corn and beans, animal husbandry of piglets, cattle and backyard animals, as well as the preparation of tostadas and tortillas, bread both for family consumption and for sale in the Comitán market. Additionally, this locality is has a creek, a water well, a lagoon, an area of Montezuma pine forest and a reforested area for the community for carbon capture. The community also counts on the basic services of electricity, drinking water, kindergarten, primary and secondary schools and a health center of the Mexican Institute for Social Welfare (IMSS).

2.2.2. Guadalupe quistaj
This community is formed by 570 inhabitants devoted to agriculture, especially the production of tomatoes, beans, and corn. The settlers began cultivating tomato eight years ago because it is the product that more sells on the market. The community is provided with basic services of education, health, and communication.
2.3. Method

A quantitative and qualitative study was conducted in order to examine the social vulnerability and the community capitals of the target communities regarding threats connected to climate change-related disasters, food insecurity, and illnesses. The target population of the study was integrated by the leaders of the localities and residents of the communities of study.

In the two localities, interviews and a survey of social vulnerability were conducted with the leaders of the communities. The questionnaire of the survey was structured and analyzed across an integral model designed based on the Community Capitals Framework (MCF), with the premise that social vulnerability expresses itself in scarce or low capitals of the community. The selection of variables for the construction of each capital and of the complementary variables drew from the indicators used in two case studies (Gutiérrez-Montes et al., 2014; Soares & Gutiérrez, 2011). Additionally, we proposed other components which were considered to give a better understanding of the health and the education realities of the localities (Ríos, Louman, & Jiménez, 2011) (See Table 1). The answers for several categories were turned into dichotomous variables; for example, the variable of “organization exists in the community” (Social capital) represents the unified responses regarding the level of organization in the community “slightly organized” and ‘not organized at all” as “NO” (it does not exist or little organization exists), while the “very organized” and “more or less organized” responses were assigned “yes” (the locality has more or less organization or is very organized).

A continuous scale from 0 to 1 was used for every variable analyzed in each community capital. Depending on the case, the total population or the total number of questionnaires for the locality was considered. Afterward, the average of the unweighted sum of the variables was obtained, which represented a capital index. Based on Bennett (2012), the averaged values were located in vulnerability scales in the following way: very high vulnerability (capital index 0–0.25), high vulnerability (low capitals >0.25–0.5), medium vulnerability (average capitals >0.5–0.75) and low vulnerability (high capitals >0.75–1).

For the application of the questionnaires, a significant statistical sample was calculated in the program Epi-info with intervals of confidence of 95% and taking as a baseline the total inhabited housing registered by INEGI in 2010 (Yalumá 594 homes and 160 in Guadalupe Quistaj). On the whole, 115 persons were interviewed in their homes, 50.3% in Yalumá and 65.1% in Guadalupe Quistaj, including information of 247 and 199 persons, respectively. The average number of occupants in inhabited private homes were 3.99 in Yalumá and 3.56 in Quistaj. The design of the database, the data entry, as well as the analysis of the information was realized in the Program SPSS.

3. Results

3.1. Community capitals framework

Below a table is presented with the summary of the values of the capitals and its classification in low, medium and high vulnerability (Table 2). Values of the capitals were between 0.25 and 0.55. In general, these are values that suggest a high vulnerability both regarding environmental and social factors. A description of each one follows.

3.1.1. Human capital

Human capital is the well-being of the population considered principally by means of health, education and occupation indicators. The demographic structure in ages of the population was distributed in a similar way in both localities; the polled families are considered to be young people since 21.5% of Yalumá and 21.1% in Quistaj were composed by 6-year-old minors. 7.9% of the persons polled in Yalumá and 23.1% of Quistaj had some relative working out of the community permanently.

