

# Ecotourism and Biodiversity Management of Santa María Ixtepeji and

# Capulálpam de Méndez, Oaxaca

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**Abstract:** In Mexico, and in particular in the Sierra Norte state region of Oaxaca, ecotourism has become an alternative to the use of natural resources for communities and community companies, which have managed to generate strategies organizations, social and cultural activities that have allowed them to continue and diversify economic activities around the "sustainable" use of natural resources. Given the importance of these activities, the objective of the research is to explain the capacity of the communities of the Sierra Norte of Oaxaca with ecotourism activities to promote the use and protection of their ecosystems and biodiversity. The conduct of the research results in the relationship between the variables, showing that there is a positive relationship between the independent variables ecotourism, sustainable management and the dependent variable, sustainable development.

Key words: sustainable management; biodiversity; ecotourism

JEL codes: Q01

# 1. Ecotourism in the Northern Sierra of Oaxaca

The natural resources of the Sierra Norte of Oaxaca have a long history of exploitation and rants, many municipalities were subjected to intense environmental predation by parastatal and private companies through concessions for the use of forests, since the 1950s. In 1956 the firm Fábricas de Papel de Tuxtepec (FAPATUX) was awarded the most important concession, operating in the municipalities of Santa Catarina Ixtepeji, San Juan Atepec, Ixtlán de Juárez, Capulálpam de Méndez, Santiago Xiacui, La Trinidad, and San Pablo Macuiltianguis, also the company Compañía Maderas de Oaxaca extracted wood in the intermunicipal alliance called Pueblos Mancomunados. However, the disproportionate sawing caused unease in communities, and the non-compliance with contracts and bureaucratic complexity to claim the rights of mount led to the mobilization of the communities of the Sierra Norte, which were Organization for the Defense of Natural Resources and Social Development of the Sierra Juárez (ODRENASIJ) (Gasca, 2014).

After a long struggle of the communities of the Sierra Norte to regain their territory in the face of the exploitation of their natural resources by capitalist companies, they achieved their goal. ODRENASIJ promoted the community enterprise training project, empowering communities and generating their participation in development processes. In a first phase, they started with the implementation of forestry companies that

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demonstrated a new type of business organization. Subsequently, activities were diversified towards the use of natural resources, expanding in the management towards mining, water, logging and ecotourism as a way to generate positive impacts in the economic and social fields (Gasca, 2014).

In recent years, ecotourism emerged as a strategy of reducing the ecological impact of tourist activity and as a way of reducing poverty (Rosas & Correa, 2016). Currently, the region of the Sierra Norte of Oaxaca presents a high biological and cultural diversity, which are used for the realization of ecotourism activity in several communities of the region (Table 1).

Locality	Municipality	District	Region
Capulálpam de Méndez	Capulálpam de Méndez	Ixtlán	Sierra Norte
Ixtlán de Juarez	Ixtlán de Juárez		
Cuajimoloyas	San Miguel Amatlán		
Llano Grande			
San Miguel Amatlán			
El Punto	Santa Catarina Ixtepeji		
San Pedro Nexicho			
Santa Catarina Lachatao	- Santa Catarina Lachatao		
Benito Juárez			
Latuvi			
La Nevería			

 Table 1
 Communities of the Northern Sierra Providing the Ecotourism Service

Source: Own elaboration from Rosas & Correa (2016)

Although ecotourism activity is intended to have the least impact on natural resources and biodiversity, it is undeniable that it has caused the loss of species and decline of some others. The impacts of tourist activities in a territory are the result of a complex interaction that manifests itself in the link between tourists, the destination area and the community (Quinteros, 2004).

In this tenor, Oaxaca State Ministry of Tourism has identified the following problems that must be addressed in order to ensure the preservation of the environmental capital that supports tourism activity in the region: (Secretariat of Tourism, 2013)

- Exhaustion of springs and pollution, the community sold out 13 of the 20 springs that existed.
- The presence of erosion was identified in three areas: Santo Domingo, Rievee and Polvorín, currently partially repair of the area.
- Loss of some native species such as copal, maguey, cancer leaf and chepil.
- Displacement of flora in terms of native vegetation on the old road to the light plant.
- Loss of plant cover due to the construction of the infrastructure for ecotourism activity.

