Human-Wildlife Interactions in the Sierra Gorda Biosphere Reserve, Mexico
Annual Report Y2

Rufford Small Grant for Nature Conservation
In association with the Whitley Laing Foundation

By:

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1. Introduction

Wildlife-human conflict is a widespread conservation issue of increasing concern to conservationists (Woodroffe *et al*., *in press*). Human-wildlife conflict occurs when the needs and behavior of wildlife impact negatively on the goals of humans or when the goals of humans negatively impact the needs of wildlife. These conflicts may result when wildlife damage crops, injure or kill domestic animals, threaten or kill people (WPC Recommendation, 2003). In actuality, whenever a human-wildlife conflict occurs, both parties (humans and wildlife) lose (Conover, 2002: 8; Sitati, 2003; Vaske & Manfredo, 2004; Walpole *et al*., 2003), thus, human–wildlife interactions is a challenging aspect of most wildlife management (Kaltenborn, Bjerke & Nyahongo, 2006; Treves *et al*., 2006).

The extent to which people tolerate wildlife damage may be influenced by various socio-economic factors, including relative wealth, levels of education, the extent to which people derive monetary or other benefit from wildlife, and the magnitude of wildlife-associated costs. However, personal values also have an important influence on attitudes towards conservation. Therefore, understanding which factors influence attitudes and tolerance in different situations is key to choosing and targeting the most appropriate solutions, whether mitigation to reduce losses, education to improve awareness, or benefit generation to provide incentives (see Zimmermann, Walpole & Leader-Williams, 2005).

This study attempts to give a balanced review of the importance of the interactions of humans and wildlife within Sierra Gorda Biosphere Reserve (RBSG), Querétaro, Mexico. The current status of wildlife in the RBSG and its conservation challenges can be best understood in the context of its historical association with people. The area's mosaic of geophysical and climatic features explains the great variety of vegetation types and species richness and also accounts for the high dispersion of the human population within the Reserve. This has resulted in various conflicts between wildlife and people, such as the hunting of mountain lions, jaguars and coyote because of their perceived threat to livestock. To conserve the wildlife of the Reserve, there is a need for a clear understanding of these conflicts and for the development of innovate solutions.
A greater understanding of the human wildlife conflicts will also provide a greater understanding of the use, values and importance of wildlife in the region and render more tools for conservation, where neither humans nor wildlife have an adverse impact upon the other.

In order to better serve the long-term goal of reconciling the concrete needs of the local inhabitants of Sierra Gorda Biosphere Reserve, those of the wildlife species, and those of Grupo Ecológico Sierra Gorda (GESGIAP) and the authorities of the Reserve, the project has the following objectives:

a. Give an overview of the human-wildlife interactions (positive and negative) in the Sierra Gorda Biosphere Reserve (SGBR), highlighting their relevance and relative importance.
b. Determine the current and potential human-wildlife conflicts in the SGBR.
c. Examine the factors that have contributed to promote human-wildlife conflicts in the SGBR.
d. Investigate previous and present conflict mitigation strategies for human-wildlife conflicts in the SGBR.
e. Assist both GESGIAP and the authorities of the Reserve in the identification of constraints and opportunities to address said conflicts with innovative strategies.

In order to fulfill the aforementioned objectives, with the support of Rufford Small Grant for Nature Conservation, research was carried out during a two year period. Local organizations, GESGIAP and the protected area authorities (RBSG) also provided in kind support to enable us to reach the visited localities. In this document, we report the activities that took place in the second year in the context of the project as a whole.

2. Study Area

Biophysical Profile

The Sierra Gorda Biosphere Reserve (SGBR) is located in the State of Queretaro in northern Mexico between 20° 50´ and 21° 45´ latitude north and 98° 50´and 100° 10´ longitude west (Figures 1, 2 and 3) (GESGIAP, 2005).

The RBSG belongs to the Pánuco River basin via the Santa María and Moctezuma rivers, which in turn are fed by the Escanela, Tancuilín, Extoraz, Ayutla and Concá rivers. The RBSG presents great physiographic complexity, with altitudes ranging from 300 meters above sea level in the canyon of the Santa María River in the municipality of Jalpan de Serra to 3,100 meters above sea level at the summit of the Cerro de la Pingüica, found in the municipality of Pinal de Amoles. This physiological complexity, combined with a heterogeneous precipitation pattern, ranging from 350 to 2,000 mm per year, generates numerous climate variations. The strong variation in rain patterns is a result of rain shadows created by the mountain ranges of the Sierra Gorda (GESGIAP, 2005).

Figure 1. Location of the Sierra Gorda Biosphere Reserve in Mexico

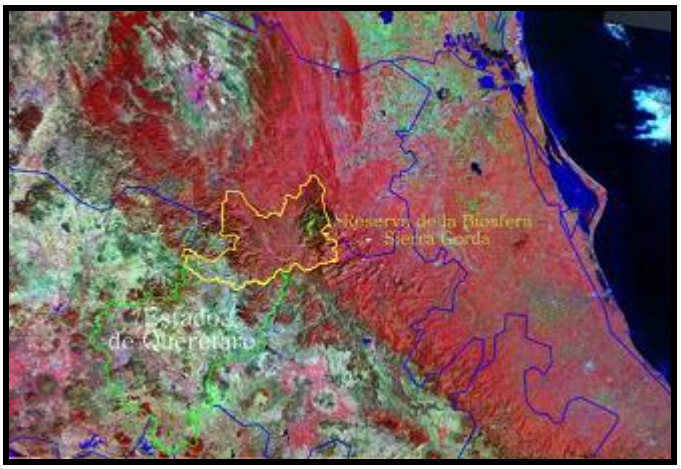

Figure 2. Location of the Sierra Gorda Biosphere Reserve in Mexico

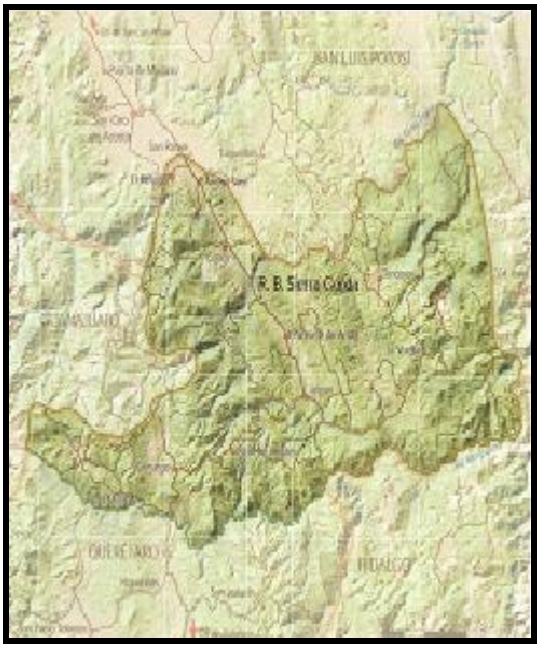

Figure 3. Location of the Sierra Gorda Biosphere Reserve in Mexico

Its strategic biogeographical position between the Arctic Neotropical and the Mesoamerican Mountain regions makes Sierra Gorda one of the most ecologically rich and diverse natural protected areas in Mexico. The conservation of the ecosystems of Sierra Gorda is essential, they host a number of threatened species and serve as a refuge for migratory species (UNESCO, 2005).

The principal biological characteristic of the Sierra Gorda is eco-diversity. It is unique for its large number of distinct ecosystems with high diversity of life forms. For biodiversity, it is one of the richest, best-conserved and diverse sectors of the state of Querétaro, and stands out for its level of conservation in comparison with neighboring regions and states (GESGIAP, 2005).

Vegetation Types

The vegetation of the Sierra Gorda Biosphere Reserve (RBSG) is composed of 14 vegetation types and subtypes, dominated by the tropical sclerophyllous forest. The RBSG vegetation types include: Tropical Evergreen Forest, Tropical Sub-deciduous Forest, Tropical Deciduous Forest, Xerophyllous Scrubs (Piedmont, rosetophyllous, crasicaulescent, microphyllous and oak scrub), Oak Forest, Coniferous Forest, Pine-Oak Forest, Cloud Forest, Riparian Forest, and Aquatic Vegetation (Figure 4) (SEMARNAP, 1999; GESGIAP, 2005).

To date, 2,308 species of vascular plants have been registered. The SGBR eco-diversity is shown by the presence of pure Nearctic species such as the Douglas fir (*Pseudotsuga menziesii*) and the quaking aspen (*Populus tremuloides*) in the highest part of the mountains of Pinal de Amoles, as well as species that grow in the jungles of southeast Mexico, such as the ceiba (*Ceiba pentandra*) and the breadnut (*Brosimum alicastrum*). The Sierra Gorda Biosphere Reserve also contains species common to the arid deserts of northern Mexico, such as the "cholla" (*Opuntia imbricata*) and the creosote bush (*Larrea tridentata*); and in the humid cloud forests of Chiapas, represented by the elm (*Ulmus mexicana*) and the tree fern (*Nephelea mexicana*) (SEMARNAP, 1999; GESGIAP, 2005).