The illnesses related to climate change, due to air and water contamination, are acute respiratory disease (ARD) and acute diarrheal disease (ADD). The ARD predominance in the entire population (interviewed persons and families) in Yalumá was 19.8% and 33.7% in Quistaj.
| COMPONENTS | Weighted value (scale 0–1) | Villahermosa | Yalumá | Guadalupe Quistaj |
|------------|---------------------------|--------------|--------|------------------|
| **HUMAN CAPITAL** | | | | |
| Population with the possibility of confronting risk situations | 0.79 | 0.79 | | |
| Permanent residence in the locality | 0.83 | 0.75 | | |
| Population with basic schooling | 0.04 | 0.11 | | |
| Low ARD predominance | 1 | 0.75 | | |
| Low ADD predominance | 0.75 | 1 | | |
| He tackles actions before disasters | 0 | 0 | 0.57 | 0.57 |
| **CULTURAL CAPITAL** | | | | |
| Recognition of natural heritage | 0.46 | 0.15 | | |
| Identification of dangers | 0 | 0 | | |
| Disaster prevention | 0 | 0 | | |
| | | 0.15 | 0.05 | |
| **SOCIAL CAPITAL** | | | | |
| Belonging to groups or institutions | 0 | 0 | | |
| Participation in the groups | 0 | 0 | | |
| Organization in the community | 0.56 | 0.67 | | |
| Participation in plans to face disasters | 0.10 | 0.04 | | |
| Existence of brigades or Civil Defense committees in the community | 0.37 | | | |
| | | 0.20 | 0.15 | |
| **POLITICAL CAPITAL** | | | | |
| Capacity of government response to disasters | 0.43 | 0.48 | | |
| Disaster preparedness by authorities | 0.60 | 0.54 | | |
| Relation community—government in disasters | 0.48 | 0.60 | | |
| The government listens to the proposals of the community | 0.46 | 0.52 | | |
| Knowledge of legislation on disasters or climate change | 0.02 | 0.00 | | |
| | | 0.39 | 0.43 | |
| **NATURAL CAPITAL** | | | | |
| Practices of conservation of flora | 0.27 | 0.14 | | |
| Practices of conservation of fauna | 0.13 | 0.02 | | |
| Good condition of the soil | 0.19 | 0.15 | | |
| Good condition of the principal natural riches | 0.24 | 0.08 | | |
| | | 0.21 | 0.09 | |
| **PHYSICAL OR BUILT CAPITAL** | | | | |
| Running water | 0.98 | 1 | | |
| Health clinics | 1 | 0 | | |
group predominance of ARD in 10-year-old minors was 15.4% in Yalumá and 45.9% in Quistaj, both prevalence levels at less than the national and state predominance. The ADD predominance in the total population was 3.6% in Yalumá and 4% in Quistaj. In 5-year-old minors, the predominance was 13.3% in Yalumá and 7.1% in Quistaj.

3.1.2. Cultural capital
We considered the evaluation of the biocultural patrimony of the localities, as well as the recognition of the natural and social riches that give meaning to everyday life in the community. 23.8% of the persons polled in Yalumá thought that there are no natural riches in their locality, while in Quistaj it was 34.6%. On the other hand, 19% of the persons in Yalumá answered that its natural riches were the trees and 9.6% in Quistaj. The percentage of persons who did not answer the question was 28.6% in Yalumá and 44.2% in Quistaj. In total, the communities are comprised of mixed ethnic population and are not speakers of indigenous languages.

3.1.3. Political capital
A 42.9% in Yalumá and 48.1% in Quistaj mentioned that the municipal governments have the capacity to face to disasters, in contrast, 46% in Yalumá and 26.9% in Quistaj mentioned that the government does not have this capacity.

Disaster management by the authorities was qualified as unremarkable by 38.1% in Yalumá and 38.5% in Quistaj; as poor by 22.2% and 13.5%; and as good by 15.9% in Yalumá and 15.4% in Quistaj.

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**Table 1. (Continued)**

| COMPONENTS | Villahermosa | Yalumá | Guadalupe Quistaj |
|------------|--------------|--------|------------------|
| Schools    | 1            | 1      | 1                |
| Electricity| 1            | 1      | 1                |
| Transportation| 1      | 1      | 1                |
| Churches   | 1            | 1      | 1                |
| Access to financing | 0      | 0      | 0                |
| Income from government programs | 0.33 | 0.18  |                  |
| Income from remittances | 0    | 0      |                  |
| **Weighted value (scale 0–1)** | 0.11 | 0.06  |                  |

**Table 2. Summary of seven capitals of the Capital Framework in the studied communities**

| Component   | Value in Yalumá | Grade of Vulnerability | Value in Quistaj | Grade of Vulnerability |
|-------------|-----------------|------------------------|------------------|------------------------|
| Human       | 0.57            | Medium                 | 0.57             | Medium                 |
| Cultural    | 0.15            | High                   | 0.05             | High                   |
| Social      | 0.20            | High                   | 0.15             | High                   |
| Political   | 0.39            | High                   | 0.43             | High                   |
| Natural     | 0.21            | High                   | 0.09             | High                   |
| Physical    | 1               | Low                    | 0.83             | Low                    |
| Financial   | 0.11            | High                   | 0.06             | High                   |
The relation between government and community was qualified by 38.5% of the persons polled in Quistaj and 20.6% in Yalumá as unremarkable (sometimes they provide support); as bad by 23.8% in Yalumá and as good by 19.2% (there is collaboration) in Quistaj. 19% in Yalumá neither gave their opinion nor qualified the government—community relation, as was the case of 25% in Quistaj.

In Yalumá and Quistaj, 46% and 51.9%, respectively, of the polled persons answered that the government listens to the proposals of the community, on the contrary, 38.1% in Yalumá and 21.2% in Quistaj said that they are not listened to.

As for knowledge of some strategy or law on Climate change, 84.1% in Yalumá and 75% in Quistaj said they not to know of any; only 1.6% of Yalumá said yes to knowing any.

3.1.4. Natural capital
27% in Yalumá and 13.5% in Quistaj of the polled persons mentioned to have applied some practice of plant conservation. While 12.7% in Yalumá and 1.9% in Quistaj mentioned to have conducted some practice of animal conservation.