The research has the following general objective: To explain the capacity of the communities of the Sierra Norte of Oaxaca with ecotourism activities to promote the use and protection of their ecosystems and biodiversity.

# 2. Research Questions

From the problem raised the following research questions arise:

• To what extent does sustainable management have an on the protection of the biodiversity of the

municipalities of the Sierra Norte of Oaxaca with ecotourism activity?

- What dimensions characterize variables sustainable management, ecotourism and sustainable development?
- What have been the effects that ecotourism activities have had on biodiversity?
- What actions have the communities of the Sierra Norte of Oaxaca undertaken with ecotourism activity towards the conservation of biodiversity?
- What is the problem faced by community ecotourism companies in the Sierra Norte of Oaxaca to implement sustainable management tools towards biodiversity?

#### 2.1 Capulálpam de Mendez

The municipality has legal personality in terms of the provisions of Article 9 of the Agrarian Law, and by the judgment of partial titling of communal goods issued by the 21st Agrarian Unitary Court, dated May 16, 1995, in which communal goods with an area of 3,843 15 52.59 hectares are recognized to benefit 347 trained communes of the Community of Villa Capulálpam de Méndez (COPLADE, 2017). The land ownership is communal, that is, each peasant has his plot in possession that is respected as private property, of the 3,850-ha corresponding to the free zone of the municipal territory of which, 66.42% is for forest use, 21.13% corresponds to forest protection areas, only 16.44% is used in agricultural activities (Unión de Comunidades Productoras Forestales Zapotecos-Chinantecos de la Sierra Juárez de R. I., 2001). Within the community there is buying and selling plots and plots, but these transactions are not allowed to be carried out with people outside the community. The property is shared in collective by a population group with a common ethnic and family origin, the regime of government is of customs and customs and from the age of 16 the children of commoners acquire obligations and rights that require them to pay positions within the community, while acquiring rights of access to the land.

It has a total population of 1,467 people, of whom 805 are women and 662 are men. The municipality is considered with a low degree of municipal marginalization and the population in conditions of extreme poverty is 4.8% of the total population (SEDESOL, 2013). Data from the 2010 General Census of Population and Housing indicate that the indigenous language speaker population of 5 years and more is 108 people (INEGI, 2010). One of the factors that has influenced population growth is migration, therefore, it is considered to have grown slightly in the last 20 years, the migration of the young population began since the seventies and has been of a strong weight, although less compared to other communities of the mountains and the state, the communal authorities estimate that it migrates about 35% of young people, the most frequent destinations of migrants have been the cities of Oaxaca and Mexico.

In 1954, the forest of Capulálpam and other communities belonging to the Sierra Juárez were granted to the company FAPATUX that obtained authorization for the extraction of wood of these lloafiesis and continued to operate for 25 years, these actions caused the forests of the communitiestobe altered to produce pulpfor paper, in additionto takingthebest of their forests without giving anything to change tothe communities. This caused discomfort in the people of the community and to beginororganize in defense of the natural resources of the Sierra Norte of Oaxaca. In the 80's the permission granted to FAPATUX was about to be completed, so the communities developed various movements to prevent renewal and achieved the repeal of the concession decree (Bartra & Anna, 2014).

At the beginning of the 21st century a new mining phase began, the federal government granted a concession to the Canadian company called Continuum Resources Ltd, which meant that more than 54 thousand hectares wentton destined for this activity. Mineral exploitation meant that the constructions of the mine tunnels were

spread in the subsoil in areas of forest and aquifers, causing irreversible damage to rivers and springs, 13 of the 20 springs that existed in the community disappeared along with a swamp, the advance of pollution was such that it reached the Rio Grande of the community (70 kilometers from the city of Oaxaca), making it impossible to use water for irrigation or for human consumption. In addition, the mining company La Natividad y Anexas S.A. de C.V. took possession of communal land of Capulálpam to place waste, mining waste and contaminated water; becoming a natural disaster (Bartra & Anna, 2014).