Among the wild flora species found in the SGBR are (SEMARNAP, 1999; GESGIAP, 2005):

a. Endangered species: giant biznaga (*Echinocactus grandis*), chapote (*Diospyros riojae*), peyote (*Lophophora diffusa*), magnolia (*Magnolia dealbata*), Guatemalan fir (*Abies guatemalensis*).
b. Threatened species: magnolia (Magnolia schiedeana), Mexican cycad (*Dioon edule*), Yew (*Taxus globosa*), Mexican cypress (*Cupressus lusitanica*), red cedar (*Cedrela dugesii*), paloescrito (*Dalbergia paloescrito*), and Douglas fir (*Pseudotsuga menziesii*).
c. Endemic species: *Adiantum andicola, Agave tenufolia, Dyscritothamus filifolius, D. mirandae, Berberis albicans, B. zimapana, Fouqueira fasciculata, Lophophora diffusa, Neobauxbamia polylopha, Yucca queretaroensis, Ceratozamia sabatoi, C. microstrobila, Pinguicola acnata, P. montezumae, P. calderoninae* and *Velascoa recondita.*

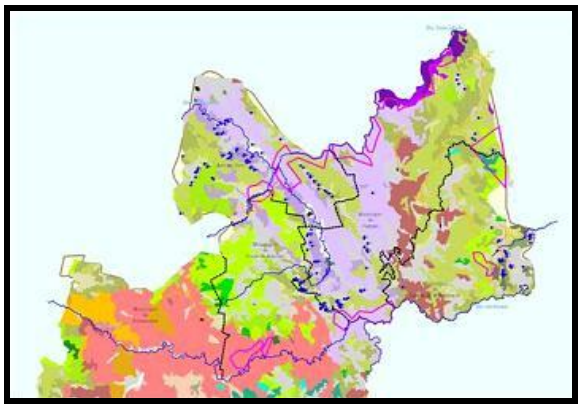

Figure 4. Map of Sierra Gorda Biosphere Reserve showing types of vegetation

Fauna

A total of 548 vertebrate species are reported in the Sierra Gorda Biosphere Reserve (SGBR) (SEMARNAP, 1999; GESGIAP, 2005). The only recorded group of invertebrates is the butterflies, with 725 species registered. This is a remarkable figure, placing the SGBR in second place nationwide for its butterfly diversity, surpassed only by the Montes Azules Biosphere Reserve, located in the Lacandon forest in Chiapas (Table 1) (GESGIAP, 2005).

Table 1. Vertebrate species reported in the Sierra Gorda Biosphere Reserve

Taxa	Total Sierra Gorda (*n*)	Total Mexico (*n*)	Percentage (%)
Birds	323	1,050	31
Mammals	131	502	26
Reptiles	71	717	10

(Modified from GESGIAP, 2005)

Amphibians	23	290	8
Butterflies	725	2,610	28

As a transition area between the Nearctic and Neotropical bioregions, the Sierra Gorda has a variety of species representative of both regions, including species like butterflies *Autochton siermadrior* and *Eucheira socialis*; Querétaro pocket gopher (*Pappogeomys neglectus*); bearded-wood partridge (*Dendrortyx barbatus*); crested guan (*Penelope purpurascens*); emerald toucanet (*Aulacorynchus prasinus*), military macaw (*Ara militaris*); porcupine (*Coendu mexicanus*); kinkaju (*Potos flavus*); otter (*Lutra longicaudis*); black bear (*Ursus americanus*); and, all of Mexico's feline species: jaguar (*Panthera onca*), puma (*Puma concolor*), bobcat (*Felis rufus*), margay (*Leopardus wiedii*), ocelot (*Leopardus pardalis*), and jaguarundi (*Herpailurus yagouaroundi*) (SEMARNAP, 1999; GESGIAP, 2005; Falconer, 2007; Pedraza 2007, Pers. comm.).

Administrative Profile

The Sierra Gorda Biosphere Reserve (RBSG) covers 383,567 hectares of the state of Querétaro (32% of Querétaro's territory). The RBSG contains 11 core protected areas that cover 24,803 hectares and a buffer zone with 358,764 hectares (SEMARNAP, 1999; GESGIAP, 2005).

The SGBR emerged from a presidential decree granted on May 19, 1997 with the purpose of protecting the Reserve's exceptional richness of species and ecosystems. The Reserve is managed by the National Commission of Natural Protected Areas (CONANP) of the Ministry of Environment and Natural Resources (SEMARNAT) (CONANP, 2005).

In 2000, a Management Plan was launched as a result of the joint effort between the Mexican Government, civil associations and the local communities to focus on the sustainability of the agricultural production and the restoration of degraded natural systems, with special attention to generating local benefits. A programme for environmental education has also been put in place where 162 schools will focus on 'education for sustainability'. The biosphere reserve's principal goal is to implement an economic development strategy with local communities and institutions, especially on commercial forest plantations in degraded areas (UNESCO, 2005).

Socio-Economic Profile

The Sierra Gorda Biosphere Reserve (RBSG) is divided in five municipalities, which are: Jalpan de Serra, Arroyo Seco, Landa de Matamoros, Peñamiller, and Pinal de Amoles (Figure 5). The RBSG has approximately 100,000 citizens (7.5% of the State population). In the (RBSG) there are 638 localities, which are highly dispersed and marginalized; there are only 7 localities between 1000 and 2499 inhabitants and one locality with more than 5000 inhabitants (SEMARNAP, 1999; GESGIAP, 2005; UNESCO, 2005).

Although the inhabitants of the SGBR carry out some economic activities (seasonal agriculture, cattle ranching and forestry), people mostly depend on the income ("remesas") generated by workers that emigrate to the United States (US) and to other parts of Mexico. As a result, the overall population of the RBSG is either stagnant or declining, the cultural identity is being lost, there is segregation and abandonment, and there are new consumer needs. Migration, on the other hand, is alleviating the pressure posed from the people over natural resources (SEMARNAP, 1999; GESGIAP, 2005; UNESCO, 2005).

Although the great majority of the inhabitants of the SGBR speak Spanish, there are distinct Indigenous communities (Nahuas, Tenec, Pames, and Capulcos) that speak "pame" and "huasteco". In fact, the region is influenced by the 'huasteca' culture, which is reflected in music and cooking. As for the land

tenure system in RBSG, approximately 70% is private property and 30% is community administered regime or "Ejido" (SEMARNAP, 1999; GESGIAP, 2005).

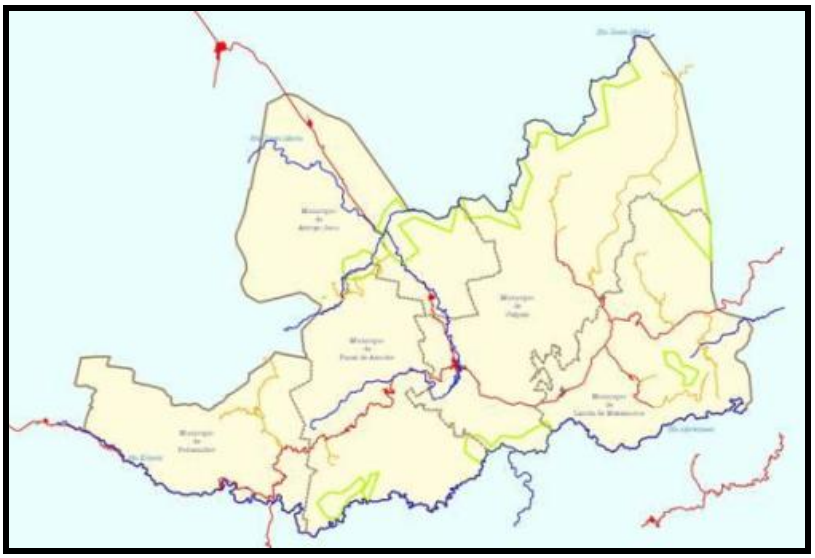

Figure 5. Map of Sierra Gorda Biosphere Reserve showing geopolitical division

3. Methods

Data collection

Semi-structured interviews were conducted with key informants in pre-selected local communities and opportunistic data were also recorded.

The rationale behind the selection of the localities was three fold:

a) The actual existence of a conflict, as communicated by local people either to the authorities of the SGBR or to the staff of either one of the NGOs working in the Reserve (Bosque Sustentable A.C. and GESGIAP).
b) The remoteness of the locality regardless of whether conflicts have been reported or not. Remoteness meant higher probabilities of even more severe conflicts taking place given that the presence of wildlife increases as human presence and concentration (density) decreases.
c) An opportunistic approach for transportation to certain localities became available from authorities of the SGBR or NGO staff.

Personnel of the two NGOs working in the Reserve (Bosque Sustentable A.C. and GESGIAP) were our allies in contacting the informants and in reaching their respective localities, throughout the duration of the project. All personnel from these organizations and reserve's authorities respectfully refrained from interfering with the conversations or interviews. A guide or checklist with the critical issues to address during the semi-structured interviews was prepared and used (see Table 2). The checklist was for the use of the interviewers only, never shown to the interviewees, so they could speak openly and freely about their interactions with wildlife. Data gathered were sorted out in MS Excel spreadsheets and MS Word files for processing and further analysis.

The interviews were conducted by Inés Arroyo-Quiroz, Ramón Pérez-Gil Salcido and Roberto Romero Ramírez from FAUNAM AC and Isabel Landaverde Ramírez (GESGIAP). Increasing the number of

interviewers enabled us to increase the number of localities visited and consequently multiply the number of interviews as well. Information resulting from the interviews was recorded in notes taken in log books but also every single conversation was digitally recorded with prior consent of the interviewees. As we did during the first year of work, when some preliminary findings emerged, we held lengthy meetings with GESGIAP and RBSG staff in order to better define the next localities to visit as well as the timing and itineraries.