The state of natural riches: 17.5% of persons in Yalumá and 15.4% in Quistaj mentioned that the state of the natural riches was deteriorated; 12.7% in Yalumá and 5.8% in Quistaj mentioned that it was preserved. A 49.2% in Yalumá mentioned that there are no natural riches in its community and, similarly, 34.6% in Quistaj.

3.1.5. Physical capital
Running water in the homes was found in 100% of the persons polled in Quistaj and in 98.4% in Yalumá; 100% of both localities have electricity in their homes.

3.1.6. Financial capital
It was found that only 18.1% of the polled persons and families in Quistaj received some type of support of the government. 32.8% of the polled persons and families in Yalumá receive it, this generally referred to the program *Prospera*, which is dependent on the federal government and is distributed to women according to the number of children and their participation in education and health.

3.2. Perceptions of the inhabitants regarding the community resources
The results of the workshops and interviews of the leaders of the localities envisioned the conditions, capacities, and resources which the community counts on. Regarding the natural resources of the community, they are perceived as being related to its livelihood, which they supplement with vegetable farming, pig and cattle husbandry, the preparation of tostadas and tortillas, and bread baking that they take to the Comitán market. Another resource that they envision is the community’s own organization, as they have received training courses in areas such as sewing, electricity, computing, have made use of the educational presentations of the program *Prospera* in nutrition, and have established certain agreements with the authorities to repair water problems and others related to education and health.

The socioeconomic problems detected by the group were difficulties for the commerce of tostadas and health problems principally from the smoke, this being related to the absence of participation of the women and low income. They lack the resources for education and health since they detect food insecurity during the dry seasons. In general, they comment on the need for services and increased participation to diversify their sources of livelihood.

Digging deeper into the health problems, the groups mention that in the 90s they had better health conditions and that the illnesses increased with the agricultural crisis and with low production of corn and beans, the growth of the availability of processed foods rich in carbohydrates and fats, which in addition to the lack of water, they have provoked a perception of poor nutrition and
food insecurity. In Yalumá, where the women devote themselves to the sale of tostadas, the problems of low commercialization and physical exhaustion of the women were presented; therefore, they suggest the search for labor alternatives.

In the locality of Guadalupe Quistaj, the principal problem of water pollution, caused by drainage of black waters originating from the city of Comitán and high concentrations of fertilizers and pesticides from the tomato cultivation, was mentioned. The need to use crop rotation and diversity to avoid the further deterioration of the soil and the need for training for men and women in other productive activities were mentioned. Also mentioned was that health is perceived to be deteriorated and cases of cancer have appeared as well as an increase of diarrheas.

In both localities, the main transformations perceived by the inhabitants have occurred in the last 10 to 20 years, which they attribute to the modernization development and the agricultural crisis. In general, an advance is perceived in the securing of services of education and health, highways and communication; nevertheless, there has been an increase in illnesses like diabetes and cancer, in addition to the contamination of the air, water and the changes in the rain and dry seasons, which leads to more frequent acquisition of daily food and the appearance of the combinations of undernourishment and obesity.

4. Discussion
With the evaluation of the capitals and the perceptions of the population, high social vulnerability is appreciated in the light of diverse environmental threats like climate change; drought and soil deterioration, as well as social threats in agricultural production systems and the absence of revenue alternatives, all coupled with the findings of low capitals levels in the community. Although the perception of changes in the rainy season and the threat of the drought is increasing, the response of the social organization to face such challenges and to adapt itself are limited. The two communities devote themselves to the cultivation of corn and tomato, with challenges of low productivity in addition to the problems of contamination and access to the water that have sharpened in the last years. In Yalumá the homes have running water; nevertheless, its use is prohibited for irrigation and fines have been implemented to persons who are caught watering some plants and gardens. In Guadalupe Quistaj the crops are watered with drainage water from the city of Comitán, with a constant risk of exposure to the farmers.

The community capitals that were evaluated as low present, for the most part, difficulties and challenges for reaching sustainable means of livelihood. They also demonstrate a high level of complexity for the application of alternative production, given that the deterioration of the soil, the scarcity of the water and food insecurity related to results of the climate change are the panorama in the medium and long term.

5. Conclusions
The scenarios on a global level denote a high social vulnerability to environmental and social changes, principally the transformations in livelihood and food production systems at the local level. The capitals of the studied rural localities are scarce and are in an inverse relation with the vulnerability; the lower the capitals, the higher the social vulnerability. The damages to the health-related to the low crop production for personal consumption have allowed changes in the food practices with the introduction of industrialized food daily diet which has changed the perceptions about health and food security. Climate change at the local level shown by the changes in the rainy seasons, with modifications in the extremes of intensity and length of the droughts periods has become the main threat for food insecurity.

The production alternatives are scarce due to the problems of water access. This is complicated by the need to diversify systems of production which has been out of the reach of the men, as well as the difficulties of implementing other tasks to contribute to the family income by the women who are dedicated to the care of the health, feeding, and education of the children.
The social vulnerability according to the inhabitants has increased in the last 20 years due to the transformations of development and changes in the means of life. Therefore, the commitment from the social and environmental policies should focus on the search for alternatives that increase the adaptation and resilience to threats like climate change in rural settings such as the studied localities.

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