Both the environmental disaster in Capulálpam and the struggle for its forest resources had remained relatively calm until 2007. But in the face of the lack of attention by state and federal agencies, the community organized itself and initiated a legal process to defend their resources, they integrated the pro-defense committee of natural resources which was commissioned to follow up on complaints (COPLADE, 2017) before the Ministry of Environment and Natural Resources (SEMARNAT) and the Federal Office for Environmental Protection (PROFEPA) (Bartra & Anna, 2014). Currently in Capulálpam de Méndez there are community companies or community organizations of the economic and social type, which have been managed to maintain thanks to the system of charges and the tequio. As a result of forest management, companies have managed some natural resources sustainably and exploited. The companies located in the municipality are: Unidad Económica Especializada de aprovechamiento Forestal Comunal San Mateo Capulálpam (Specialized Economic Unit for The Community Forest Use San Mateo Capulálpam), Planta Trituradora de Agregados Pétreos [Stone Aggregate Shredder Plant], Turismo Ecológico Comunitario Capulálpam Mágico (Magic Capulálpam Community Ecological Tourism) and Procesadora de Alimentos YetziGagüi (YetziGagi Food Processor) (COPLADE, 2017).

## 2.2 Santa Catarina Ixtepeji

Santa Catarina Ixtepeji is located surrounded by the Sierra Juárez mountains in the Sierra Norte state region of Oaxaca, located to the north of the Central Valleys. It has a total population of 2,633 people, of whom 1,366 are women and 1,267 are men. The municipality is considered to have an average degree of marginalization and its population in conditions of extreme poverty is 451 people (SEDESOL, 2013). 80% of the territory is covered by forests, of which 71% is earmarked for forest harvesting activities of its timber and non-timber resources. Therefore, the population depends economically on the natural resources and the activities that are generated from their use (SEDESOL, 2010).

In the community of Santa Catarina Ixtepeji the form of government is through the system of customs and customs, the political organization is governed by a system of charges, both at the municipality level and in the commissary of communal goods (CBC<sup>1</sup>). This figure arose during the 1950s with the aim of protecting the interests of the municipality, which at the time had dealings with the company FAPATUX. At the end of the 1970s, after several years of being granted their forests, and realizing the looting of the resources of which they were victims, a movement was generated promoted by the communities of the Sierra Juárez to prevent the concessions from being renewed. They carried out a series of actions and brought amparo trials, resulting in the concessions not being renewed. From this, conditions were given for the communities to take over forestry harvesting activities (Abardía & Solano, 1995), the forestry company was one of the first community companies to be established in Oaxaca with the support of technicians from the SARH Forest Development Program and by 1983 the Forest Raw Material Production Unit (UPFPM)was formed as a pilot project and who sought to replicate in other communities (ASETECO, 2002).

<sup>&</sup>lt;sup>1</sup> Comisariado de Bienes Comunales (CBC).

The companies identified in Santa Catarina Ixtepeji are: Unidad Productora de Materia Prima Forestal (Forest Raw Material Production Unit), Empresa de ecoturismo (Ecotourism Company), Purificadora de Agua Latzillela (Latzillela Water Purifier), Destiladora de Resinas y Derivados Ixtepeji, S.S.S (Resin Distiller and Derivates Ixtepeji, S.S.S) (Gasca, 2014). It is therefore understandable that the main sources of jobs or self-employment are currently concentrated in the primary sector (65.40% of the PEA<sup>2</sup>), this sector mainly includes activities related to agriculture, forestry and livestock production.

# 3. Theoretical Concepts

#### 3.1 Sustainable Development and sustainable Resource Management

The term development as a hegemonic concept in the capitalist paradigm and has been used as a synonym for economic growth. However, it has entered a process of serious criticism and pointedouts by academics and social sectors who have shown the serious social and ecological problems. They noted that, due to the economicists' conception of natural resources and the environment as factors of production and services, which has increased the degradation of the environment, and natural resources. In other words, it is an unsustainable model, which has caused climate problems and which in turn could affect the vital resources of men and women (Cuevas, 2009). These issues were so important that they were discussed on one of the most important platforms, i.e., at the United Nations meetings on the Human Environment held in Stockholm Sweden in 1972 (López, López, & Ancona, 2005), noted that it has not meant well-being, so there was a new qualifier to be able to admit, disseminate and engage with it (Enkrlin, Cano, Garza, & Vogel, 1997).