Table 2. Checklist used during interviews in the Sierra Gorda Biosphere Reserve, Querétaro, Mexico

Information to be collected	
General Information	☐ Date ☐ Location ☐ Village name ☐ Informant's name ☐ Sex/ Gender ☐ Age ☐ Ethnicity ☐ "class" & "status" in community ☐ Religion ☐ Time spent per interview
Socio-economic, demographic and political information **Wildlife information** **Human-wildlife conflict – the facts**	☐ Land use strategies ☐ Population densities ☐ Human Distribution ☐ Tenure systems ☐ Men and women's responsibility for access to and control of various resources ☐ Location of communities/farms in relation to human habitation, NPA boundaries ☐ Field distance from villages ☐ Interviewee's field size (hectares) ☐ Description of surrounding vegetation and habitat type ☐ People's dependence on specific resources ☐ Types of crops grown ☐ Uses of, and value of, different crops to households ☐ Ranking of crops ('most important' – 'least important' and why) ☐ Ranking of crops with respect to vulnerability to damage by animals ☐ Agricultural calendar (planting and harvesting times) ☐ National law and government policy with respect to wildlife, land and conservation issues ☐ Local knowledge of wildlife laws and conservation issues ☐ Local knowledge of conservation efforts by GESGIAP ☐ Traditional institutions for controlling wildlife ☐ Interviewee's specific means of livelihood ☐ **Presence/absence of damage by wildlife** ☐ **Interactions taxonomy** ☐ **Ranking of species (ranked from 'most' to 'least' troublesome and why)** ☐ **Explicit ranking criteria** ☐ **Current uses of wildlife species** ☐ **Species causing damage-problems** ☐ **Timing (diurnal/nocturnal)** ☐ **Frequency (daily, weekly, occasional)** ☐ **Seasonality**

Impact (crop, livestock, human lives) **Local people's perception**	□ **Where do wildlife species come from** □ **Behaviour** □ Date of incident □ Village name □ The spp. to be responsible or believed responsible for losses □ Map reference- GPS □ Spatial distribution of damage events and NPA boundaries □ The natures of the conflict (crop losses, damage to property, threat to human life, if plant, part damaged) □ Type of conflict (direct, indirect, substantive, emotional, destructive, constructive) □ Stakeholders in conflict □ Types of crop/livestock damaged by wildlife □ Other crop/livestock present but not damaged □ Whether neighboring field/animals were damaged □ Who are the people who complain most about problems with wildlife locally (sex, age, ethnicity, class, location in relation to NPA, forests) □ Who actually makes formal complaints □ Have you made a specific claim? □ What was the incident? Elaborate please □ When?, □ To Whom? □ What Happened? □ **Amount of damage (damage per village per month, damage per household per month). Actual damage** □ **Who determines, measures, the degree of actual damage?** □ **The number of households affected locally** □ **Frequency of damage per month** □ **Estimate of losses (area, kgs., lives)** □ **Area of loss to an estimate of kg/ha lost** □ **Average percent loss per damage event** □ **Overall mean annual percentage loss** □ **Other indirect economic losses** □ Knowledge of local perceptions of the severity of damage by wildlife (how and why people perceive damage the way they do) □ Interviewee's opinion on the severity of damage □ What the situation means to individuals □ Why people act the way they do □ Do local people value wildlife resources and if so which ones and why? (U.V. e I.) □ Do local communities think they get any benefits from local wildlife? □ Do you think you do something in particular to encourage such positive or negative interactions □ Do you think you do something in particular to deter or prevent negative interactions □ According to local communities who should be responsible for protecting crops/property/people against the activities of wildlife? □ Do local communities consider conservation to be an important issue locally and if so, why? □ Particular cultural practices related to wildlife □ Other local values, beliefs and taboos as regards wildlife □ **How and whether people use particular strategies to try to minimize the levels of damage** □ **Details of any risk sharing systems or strategies already in**

Information to facilitate arriving at an acceptable solution **Community / local expectations**	**place that might be adapted to cope with the problems associated with damage by wildlife?** - **What are the local views on how the damage by wildlife should be dealt with and why do they think this?** - **What if any are the possibilities for alternative income generating sources appropriate to the area so that people can adopt an alternative subsistence strategy** - **Interviewee's opinion on the matter** - Local expectations of local wildlife authority personnel, conservation agencies and researchers (responsibility and outcomes) - Local expectations of benefits from conservation of wildlife - What they expect from any intervention - How do they think they should take the lead? - Who they expect to take responsibility for the issue - Other perspectives

Areas for consideration

A list of areas considered for the analysis and interpretation of data by researchers is presented in this section. The combination of equally important approaches, local communities' perspective (humans) and conservation from the perspective of wildlife was considered:

a. The way local communities access and value local natural resources
b. How local communities prioritize particular decisions with respect to livelihood
c. Household economic security
d. Access to and distribution of resources
e. How they perceive particular human-wildlife conflict issues
f. What the important issues are locally
g. How far important issues extend geographically and temporarily
h. What portion or group within the local population are affected, or considered themselves to be at risk
i. The type of problem that exists (people suffering, damage, potential damage, loss of human life)
j. A good understanding of the actual problem (fear of particular species render people to complain even when they cause small amounts of damage)
k. Detailed and accurate information as to the extent of the problem (are people equally affected as per location; is the problem seasonal; which particular species are involved)
l. Knowledge of the degree of people's perception of risk (vital to understand when and why people's complaints exaggerate)
m. Community related factors such as socio-economic information (village residential patterns; land tenure practices; particular human-wildlife conflict' issues as perceived by local people)
n. Losses (vulnerable crop and/or livestock and their role in local security and the extent of damage they sustain)
o. The social and economic costs of damage to households
p. Wildlife (Biological and ecological aspects about the species perceived as problematic)
q. Deterrence (methods of reducing losses already in use and presence/absence of local community management structures that might be used to implement monitoring and deterrence strategies)
r. Possible options with respect to intervention and trying to reduce human-wildlife conflicts, if any.

4. Effort

During Y2, a total of 67 localities of the Sierra Gorda Biosphere Reserve (SGBR) were visited between November 2006 and April 2007, mainly from the Municipalities of Jalpan de Serra (28.3%) and Arroyo Seco (20.9%), followed by Landa de Matamoros (19.4%), Pinal de Amoles (17.9%), and Peñamiller (13.4%) (Tables 3, 4; Annex 1). A total of 163 semi-structured interviews were undertaken in these localities (Table 5). Also, a total of 8 semi-structured interviews were undertaken in the outskirts of the SGBR (Table 6).

Table 3. Localities visited in the Sierra Gorda Biosphere Reserve between November 2006 and April 2007

Municipality	Locality
Arroyo Seco	Agua Fría de los Fresnos
	Ayutla
	Casas Viejas
	El Bosque
	El Pocito
	El Sabinito
	El Tepozán
	Laguna de la Cruz
	La Mojonera
	La Purísima de Arista
	Río Carrizal
	Salitrillo
	San José de las Flores
	Santa María de Cocos
Jalpan de Serra	Acatitlán del Río
	Agua Fría
	Barriales
	Carrizal de los Sánchez
	El Álamo
	El Carrizalito
	El Saucito
	La Esperanza
	Los Charcos
	Los Guayabos
	Los Jasso
	Piedras Anchas
	Saldiveña
	San Antonio Tancoyol
	San Isidro
	San Juan de los Durán
	Soledad del Refugio
	Tancoyol
	Tierra Fría

Landa de Matamoros	Acatitlán de Zaragoza
	El Lobo
	El Madroño
	Encino Solo
	La Joya Chiquita de San Antonio
	La lagunita
	La Reforma
	Mazacintla
	Neblinas
	Otates
	Palo Verde
	Polvareda
	Valle de Guadalupe
Peñamiller	Agua Fría
	Camargo
	Extoráx
	La Colonia
	La Estación
	Peña Blanca
	Peñamiller
	Plazuela
	San Juanico
Pinal de Amoles	Agua del Maíz
	Agua Amarga
	Cuesta Blanca (Río Escanela)
	Derramadero de Juárez
	El Cantón
	Epazotes Grandes
	La Colgada
	Los Pinos
	Río Escanela
	Santa Águeda
	Tonatico
	Hierba Buena

Table 4. Localities visited in the Sierra Gorda Biosphere Reserve per Municipality between November 2006 and April 2007

Municipality	**Number of Localities**	**Percentage (%)**
Jalpan de Serra	19	28.3
Landa de Matamoros	13	19.4
Pinal de Amoles	12	17.9
Arroyo Seco	14	20.9
Peñamiller	9	13.43
Total	**67**	**100**

Table 5. Semi-structured interviews undertaken in the Sierra Gorda Biosphere Reserve per Municipality between November 2006 and April 2007

Municipality	Number of Interviews	Percentage (%)
Pinal de Amoles	50	30.6
Jalpan de Serra	33	20.2
Landa de Matamoros	30	18.4
Arroyo Seco	27	16.5
Peñamiller	23	14.1
Total	**163**	**100**

Table 6. Localities visited in the outskirts of the Sierra Gorda Biosphere Reserve between November 2006 and April 2007

Municipality	Locality	Number of Interviews
Xilitla (San Luis Potosí)	El Retén	2
	Potrerillos	1
	Soledad de Zaragoza	2
Atargea (Guanajuato)	Atargea	3
Total		**8**

During Y2 we were able to reach remote localities not covered during Y1 (Table 7). As planned, these localities were selected together with the Grupo Ecológico Sierra Gorda (GESGIAP) and the SGBR staff considering primarily their relative importance as per the human wildlife conflicts reported and secondly, the foreseen probabilities of finding conflicts due precisely to the localities remoteness. These are places hard to access, few are close to where dirt roads end but most of them are accessible only by foot and hoof paths, or following with a 4X4 all terrain vehicle the bed of a river, or equivalent undertakings, they inhabited by very few families and much closer to undisturbed forests or natural habitats. We foresaw, for Y2 the need to visit localities situated far from densely populated areas, far from heavily trafficked roads, from busy areas, and hopefully as a consequence, in close proximity to natural habitats. The assumption being that remote areas might have more cases of events of contact between wildlife and humans (or human property like cattle) and that such incidents might perhaps be regarded as conflicts thus worth documenting for the purposes of this study. In fact, when Y1 concluded, we discussed and agreed with our colleagues in the Reserve the need to expand our geographical coverage in the coming years in order to visit some of these remote localities. From some of these localities reports have been received at the Reserve Headquarters of attacks by large predators for example, but not exclusively. For the aforementioned reasons, 22.38% of all localities visited are some of those considered remote (Table 7).

Table 7. Remote localities visited in the Sierra Gorda Biosphere Reserve between November 2006 and April 2007

Municipality	Locality
Arroyo Seco	Casas Viejas
	El Bosque
	El Tepozán
	Santa María de Cocos
Jalpan de Serra	El Carrizalito
	Los Jasso
	San Antonio Tancoyol
	Soledad del Refugio
Landa de Matamoros	La Joya Chiquita de San Antonio
	La Lagunita
	Neblinas
Pinal de Amoles	El Cantón
	Epazotes Grandes
	Los Pinos

Finally, some localities that were visited during Y1 were visited again during Y2 in order to complement and enriched the information gathered during Y1 (Table 8). This more in depth coverage of certain localities allowed fine tuning, verification and/or confirmation of previous findings.

Table 8. Localities visited in the Sierra Gorda Biosphere Reserve during Rufford Y1 (2004-2005) and Rufford Y2 (2006-2007)

Municipality	Locality
Arroyo Seco	El Tepozán
	La Mojonera
Jalpan de Serra	El Carrizalito
	La Esperanza
	Los Charcos
	Los Jasso
Landa de Matamoros	Acatitlán del Río
	La Lagunita
Peñamiller	Peñamiller
Pinal de Amoles	La Mesa de la Colgada

Effort Y1 vs. Y2

During Y1 we were able to visit 28 localities and conducted a total of 46 semi-structured interviews (see Final Report Y1). The originally expected number of localities and interviews for Y2 was around 25 localities and 40 interviews, provided that an equivalent support was going to be received from the local organizations (Table 9). However, the support received was greater for Y2, the scope varied in nature as per the request of the local NGOs and Reserve Authorities and we added two more interviewers. Instead, the figure accomplished was 67 localities visited and a total of 163 semi-structured interviews undertaken in the Sierra Gorda Biosphere Reserve (Tables 4, 5). To the aforementioned, we must also add 8 interviews in 4 localities in the outskirts of the Reserve (Table 6), consequently the overall figure for Y2 is 171 interviews conducted (over three and a half fold increase) and 71 localities visited (over two fold increase) (Table 9).

Table 9. Localities visited and interviews undertaken in the Sierra Gorda Biosphere Reserve: Comparative results from Rufford Y1 (2004-2005) and Y2 (2006-2007)

	Y1 accomplished	**Y2 expected**	**Y2 accomplished**
Number of Localities	29	25	**71**
Number of Interviews	46	40	**171**
Interviews per locality ratio	1.58	1.6	**2.4**

Migration, household economy and wildlife conflicts

During Y2 we gathered relevant information, through the interviews and bibliographic searches about the social and economic characteristics of the 5 municipalities of the Sierra Gorda Biosphere Reserve (SGBR) where the study takes place. The purpose of this effort was to use this information to better understand the interdependence between household economy and human wildlife conflicts. Descriptive statistics for all the municipalities was gathered with reference to a number of figures such as gender, age, degree of education, mortality, health, income, employment, as well as indexes like UNDP on Human Development (IDH), Gender Empowerment (IPG) and Gender related Development (IDG) (Annexes 1, 2). We also continued gathering information about migration (e.g. Nadal, 2003; Enciso, 2006; Mejía *et al*., 2006, among other) for it was clear during Rufford Y1 that the migration phenomenon taints all that takes place in the SGBR. Once we finish the transcription of all interviews and the cumulative analysis of Y1 and Y2, then we will be in a position to correlate thoroughly the human-wildlife conflict findings with the social and economic information, including migration.

5. Monitoring and Evaluation

We designed our own set of indicators and performance scale as part of our quality assurance monitoring and evaluation scheme. Four elements comprised the indicators a) number of interviews, b) number of localities visited in field trips, c) geographical coverage and d) products and deliverables. In terms of the number of interviews achieved, as well as the number and remoteness of the localities visited, the field work undertaken during Y2 was completed successfully (see Tables 4, 5, 7, 9; Annex

1). On the other hand, since the number of localities visited and the number of interviews undertaken increased dramatically during Y2, as suggested by the Authorities of SGBR and GESGIAP, in order to comply with the amount of work we were forced to waive, temporarily, other activities, products and deliverables originally planned:

1) Select case studies to try deterrence techniques;
2) Draft and distribute among the local NGOs and Authorities of the SGBR, some techniques and/or strategies (scientifically proven and empirically used) that could be disclosed in specific communities aimed at lessening human-wildlife conflicts and false myths concerning wildlife species[1]; and,
3) Transcription of all interviews[2]
4) Analysis of all the information gathered

Once we finish processing all the information gathered during Y2, we will be able to conduct a cumulative analysis adding the information from Y1 and a couple of presentations and papers will be prepared in due time.

6. Results

Description of the sample

Some descriptive characteristics of the Y2 sample are the following:

a. 100% of the interviewees are "Mestizos"
b. 100% of the interviewees belong to the Roman Catholic religion
c. 60% of the interviewees were males and 40% females
d. The age average in years of the interviewees was 54.5
e. The majority of the interviewees rely on migration, primarily to the U.S., as their prime means of survival. There is not a single locality in our sample that is not receiving money (*remesas*) from migrant workers. As per the information offered by the SGBR authorities and GESGIAP directives, all communities have migrant workers.

Overall report of all species

The following table summarizes the species recorded during the interviews as believed responsible of the damages for losses (Table 10, Annex 1). Although a number of invertebrate species (e.g. ants, beetles, white flies, larvae) responsible for economic losses and damages for causing problems to crops and stored goods were mentioned during the interviews, these are not taken into account as they were excluded from this study from the onset.

Table 10. List of species mentioned between November 2006 and April 2007 in 171 interviews as believed responsible for losses in the Sierra Gorda Biosphere Reserve

Common name	Species
Armadillo	*Dasypus novemcinctus*

[1] This was done exclusively during the interviews, at the end of which, when appropriate, we shared information with the interviewees so as to how conflicts are lessened elsewhere.
[2] Up to date roughly we have already transcribed four weeks of field work out of eight weeks

Coatimundi	*Nasua narica*
Vampire Bat	*Desmodus rotundus*
Bird	n.d.
Black bear	*Ursus* spp.
Coyote	*Canis latrans*
White tailed deer	*Odocoileus virginianus*
Eagle	*Spizaetus ornatus*
Feral dogs	*Canis familiaris*
Gray Fox	*Urocyon cinereoargenteus*
Hawk	*Accipiter* spp.
Jaguar	*Panthera onca*
Jaguarundi	*Felis yagouaroundi*
Mice	*Mus musculus, Peromyscus* spp. and other spp.
Bob cat	*Lynx rufus*
Opossum	*Didelphis virginiana*
Parrots	*Amazona* spp.
Puma	*Puma concolor*
Rabbit	*Sylvilagus* spp.
Racoon	*Procyon lotor*
Rat	*Rattus rattus*
Salamander	*Pseudoerycea belli*
Snakes	*Crotalus* spp., *Bothrops* spp. and other spp.
Squirrel	*Sciurus* spp.

The following percentages summarize the relative ranking of the species responsible of the damages recorded as per the proportion of the interviewees that freely mentioned knowing or experiencing a recent negative interaction with these species (Table 11). The statistical frequency of the species accounts for its ranking.

Table 11. Relative ranking of the species mentioned in 171 interviews between November 2006 and April 2007 as believed responsible for losses in the Sierra Gorda Biosphere Reserve

Common name	Species	Percentage (%)
Squirrel	*Sciurus* spp.	21.7
Hawk	*Accipiter* spp.	14.0
Puma	*Puma concolor*	12.5
Coatimundi	*Nasua narica*	10.1
Gray Fox	*Urocyon cinereoargenteus*	8.69
Coyote	*Canis latrans*	6.28
White tailed deer	*Odocoileus virginianus*	4.34
Rabbit	*Sylvilagus* spp.	4.34
Vampire Bat	*Desmodus rotundus*	1.93
Eagle	*Spizaetus ornatus*	1.93
Feral dogs	*Canis familiaris*	1.93
Racoon	*Procyon lotor*	1.93
Armadillo	*Dasypus novemcinctus*	1.44

Bird	n.d.	1.44
Jaguar	*Panthera onca*	1.44
Jaguarundi	*Felis yagouaroundi*	0.96
Mice	*Mus musculus, Peromyscus* spp. and other	0.96
Snakes	*Crotalus* spp., *Bothrops* spp. and other spp.	0.96
Black bear	*Ursus* spp.	0.48
Bob cat	*Lynx rufus*	0.48
Opossum	*Didelphis virginiana*	0.48
Parrots	*Amazona* spp.	0.48
Rat	*Rattus rattus*	0.48
Salamander	*Pseudoerycea belli*	0.48

Overall report of all species Y1 vs. Y2

In these preliminary results, -for the cumulative analysis for both years is in progress and will eventually be turned into a published paper-, we can briefly compare the relative ranking that species, considered obnoxious, are given by interviewees during Y1 and Y2. Twice as many species as those reported during the first year's field work were mentioned in this second year (Table 12). As expected, this is a result of the increase in geographical coverage, hence number of localities visited and interviews undertaken.