But it was until 1987 that the proposal for the concept of sustainable development emerged, which became an international aspiration during the Brundtland Commission, its emergence was the result of various studies and debates carried out over three years (López, López, & Ancona, 2005) in which the politicians became aware of the problems and negative effects of the neoliberal model (Bustillo & Martínez, 2008).

This concept was based on the position of meeting current needs without compromising the options of future needs, which means not ending or wasting natural resources, pretending to be compatible with economic progress with social and environmental needs (López, López, & Ancona, 2005). Without compromising the possibilities of future generations to meet their needs (Carpinetti & Esponda, 2013). In general, this balance between the social, economic and environmental must be sought to ensure a natural ecological situation, in addition to economic efficiency and benefit for the inhabitants. Therefore, to promote sustainable plans or projects, the objective of improving the quality of life of the general population, which is only possible if there is a harmony in economic, social, political and cultural development, should be set as a goal (Hernádez, 2012).

Sustainable development must be composed of four dimensions: social dimension, institutional political dimension, economic dimension and environmental dimension, which are in constant interaction, which although each has its own characteristics, at the same time, are conditioned and condition the other dimensions (Sepulveda, 2008). The term, by providing a broad perspective, has allowed to integrate human needs and environmental problems as elements of the same project (Aponte & Alexis 2007).

The importance of this term lies not only in the concern for the rational and efficient use of scarce resources (Escobar, 2010), but also seeks the regeneration or restoration of the natural-social fabric affected by the expansion of the industrial civilizing model, capitalist materialist (Escobar, 2010). In other words, we must seek

<sup>&</sup>lt;sup>2</sup> Economically active population (Población Económicamente Activa (PEA).

balance between the social, economic and environmental, since only in this way could a natural ecological condition, economic efficiency and the benefit for the inhabitants be guaranteed (Hernádez, 2012). But despite the great benefits of adopting sustainable development, it has not ceased to be a good theoretical proposal that still fails to realize its formulations in instruments in the earth or public policy, therefore (López, López, & Ancona, 2005) it risks becoming an element of political discourse.

For its part, sustainable management emerged in the 1970s as a reorientation of environmental thinking of eco-development and sustainable development, and also emerged as a diagnostic and planning tool for the resolution of environmental problems that were already beginning to be seen as a result of industrialization and market (Muriel, 2006).

Muriel R. D. (2006) sets out two main objectives that sustainable management pursues:

1) Mmaintain and/or improvement of the environmental offer: it focuses on the object of environmental action, seeks to maintain or improve the environmental offer in quality, quantity and availability. To this end, the sustainability of the natural environment must be ensured and that natural resources remain available even for future generations

2) Orient cultural processes towards sustainability: it focuses on the subject/object of action, on the regulation of human activity with the purpose of building individual and social values.

#### 3.2 The Biodiversity Crisis

The term biodiversity refers to the variety of living beings on Earth and the natural patterns that make up it, comprising the range of ecosystems, species and their populations, as well as the generic differences between the individuals that constitute them (Jiménez, Torres, & Corcuera, 2009). It refers to the richness or variety of living forms: plants, animals and microorganisms. The organisms in turn are accommodated in communities or ecosystems that characterize the landscape of the planet (Tacón, 2004). It consists of three hierarchical levels of biodiversity: a) genes, b) species and c) communities, which are necessary for the survival of life as it known (Plascence, Castañón, & Raz, 2011).

Today it is mainly stowed by humans and their wasteful consumption mainly by the most privileged sector of society, as well as by the constant growth of the population that provoke unsustainable demands. These actions have had an impact on the decline and disappearance of a large number of species and even though there is no consensus, it is estimated that over the past hundred years man's intervention has accelerated the rate of extinction possibly to 100 times with respect to the natural rhythm. It is currently estimated that "between 50 and 300 species have been extinguished each day, and between 4,000 and up to 90,000 species each year. In addition, the rate of extinctions is expected to be 10 times faster than the current one in the next 50 years" (Oberhuber, 2010, p. 6).