Table 12. Relative ranking of the species mentioned during Y1* and Y2 as believed responsible for losses in the Sierra Gorda Biosphere Reserve**

Relative Ranking Y1	Common name	Species	Relative Ranking Y2	Common name	Species
1	Puma	*Puma concolor*	1	Squirrel	*Sciurus* spp.
2	Squirrel	*Sciurus* spp.	2	Hawk	*Accipiter* spp.
3	Coatimundi	*Nasua narica*	3	Puma	*Puma concolor*
4	Gray Fox	*Urocyon cinereoargenteus*	4	Coatimundi	*Nasua narica*
5	White tailed deer	*Odocoileus virginianus*	5	Gray Fox	*Urocyon cinereoargenteus*
6	Hawk	*Accipiter* spp.	6	Coyote	*Canis latrans*
7	Snakes	*Crotalus* spp.	7	White tailed deer	*Odocoileus virginianus*
8	Vampire Bat	*Desmodus rotundus*	8	Rabbit	*Sylvilagus* spp.
9	Jaguar	*Panthera onca*	9	Vampire Bat	*Desmodus rotundus*
10	Coyote	*Canis latrans*	10	Eagle	*Spizaetus ornatus*
11	Cycad	*Dion edule*	11	Feral dogs	*Canis familiaris*
12	Coral Snake	*Micrurus fulvius*	12	Racoon	*Procyon lotor*
13	Jaguarundi	*Herpailurus yagouaroundi*	13	Armadillo	*Dasypus novemcinctus*
14	Jumping Pit Viper	*Atropoides nummifer*	14	Bird	n.d.
			15	Jaguar	*Panthera onca*

			16	Jaguarundi	*Felis yagouaroundi*
			17	Mice	*Mus musculus, Peromyscus* spp. and other
			18	Snakes	*Crotalus* spp., *Bothrops* spp. and other spp.
			19	Black bear	*Ursus* spp.
			20	Bob cat	*Lynx rufus*
			21	Opossum	*Didelphis virginiana*
			22	Parrots	*Amazona* spp.
			23	Rat	*Rattus rattus*
			24	Salamander	*Pseudoerycea belli*

* 46 interviews between November 2004 and October 2005
** 171 interviews between November 2004 and April 2007

According to Y1 and Y2 results, there are eight species reported for both years that top the list of the animals responsible for losses in the Sierra Gorda Biosphere Reserve, these are: 1) Squirrel *Sciurus* spp.; 2) Puma *Puma concolor* (Cougar or Mountain Lion, locally named "león"); 3) Coatimundi *Nasua narica* (locally named "Tejón", that happens to be the common name given in Northern Mexico to the Badger *Taxidea taxus*); 4) Hawk *Accipiter* spp. (presumably also *Buteo* spp. and even some Kites and Eagles erroneously taken as Hawks); 5) Gray Fox *Urocyon cinereoargenteus* (locally named "Mountain Cat" for they climb trees easily and is oftentimes confused and taken as a feline); 6) White tailed deer *Odocoileus virginianus*; 7) Vampire Bat*Desmodus rotundus*; and 8) Coyote *Canis latrans*. Among these, the Squirrel *Sciurus* spp. and Puma *Puma concolor* (see Plates 1-6) are the top ranking species in the overall frequency of mentions made by the interviewees reported for both Y1 and Y2 (Table 13). There are also two species reported for both years among the top ranking perceived as causing conflicts to humans, these are: the Jaguar *Panthera onca* and Snake *Crotalus* spp. (Tables 12, 13). Finally, there are two species that also top the list of the animals responsible for losses but that are reported only for Y2, these are Rabbit *Sylvilagus* spp. and Eagle *Spizaetus ornatus* (Table 13).

Table 13. Top ranking species in the overall frequency of mentions made by the interviewees during Y1* and Y2 as believed responsible for losses in the Sierra Gorda Biosphere Reserve**

Relative Ranking Y1	Common name	Species	Relative Ranking Y2	Common name	Species
1	Puma	*Puma concolor*	1	Squirrel	*Sciurus* spp.
2	Squirrel	*Sciurus* spp.	2	Hawk	*Accipiter* spp.
3	Coatimundi	*Nasua narica*	3	Puma	*Puma concolor*
4	Gray Fox	*Urocyon cinereoargenteus*	4	Coatimundi	*Nasua narica*
5	White tailed deer	*Odocoileus virginianus*	5	Gray Fox	*Urocyon cinereoargenteus*
6	Hawk	*Accipiter* spp.	6	Coyote	*Canis latrans*
7	Snakes	*Crotalus* spp.	7	White tailed deer	*Odocoileus virginianus*

8	Vampire Bat	*Desmodus rotundus*	8	Rabbit	*Sylvilagus* spp.
9	Jaguar	*Panthera onca*	9	Vampire Bat	*Desmodus rotundus*
10	Coyote	*Canis latrans*	10	Eagle	*Spizaetus ornatus*

* 46 interviews between November 2004 and October 2005
** 171 interviews between November 2004 and April 2007

Plate 1. Calf property of Mario Pedraza killed by a Puma (*Puma concolor*) on October 25, 2006 in Tonatico, Pinal de Amoles, Sierra Gorda Biosphere Reserve, México
(Photograph courtesy of Informant Mario Pedraza)

Plate 2. Place where a calf was killed by a Puma (*Puma concolor*) on October 25, 2006 in Tonatico, Pinal de Amoles, Sierra Gorda Biosphere Reserve, México
(Photograph courtesy of Informant Mario Pedraza)

Plate 3. Calf property of Mario Pedraza killed by a Puma (*Puma concolor*) on October 25, 2006 in Tonatico, Pinal de Amoles, Sierra Gorda Biosphere Reserve, México
(Photograph courtesy of Informant Mario Pedraza)

Plate 4. Inner section of a calf property of Mario Pedraza killed by a Puma (*Puma concolor*) on October 25, 2006 in Tonatico, Pinal de Amoles, Sierra Gorda Biosphere Reserve, México
(Photograph courtesy of Informant Mario Pedraza Ruiz)

Plate 5. Cuts made by a Puma (*Puma concolor*) over the skin of a calf killed on October 25, 2006 in Tonatico, Pinal de Amoles, Sierra Gorda Biosphere Reserve, México
(Photograph courtesy of Informant Mario Pedraza Ruiz)

Human wildlife conflicts: remote areas vs. populated areas

Some preliminary conclusions as result of evidence gathered during our field trips are:

Remote areas	**Populated areas**
The nature of damages is different in remote areas given that large carnivores (e.g. Jaguar and Puma) prey upon domestic animals and roam more freely without encountering humans.	Birds of prey and small mammals seem the most frequent obnoxious or troublesome animals in more densely populated areas.
The intensity is different in remote areas, for a given predator might persist on attacking the same herd intermittently but consistently for a larger period of time	In more heavily populated areas, patchy due to roads, paths, buildings and fences, attacks distribute more sparsely, perhaps because animals need to run off more rapidly.
The number of events in a given period of time is lower in remote areas due to the existence of a greater variety of species to feed upon in the proximity of remote localities.	The frequency of events is higher in more populated areas than in remote ones due to the scarcity of other food items different from domestic animals as readily available.

The role of the Sierra Gorda Biosphere Reserve (SGBR) and Grupo Ecológico Sierra Gorda (GESGIAP)

The conception of nature conservation has been imposed by SGBR and GESGIAP to inhabitants of the localities within the boundaries of the SGBR. This is usually the case in most NPAs in Mexico, however, in this case, which is almost unique, the "enforcement" of the principles of nature conservation

and the guidelines included in the Reserve's management plan is carried out in such a way that the human communities, even in remote localities, know that capturing animals or hunting is forbidden. The word has spread that if a tree needs to be taken down for a given reason, they should talk with the Reserve's authorities first. This is why understanding human wildlife conflicts seems valuable to design better messages to convey the benefits and purpose of nature conservation. The interest of GESGIAP and Reserve's Authorities with regards to this issue has grown due perhaps to the fact that the two field work efforts became eye-openers in the sense that the local communities' perceptions on wildlife species are decisive if one wishes to convey nature conservation messages. One can foresee a greater involvement of the local NGOs and the Reserve's Authorities, hence perhaps in the near future a protocol or set of procedures to deal with human-wildlife conflicts as has been our recommendation from the onset might be used as an example for other regions in the country.

The GESGIAP personnel are actively promoting among local cattle owners whose cultural practice is to release cattle to roam freely in forested areas to shift to other productive activities like forestry, rather than continue with cattle rising. Literally, hundreds of hectares previously used as foraging areas, have now been recovered and devoted to conservation, sustainable forestry or environmental services (carbon and water). So nowadays, in addition to the severe poverty and the associated migration phenomenon (Enciso, 2006; Mejía *et al*., 2006; Nadal, 2003) the count of herds (e.g. cows, sheep and goats) roaming freely in the RBSG has also diminished (Pedraza 2007, Pers. comm.) due to the active promotion of GESGIAP' programmes in which people is invited to engage in ecologically sound productive activities within the Reserve's boundaries. Locals are more interested in the short term return of their shifting of activities than in the long term benefit that such a shift will provide. For instance, people shifting from cattle ranching to planting trees are doing it with a short term gain having environmental services in mind. These shifts in land use may explain the alleged come back of certain species (e.g. *Odocoileus virginuanus* and *Melleagris gallopavo*, see Final Report Y1). In this regard, it is worth mentioning that during Y2 we witnessed what personnel of GESGIAP regards as a predator's comeback. The reappearance of Jaguar (*Panthera onca*) and Puma (*Puma concolor*) was reported, and even recorded, through photographs and prey remains (R. Pedraza-Ruiz, Pers.comm.) (Plates 1-7).

Plate 6. Juvenile jaguar captured on February 2007 in the region of La Joya del Hielo, Sierra Gorda Biosphere Reserve, Querétaro, México
(Photograph courtesy of Roberto Pedraza Ruiz, GESGIAP).

Plate 7. Juvenile jaguar captured on February 2007 in the region of La Joya del Hielo, Sierra Gorda Biosphere Reserve, Querétaro, México
(Photograph courtesy of Roberto Pedraza Ruiz, GESGIAP).

5. Final Remarks

Through Rufford Y1 and Y2 we have been able to acquire and share a much better and useful understanding of the perceptions and modes of interaction (positive and negative) of people and wildlife species in the Sierra Gorda Biosphere Reserve and surroundings. On the other hand, this experience has helped the teams of local NGOs and Reserve's Authorities to take note of a problem seldom considered as such and often neglected when fostering relationships with the communities.

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Annexes

Annex 1. Interviews November 2006-April 2007.xls

Annex 2. Social and Economic Data.xls

Date	Locality	Municipality	Informant	Gender	Age	Spp. believed responsible for losses 1	Damage over 1	Spp. believed responsible for losses 2	Damage over 2	Spp. believed responsible for losses 3	Damage over 3	Spp. believed responsible for losses 4	Damage over 4	Spp. believed responsible for losses 5	Damage over 5	Spp. believed responsible for losses 6	Damage over 6
27/11/2006	Agua del maíz	Pinal de Amoles	Roberto Pedraza Ruiz	Male	31	Hawk	Chicken	Armadillo	Vegetables								
27/11/2006	La Purísima de Arista	Arroyo Seco	Rafael Muñoz	Male	81	Puma	Sheep	Puma	Sheep								
27/11/2006	Casas Viejas / San José de las Flores	Arroyo Seco	Isidro Castillo	Male	40	Coyote	Sheep	Hawk	Chicken								
27/11/2006	El Bosque	Arroyo Seco	Ricardo Balderas	Male	70	Puma	Sheep, calves										
27/11/2006	San José de las Flores	Arroyo Seco	Javier Castillo	Male	50	Puma	Sheep, donkeys	Coyote	Sheep, hens and chicken	Feral dogs	Sheep						
28/11/2006	Tonatico	Pinal de Amoles	Mario Pedraza Ruiz	Male	29	Puma	Calf										
28/11/2006	Epazotes Grandes	Pinal de Amoles	Elías Cocino Montoya	Male	55	Coyote or "Wolf"	Lamb	Eagle, Hawk	Hens, chicken	Deer	Corn, beans						
28/11/2006	Epazotes Grandes	Pinal de Amoles	Jesús Resendiz Mendoza	Male		Coyote	Ganado y gallinas	Coyote	Ganado y gallinas								
28/11/2006	Epazotes Grandes	Pinal de Amoles	Yolanda Resendiz Mendoza	Female	44	Eagle, Hawk	Hens, chicken	Squirrel	Squash	Rabbit	Corn and beans when tender	Coyote or "wolf"	Chicken, calves	Yagoarundi	Poultry	Bats	Donkeys, mules
28/11/2006	Epazotes Grandes	Pinal de Amoles	Soledad Gudiño Velázquez	Female	55	Coyote	Lamb	Hawk	Hens								
28/11/2006	Epazotes Grandes	Pinal de Amoles	María Resendiz Mendoza y Regina Mendoza Vigil	Female	55	Coyote or "wolf"	Hens, lamb, new born donkeys	Eagle	Chicken	Rabbit	Corn, beans						
28/11/2006	Epazotes Grandes	Pinal de Amoles	Yolanda Gudiño Calixto	Female	36	Coyote	Goats	Large hawk	Goats								
29/11/2006	El Tepozán	Arroyo Seco	Antonio González	Male	60	Deer	Corn, beans	Squirrel	Corn, beans								
29/11/2006	El Pocito	Arroyo Seco	Clara López	Female	75	Deer	Beans, garbanzo	Fox	Chicken, hens	Hawk	Chicken, hens	Yagoaroundi	Chicken, hens	Mice, rats / bats	Stored corn	Bats	Donkeys, cattle
29/11/2006	El Tepozán	Arroyo Seco	Eloisa Rivas	Female	50	Hawk	Chicken	Puma	Small donkeys	Yagoaroundi (Cuixa)	Chicken						
29/11/2006	El Tepozán	Arroyo Seco	Vidal Rivas	Male	57	Snakes	People	Black bear	Cattle, donkeys	Rabbits	Corn, beans	Deer	Corn, beans				
30/11/2006	Agua del maíz	Pinal de Amoles	Marina Pedraza	Female	32	Armadillo	Garbanzo, peas	Deer	Garbanzo, peas	Hawk	Chicken, turkey chicks						
30/11/2006	Agua del maíz	Pinal de Amoles	Marina Ariciaga Vazquez	Female	32	Monutain cat (or fox)	Hens, chickens, turkey	Coyote	Pigs/ chicken	Opossum	Pigs	Hawk (Falco sparverius)	Chicken				
30/11/2006	Agua del maíz	Pinal de Amoles	Agapita Ledezma Aguilar	Female	30	Hawk	Chicken	Squirrel	Stored corn	Feral dogs	Chicken, lamb						
30/11/2006	Agua del maíz	Pinal de Amoles	Asención Ponce	Female	40	Feral dogs	corn	Hawk	Chicken	Deer	Beans						
30/11/2006	Agua del maíz	Pinal de Amoles	Felícitas Martínez	Female	40	Fox	Chicken, turkey chicks	Hawk	Chicken, turkey chicks	Squirrel	Stored corn	Salamander (Pseudoeryc ea belli)	People				
30/11/2006	Agua del maíz	Pinal de Amoles	Manuel Macario Olguín	Male	65	Hawk	Chicken	Fox	Chicken								
30/11/2006	Agua del maíz	Pinal de Amoles	Regina Montoya	Female	55	Armadillo	Garbanzo, peas	Deer	Garbanzo, peas	Hawk	Chicken, turkey	Fox	Chicken	Coatimundi	Corn	Invertebrates	Corn and stored corn

			Montoya								chicks					(scarabeidae)	
30/11/2006	Agua del maíz	Pinal de Amoles	Blanca Macario Rodriguez	Female	35	Hawk	Chicken										
30/11/2006	Agua del maíz	Pinal de Amoles	Guadalupe Aguilar Jiménez	Female	65	Feral dogs	Chicken	Hawk	Chicken	Squirrel	Stored corn	Fox	Chicken	Skunk	Corn	Rats and mice	Corn
07/03/2007	La Colgada	Pinal de Amoles	Susana Villeda	Female	58	Tejón	Maíz	Badger	Corn								
07/03/2007	La Colgada	Pinal de Amoles	Rosa García	Female	36	Hawk	Chicken										
07/03/2007	La Colgada	Pinal de Amoles	Senorina García	Female	60	Eagle	Hens										
07/03/2007	La Colgada	Pinal de Amoles	Moisés Ebreo	Male	65	Badger	Corn										
07/03/2007	La Colgada	Pinal de Amoles	Odilia Sánchez	Female	31	Fox	Corn, hens										
07/03/2007	Epazotes Grandes	Pinal de Amoles	José Gudiño	Male	60	Coyote	Goats										
07/03/2007	Soledad del Refugio	Jalpan de Serra	Antonia Sandoval	Female	45	Puma	Sheep	Jaguar	Sheep								
07/03/2007	Soledad del Refugio	Jalpan de Serra	Macario Olvera	Male	60	Puma	Sheep	Jaguar	Sheep								
08/03/2007	Los Pinos	Pinal de Amoles	Sergio Sánchez	Male	32	Fox	Chicken	Hawk	Chicken								
08/03/2007	Los Pinos	Pinal de Amoles	Mariana Sánchez	Female	48	Hawk	Chicken										
08/03/2007	Los Pinos	Pinal de Amoles	Armando Leal	Male	30	Badger	Corn										
08/03/2007	Los Pinos	Pinal de Amoles	Marcos Leal	Male	53	Fox	Corn										
08/03/2007	Los Pinos	Pinal de Amoles	Teodoro Leal	Male	56	Squirrel	Corn										
08/03/2007	Los Pinos	Pinal de Amoles	Nicolaza Hurtado	Female	47	Snakes	Corn										
09/03/2007	Agua Fría de los Fresnos	Arroyo seco	Ezequiel Del Agua	Male	78	Squirrel	Corn										
09/03/2007	Agua Fría de los Fresnos	Arroyo seco	Refugio Padrón	Male	43	Hawk	Chicken										
09/03/2007	El Sabinito	Arroyo seco	Celso Luna	Male	42	Hawk	Chicken										
12/03/2007	Encino Solo	Landa de Matamoros	Lorenzo Botello Camacho	Male	55	Squirrel	Corn										
12/03/2007	Encino Solo	Landa de Matamoros	Felipe Márquez	Male	70	Squirrel	Corn										
12/03/2007	Encino Solo	Landa de Matamoros	Ernesto Valle Estero Hernández	Male	70	Hawk	Chicken										
12/03/2007	Encino Solo	Landa de Matamoros	Eva Márquez	Female	52	Squirrel	Corn										
12/03/2007	Encino Solo	Landa de Matamoros	María Sóstenes	Female	69	Hawk	Chicken										
12/03/2007	Encino Solo	Landa de Matamoros	Mayorico Rodriguez	Female	30	Mice	Corn										
13/03/2007	Agua Marga	Pinal de Amoles	Santos Fuentes	Male	63	Ardilla											
13/03/2007	Agua Marga	Pinal de Amoles	Tomasa García	Female	55	Birds	Beans										
13/03/2007	Agua Marga	Pinal de Amoles	José Audencio	Male	41	Squirrel	Corn										
13/03/2007	Agua Marga	Pinal de Amoles	Adriana Mendoza	Female	34	Eagle	Chicken										
13/03/2007	Agua Marga	Pinal de Amoles	Pedro Resendiz	Male	78	Conchilla	Beans										
13/03/2007	Agua Marga	Pinal de Amoles	Margarita Ledesma Martínez	Female	66	Squirrel	Corn										