#### 3.3 Ecotourism

Tourism has been one of themost important economic and social phenomena that has involved a continuous geographical expansion and diversification of tourist destinations, but these are under increasing pressure on the natural, cultural and socioeconomic environments in which these activities are carried out. That is why, from the 90s of the twentieth century some governments and international institutions triedto eliminate certain with negativesequences of this activity, which range from the degeneration of traditions, culture values, to environmental damage. Thus arises, the proposal of tourist sites and natural environments that were friendswith natural resources, in which local communities acquired a predominant role. In this type of tourism, it was used as alternative tourism, proposed a positive combination between the sustainable use and conservation of the environment through the practice whether rural, ecotourism, adventure or low impact such as hiking, sidereal

observation, among others (Bringas & Ojeda, 2000).

From this proposal of tourism or alternative tourism arise variants such as rural tourism, adventure tourism and ecotourism, which have in common develop in natural and/or cultural environments. The first concerns all activities to enjoy the cultural traditions of the receiving communities; adventure tourism only involves activities in nature that impose some risk and effort, such as climbing, rappelling, horseback riding and zip-lining; and ecotourism involves activities of appreciation and enjoyment of nature (Ramirez, 2012).

#### 3.4 Sustainable Management of Ecotourism Destinations

In 1993, the World Tourism Organization (WTO) defined sustainable tourism as one that meets the needs of current tourists and receiving regions while protecting and fostering opportunities for the future. It was conceived as a pathway to the management of all resources so that economic, social and aesthetic needs can be met while respecting cultural integrity, essential ecological processes, biological diversity and systems that sustain life (Blasco, 2005).

The importance of the sustainable management of natural resources as a result of the degradation of ecosystems, makes it necessary to provide the provision alternatives that allow to conserve and manage adequately the resources available to the communities that have generated tourism theirmain income. They should be based on sustainable management as the optimal use of environmental resources, while maintaining essential ecological processes, helping to conserve natural resources and biodiversity. In other words, it must respect the sociocultural authenticity of communities, preserve their cultural attractions, their traditional values, their beliefs as well as contribute to intercultural understanding and tolerance. As well as ensuring a viable long-term economic activity, which informs all socio-economic benefits agents sufficiently well distributed (Blasco, 2005).

#### 4. Methodology

This research has a mixed approach combining qualitative and quantitative, because it will be developed from a descriptive, explanatory and co-relational methodology. It is descriptive because it describes the components of sustainable biodiversity management of the study municipalities, correlational since it is based on showing the relationship between the variables Sustainable management of biodiversity, Ecotourism and Sustainable development and is explanatory or causal as the hypothesis test is applied and will seek conclusions or suggestions of causes among the study variables.

This study considered as a unit of analysis the community companies of the municipalities, to determine the sample was established as the total population the number of active community members registered in the community, as well as the operational and administrative staff who carry out the activities for each of the community ecotourism companies in each study locality. The sample size was calculated based on the probabilistic sample, the units or sample elements were given values very similar to those of the population, so that the measurements in the subset will give accurate estimates of the larger set (Hernández et al., 2006). For the values assigned in the formula, a result of 24 people to be surveyed for the municipality of Santa Catarina Ixtepeji and 29 people for the municipality of Capulálpam de Méndez was obtained, which gives us a total of 53 questionnaires to apply for this research.

The variables covered by this research are: Sustainable Management of Biodiversity and Community Ecotourism as independent variables and Sustainable Development as a dependent variable. Each of these variables will be operationalized based on the theoretical basis in the literature with the aim of identifying the dimensions, categories and indicators necessary for the formulation of the information collectioninstrument.

The questionnaire was conducted according to Likert's scale, which allows, with the following resupposed options: a) totally disagree, b) something agrees, c) neither agrees nor disagrees or indecision, d) something agrees and e) totally agrees.