14/03/2007	Neblinas	Landa de Matamoros	Isaac Blanco	Male	48	Mice	Coffee										
14/03/2007	Neblinas	Landa de Matamoros	José Elodio Álvarez	Male	39	Parrots	Corn										
15/03/2007	Río Escanela	Pinal de Amoles	María Concepción Ríos	Female	34	Bat	Hens										
15/03/2007	Río Escanela	Pinal de Amoles	Guadalupe Sánchez	Male	73	Squirrel	Corn										
15/03/2007	Río Escanela	Pinal de Amoles	Floriberto Ramírez	Male	46	Squirrel	Corn										
15/03/2007	Río Escanela	Pinal de Amoles	Fidelina Ramírez	Female	51	Fox	Chicken										
15/03/2007	Cuesta Blanca (Río Escanela)	Pinal de Amoles	Eleazar Martínez	Male	68	Deer	Beans										
16/03/2007	Saldiveña	Jalpan de Serra	Juan Morales	Male	67	Rabbit	Beans										
16/03/2007	Saldiveña	Jalpan de Serra	David Mendoza	Male	32	Badger	Corn										
16/03/2007	Saldiveña	Jalpan de Serra	Porfirio Zepeda	Male	36	Mosquita Blanca	Tomatoes										
16/03/2007	Saldiveña	Jalpan de Serra	Reyes Mendoza	Male	51	Badger	Corn										
16/03/2007	Saldiveña	Jalpan de Serra	Alicia Mendoza	Female	56	Hawk	Chicken										
19/03/2007	La Mojonera	Arroyo seco	Pablo Landaverde Vázquez	Male	70	Squirrel	Corn										
20/03/2007	El Madroño	Landa de Matamoros	Verónica Guevara Camacho	Female	48												
20/03/2007	El Madroño	Landa de Matamoros	Silvia Pérez	Female	27	Squirrel	Corn										
20/03/2007	El Madroño	Landa de Matamoros	Esteban Guevara Martínez	Male	77	Squirrel	Corn										
20/03/2007	El Lobo	Landa de Matamoros	Antero Hernández Guillén	Male	52	Squirrel	Corn										
20/03/2007	El Lobo (de la Aguita)	Landa de Matamoros	Enedino Lugo Valladares	Male	57	Squirrel	Corn										
20/03/2007	El Reten	Xilitla (San Luis Potosí)	Nicolaza Mendoza Muñoz	Female	43	Squirrel	Corn										
20/03/2007	El Reten	Xilitla (San Luis Potosí)	Flavia Ledezma	Female	41	Squirrel	Corn										
21/03/2007	Mazacintla	Landa de Matamoros	Gudenciana Rocha Pedraza	Female	64	Puma	Cattle										
21/03/2007	Mazacintla	Landa de Matamoros	Mario Ramírez Martínez	Male	70	Puma	Cattle										
21/03/2007	Mazacintla	Landa de Matamoros	Sofia Ramírez Martínez	Female	58	Hawk	Chicken										
21/03/2007	La Reforma	Landa de Matamoros	Roberto Trejo Ramos	Male	84	Badger	Corn										
21/03/2007	La Reforma	Landa de Matamoros	Rosa García Ponce	Female	75	Racoon	Corn										
21/03/2007	Palo Verde	Landa de Matamoros	Benita Martínez Acosta	Female	50	Hawk	Chicken										
21/03/2007	Palo Verde	Landa de Matamoros	Cinticia Rodriguez Bitales	Female	68	Squirrel	Corn										
22/03/2007	Valle de Guadalupe	Landa de Matamoros	Juan Márquez	Male	29	Squirrel	Corn										

22/03/2007	Valle de Guadalupe	Landa de Matamoros	Cándido García Velázquez	Male	61	Rabbit	Beans										
22/03/2007	Potrerillos	Xilitla (San Luis Potosí)	Edmundo García Márquez	Male	61	Squirrel	Corn										
23/03/2007	Agua Fría	Peñamiller	José Orozco Sánchez	Male	67	Ant	Corn										
23/03/2007	Agua Fría	Peñamiller	Dolores Ibarra Ruiz	Male	77	Squirrel	Corn										
23/03/2007	Agua Fría	Peñamiller	Guadalupe Aguilar García	Male	75	Squirrel	Corn										
23/03/2007	Agua Fría	Peñamiller	María Yáñez García	Female	69	Squirrel	Corn										
23/03/2007	Agua Fría	Peñamiller	Guadalupe Cervantes	Female	66	Squirrel	Corn										
26/03/2007	Soledad de Zaragoza	Xilitla (San Luis Potosí)	Crecenciano Fuentes Camacho	Male	65	Squirrel	Corn										
26/03/2007	Soledad de Zaragoza	Xilitla (San Luis Potosí)	Benito Vargas	Male	69	Rabbit	Beans										
27/03/2007	Peñamiller	Peñamiller	Fernando Olvera	Male	32												
27/03/2007	Peñamiller	Peñamiller	Francisca Salinas	Female	67	Worm (puerquillas)	Corn										
27/03/2007	Peñamiller	Peñamiller	Victoriano Godoy	Male	61	Coyote	Goats										
27/03/2007	Peñamiller	Peñamiller	Enrique Medellín	Male	88	Badger	Corn										
27/03/2007	San Joanico	Peñamiller	Valentino Hernández	Male	72	Worm (puerquillas)	Corn										
27/03/2007	San Joanico	Peñamiller	Doña María	Female	79												
27/03/2007	San Joanico	Peñamiller	Blas Isidro Lara	Male	56	Rabbit	Beans										
28/03/2007	Camargo	Peñamiller	Graciela Nieto	Female	45	Rabbit	Beans										
28/03/2007	Camargo	Peñamiller	Gonzala Mejía	Female	50	Badger	Corn										
28/03/2007	Camargo	Peñamiller	Efigenia Hernández	Female	72												
28/03/2007	Plazuela	Peñamiller	José Reséndiz	Male	71	Fox	Corn										
28/03/2007	Plazuela	Peñamiller	Cirila Gudiño	Female	62	Squirrel	Corn										
29/03/2007	La Estación	Peñamiller	Tomasa Elvira Yañez	Female	38	Badger	Corn										
29/03/2007	La Colonia	Peñamiller	Norberta Guerrero	Female	55	Squirrel	Corn										
29/03/2007	Peña Blanca	Peñamiller	Eraclio Morales	Male	65	Badger	Corn										
29/03/2007	Peña Blanca	Peñamiller	José Morales	Male	45	Coyote	Goats										
29/03/2007	Extorás	Peñamiller	Faviano Martínez	Male	72	Squirrel	Corn										
29/03/2007	Extorás	Peñamiller	J. Guadalupe Guerrero	Male	69	Fox	Peanut										
30/03/2007	Atargea	Atargea (Guanajuato)	J. Guadalupe Martínez	Male	76												
30/03/2007	Atargea	Atargea (Guanajuato)	Agapito Flores	Male	58												
30/03/2007	Atargea	Atargea (Guanajuato)	Micaela Hernández	Female	42												
09/04/2007	Acatitlán del Río	Landa de Matamoros	Moisés Lugo Lugo	Male	60	Fox	Corn	Bird	White garbanzo								
09/04/2007	Otates	Landa de Matamoros	Catalina Ponce Melo	Female	46	Hawk	Chicken										
09/04/2007	Otates	Landa de Matamoros	Martha Trejo Ponce	Female	36	Fox	Corn										
09/04/2007	Otates	Landa de	Victoria	Female	47	Fox	Corn										

		Matamoros	Ponce Ponce														
09/04/2007	Otates	Landa de Matamoros	Juana Ponce Ponce	Female	50	Fox	Corn										
10/04/2007	Salitrillo	Arroyo Seco	Luis Gonzalez Castillo	Male	51	Deer	Beans										
10/04/2007	Salitrillo	Arroyo Seco	Selina Reséndíz Padrón	Female	50	Badger	Corn										
10/04/2007	Ayutla	Arroyo Seco	Balvina Hernández Ramírez	Female	46												
10/04/2007	Purisima	Arroyo Seco	Tomás Marín García	Male	32												
11/04/2007	Tancoyol	Jalpan de Serra	Esther Vega Acuña	Female	61	Hawk	Chicken										
11/04/2007	Tancoyol	Jalpan de Serra	Juan Landaverde Ramírez	Male	60	Plagues	Corn, beans										
11/04/2007	Tancoyol	Jalpan de Serra	Rigoberto Rodriguez Martínez	Male	63	Squirrel	Corn										
11/04/2007	Tancoyol	Jalpan de Serra	Antonia Quintana Chávez	Female	45	Hawk	Chicken										
11/04/2007	Tancoyol	Jalpan de Serra	Iberio Chávez Landaverde	Male	39	Squirrel	Corn										
12/04/2007	San Juan de los Durán	Jalpan de Serra	Felipe Martínez Rojas	Male	56	Racoon	Corn										
12/04/2007	San Juan de los Durán	Jalpan de Serra	Santos Orozco Orozco	Male	82	Badger	Corn										
12/04/2007	San Juan de los Durán	Jalpan de Serra	Esteban Aldegundo Martínez Maldonado	Male	62	Hawk	Chicken										
12/04/2007	San Juan de los Durán	Jalpan de Serra	Magdaleno Rubio Rubio	Male	58	Badger	Corn										
12/04/2007	San Juan de los Durán	Jalpan de Serra	Celestina Enriquez Chávez	Female	52	Squirrel	Vegetables										
13/04/2007	Santa María de Cocos	Arroyo Seco	Genaro González Moreno	Male	70	Squirrel	Corn										
13/04/2007	Santa María de Cocos	Arroyo Seco	Dionicio Guerrero Chávez	Male	67	Fow	Corn										
13/04/2007	Santa María de Cocos	Arroyo Seco	Donato González González	Male	38	Squirrel	Corn										
16/04/2007	La Lagunita	Landa de Matamoros	Concepción Pedraza Ledesma	Female	35	Puma	Cattle										
17/04/2007	Polvareda	Landa de Matamoros	Rubén Orduña Gutiérrez	Male	37	Puma	Cattle										
17/04/2007	Tierra Fria	Jalpan de Serra	Epifanio Acuña Torres	Male	43	Puma	Cattle										
18/04/2007	La Esperanza	Jalpan de Serra	Hildeberto Loredo Servín	Male	50	Birds	Garbanzo										
18/04/2007	El Saucito	Jalpan de Serra	Camilo Castillo Chávez	Male	52	Puma	Cattle										
18/04/2007	El Saucito	Jalpan de Serra	Lorenza Martínez	Female	32	Fox	Corn										

			Chávez														
18/04/2007	San Isidro	Jalpan de Serra	Hermenegildo Rubio Correa	Male	52	Badger	Corn	Racoon	Corn								
18/04/2007	La Joya Chiquita de San Antonio	Landa de Matamoros	Ciriaco Rubio Correa	Male	57	Squirrel	Corn										
19/04/2007	San Antonio (Tancoyol)	Jalpan de Serra	Martín Ayala Solís	Male	42	Puma	Cattle										
19/04/2007	San Antonio (Tancoyol)	Jalpan de Serra	Ciro Ramos Montero	Male	40	Puma	Cattle										
19/04/2007	San Antonio (Tancoyol)	Jalpan de Serra	Martina Cabrera Chávez	Female	86	Puma	Cattle										
19/04/2007	San Antonio (Tancoyol)	Jalpan de Serra	Liandra Sierra Durán	Female	63	Puma	Cattle										
20/04/2007	Hierba Buena	Pinal de Amoles	Maricarmen Rincón Landaverde	Female	57	Squirrel	Corn										
20/04/2007	Hierba Buena	Pinal de Amoles	Anselmo Ávila Hurtado	Male	70	Badger	Corn										
20/04/2007	Derramadero de Juárez	Pinal de Amoles	Tobias Hernández García	Male	53	Puma	Sheep										
20/04/2007	Derramadero de Juárez	Pinal de Amoles	Nicolás Medina García	Male	44	Puma	Sheep										
23/04/2007	El Carrizalito	Jalpan de Serra	Paula Gutiérrez Landaverde	Female	33	Puma	Horses										
23/04/2007	El Carrizalito	Jalpan de Serra	Juana Sánchez Gutiérrez	Female	63	Puma	Horses										
23/04/2007	El Carrizalito	Jalpan de Serra	Saqueo Gutiérrez Sánchez	Male	61	Squirrel	Corn										
23/04/2007	Los Jasso	Jalpan de Serra	Joaquín Olvera Hernández	Male	52	Puma	Horses										
23/04/2007	Los Jasso	Jalpan de Serra	Luis Landaverde Galván	Male	50	Puma	Horses										
24/04/2007	Agua Fría	Jalpan de Serra	Irineo Castillo Suárez	Male	73	Badger	Corn										
24/04/2007	Agua Fría	Jalpan de Serra	Camila Mar Luna	Female	60	Squirrel	Corn										
24/04/2007	El Bosque	Arroyo Seco	Victor Balderas Velázquez	Male	37	Puma	Cattle										
24/04/2007	El Bosque	Arroyo Seco	Joel Aurelio Nieto Olvera	Male	65	Squirrel	Corn										
24/04/2007	San José de las Flores	Arroyo Seco	J. Concepción Luna Palacios	Male	66	Badger	Corn										
24/04/2007	Laguna de la Cruz	Arroyo Seco	Teodora Sandoval Marín	Female	55	Puma	Cattle										
25/04/2007	El Cantón	Pinal de Amoles	Jorge Landaverde	Male	59	Badger	Corn										
25/04/2007	El Cantón	Pinal de Amoles	Vicente Velázquez Espinosa	Male	58	Bat	Cattle, poultry										
25/04/2007	Santa Águeda	Pinal de Amoles	Celso García Salinas	Male	54	Squirrel	Corn										

25/04/2007	Santa Águeda	Pinal de Amoles	Noél Leal Leal	Male	54	Rabbit	Beans											
25/04/2007	Santa Águeda	Pinal de Amoles	Crispín Leal Cortázar	Male	65	Badger	Corn											
25/04/2007	Santa Águeda	Pinal de Amoles	Pedro García García	Male	64	Squirrel	Corn											
26/04/2007	Río Carrizal	Arroyo Seco	J. Guadalupe Rivera Chavarría	Male	76	Fox	Peanut											
26/04/2007	Río Carrizal	Arroyo Seco	Zacarias Núñez Medina	Male	76	Squirrel	Corn											
26/04/2007	Río Carrizal	Arroyo Seco	Tomás Alvarado Zoria	Male	59	Badger	Corn	Racoon	Corn									

Annex 2. Social and Economic Data.xls

Social and economic characteristics of the 5 municipalities of the Sierra Gorda Biosphere Reserve (SGBR)																	
[Censo General de Población y Vivienda 2000 y del Índice de Desarrollo Humano del PNUD]																	
Entidad federativa	Clave entidad federativa	Municipio	Clave municipio	población			Porcentaje en la población de		poblacion mayor a 12 años				Población entre 6 y 24 años				
				total	hombres	mujeres	hombres	mujeres	total	hombres	mujeres		Total	hombres	mujeres		
Querétaro	22	Pinal de Amoles	22002	27,290	13,204	14,086	48.38	51.62	16,608	7,771	8,837		12,469	6,052	6,417		
Querétaro	22	Arroyo Seco	22003	12,667	6,012	6,655	47.46	52.54	8,446	3,907	4,539		5,178	2,406	2,772		
Querétaro	22	Jalpan de Serra	22009	22,839	10,898	11,941	47.72	52.28	14,603	6,700	7,903		10,049	4,747	5,302		
Querétaro	22	Landa de Matamoros	22010	19,493	9,539	9,954	48.94	51.06	12,474	5,973	6,501		8,254	4,000	4,254		
Querétaro	22	Peñamiller	22013	16,557	7,993	8,564	48.28	51.72	10,862	5,152	5,710		6,999	3,414	3,585		
Población de 15 años y más			Tasa de mortalidad infantil	Índice de salud (componente del IDH)	Índice de salud incorporando la desigualdad de género (componente del IDG)		Población alfabetizada mayor a 15 años			tasa de alfabetización de adultos			Población que asiste a la escuela entre 6 y 24 años de edad				
Total	hombres	mujeres					Total	hombres	mujeres	Total	hombres	mujeres		Total	hombres	mujeres	
14,090	6,514	7,576	40.55	0.6769	0.6461		10,866	5,326	5,540	77.12	81.76	73.13		8,158	4,057	4,101	
7,388	3,398	3,990	32.57	0.7456	0.7221		5,925	2,767	3,158	80.20	81.43	79.15		3,241	1,529	1,712	
12,669	5,748	6,921	30.79	0.7609	0.7387		10,276	4,776	5,500	81.11	83.09	79.47		6,258	3,100	3,158	
10,839	5,143	5,696	35.43	0.7210	0.6941		8,245	4,001	4,244	76.07	77.80	74.51		5,096	2,554	2,542	
9,583	4,513	5,070	32.71	0.7443	0.7202		7,929	3,920	4,009	82.74	86.86	79.07		4,254	2,151	2,103	
tasa de asistencia escolar			índice de educación (componente del IDH)	Índice de educación incorporando la desigualdad de género (componente del IDG)	Ingreso Promedio percápita anual ajustado en pesos		Ingreso percapita anual dólares PPC	PIB total dólares PPC	índice de ingreso (componente del IDH)	Índice de ingreso incorporando desigualdad de género (componente del IDG)	Población económicamente activa			Porcentaje en la población económicamente activa de			
Total	hombres	mujeres									total	hombres	mujeres	hombres	mujeres		
65.43	67.04	63.91	0.7322	0.7319	21,360		3,399	92,757,967	0.5885	0.4926	4,955	3,962	993	79.96	20.04		
62.59	63.55	61.76	0.7433	0.7434	25,750		4,097	51,902,763	0.6197	0.5342	2,959	2,308	651	78.00	22.00		
62.27	65.30	59.56	0.7483	0.7484	29,815		4,744	108,357,079	0.6442	0.6018	5,314	3,652	1,662	68.72	31.28		
61.74	63.85	59.76	0.7129	0.7129	16,750		2,665	51,956,448	0.5479	0.4210	4,288	3,590	698	83.72	16.28		
60.78	63.01	58.66	0.7542	0.7533	24,043		3,826	63,346,354	0.6083	0.5158	3,469	2,760	709	79.56	20.44		

										20,985	16,272	4,713	77.9933868	22.006613
% Representación Política		% Funcionarios y Directivos		% Profesionistas y Técnicos		Índice de participación política incorporando desigualdad entre hombres y mujeres (componente del IPG)	Índice de empleo incorporando desigualdad entre hombres y mujeres (componente del IPG)	IDH	IDG	IPG	Porcentaje de población del municipio en el estado			
hombres	mujeres	Hombres	Mujeres	hombres	mujeres									
90.00	10.00	68.25	31.75	36.23	63.77	0.3509	0.8945	0.6659	0.6235	0.4284	1.94			
72.73	27.27	71.74	28.26	32.20	67.80	0.7755	0.8414	0.7029	0.6666	0.5562	0.90			
90.91	9.09	72.04	27.96	47.29	52.71	0.3187	0.8946	0.7178	0.6963	0.4321	1.63			
81.82	18.18	69.09	30.91	37.10	62.90	0.5871	0.8929	0.6606	0.6093	0.5016	1.39			
75.00	25.00	70.83	29.17	36.73	63.27	0.7373	0.8764	0.7023	0.6631	0.5532	1.18			
											7.04			