The sustainable management variable was operationalized with four dimensions these are: rational use, protection, preservation and recovery of biodiversity. This variable is based mainly on the actions and strategies that communities carry out towards an efficient management of natural resources in relation to the excessive demand that is made of them. In such a way that these are actions that in a way that in a way that consents and directed to defined purposes perform the community ecotourism companies of the communities of Santa Catarina Ixtepeji and Capulálpam de Méndez to conserve, recover, improve, protect or use natural resources and biodiversity.

The Community Ecotourism variable was operationalized with five dimensions these are: associativity, orrganization, participation, empowerment and self-management. This variable is based mainly on the tourist offer of the site which is managed exclusively by the local population, that is, that the community is the key piece in the decisions that focus onecotourism development and the variable sustainable development has an economic, social and environmental dimension and will only be sustainable if the balance between the three factors that influence the quality of life is achieved.

#### 5. Results

With the verification of the research hypothesis, the level of relationship of the variables independessustainable management and community coturismo in relation to the variable dependent sustainable development of the communities of Santa Catarina Ixteji and Capulálpam de Méndez could be determined, concluding that these are related in a positive way. The results obtained from Pearson's relationship show that there is a positive correlation between the sustainable management and sustainable development variables (0.512), i.e., thegreater significance of the sustainable gestion carried out by the Community ecotourism company will also be presented a greater sustainabled evelopment (0.566) establish that the greater significance of community ecotourism variables and Sustainable development (0.566) establish that the greater significance of correlations the result is greater than 0.5, i.e., an average level of correlation and as raised in the methodology, the hypothesis is accepted.

Specific objective 1: Identify and evaluate the effects suffered on the ecosystem and biodiversity of the communities of Santa Catarina Ixtepeji and Capulálpam de Méndez with ecotourism activity.

Ecotourism activity is typified within the areas that take advantage of the natural and heritage resources of a territory. An ecosystem consists of a set of living organisms and the physical environment in which they are related, ecotourism activity is considered a type of low-impact tourism, the effects that the activity has brought towards biodiversity have been moderate, identifying the following:

- Damage to vegetation caused by scratching, branch ingking and seed loss
- Cumulative impacts of trails such as compaction and erosion or landslide along the path, which can be irreversible so necessary communities to be aware of this impact

- The introduction of invasive species causing environmental damage, displaced species
- · Changes in wildlife behavior due to the tourist influx causing species stress and flee from their habitat
- Increase in home discharges
- Increase in urban solid waste

Specific target 2. Diagnose the actions undertaken by communities for the sustainable management of their ecosystems and biodiversity, recognizing in particular those unique aspects found in natural areas as endemic species or those species that require special treatment as rare, threatened or endangered.

The communities of the Sierra Norte of Oaxaca in recent decades have carried out activities caused by social concern for the deterioration of differentmore natural systems, which is resounded with the perception of the ability of ecosystems to provide environmental services such as water production, regulation of the weather and mitigation of impacts. However, concern about the loss of biodiversity is less widespread as understanding the role of biodiversity in ecological regulation is less widespread.

The sustainable management of resources such as forests and the biodiversity that inhabit these ecosystems are the subject of diverse interests, perspectives and rights, however, the prominence of communities through the strengthening of their governance capacities is one of the main axes for the sustainable management schemes of their territory. Thus, the communities of Santa Catarina Ixtepeji and Capulálpam de Méndez develop sustainable management of common resources through two fundamental rules, the first refers to a ruleof appropriation that allows the sustained use of their natural resources and the provision rule, which refers to investment in the protection of ecosystems that make their conservation possible. From this perspective, the local capacities of sustainable management of their natural resources and the biodiversity of the study communities are established by the ability to formulate, comply and enforce the rules of use collectively built for the conservation of collective goods such as forests and their biodiversity.

It should be noted that these communities have achieved conservation without the imposition of Orthodox conservation measures which have been regarded as a loss of Community territories. Thus, in the last ten years these communities have developed an important forestry activity oriented towards commercial production as it is in the case of ecotourism activity, where community organization has been key to achieving a sustainable management and have made the area of the forest more estimated than it did twenty years ago, the result of the different management and protection schemes they have implemented. Among those identified are:

- Both communities have a forest management plan that controls forest extraction processes based on a community forestry system.
- The forest management plan has a management plan for protected areas.
- There is a territorial planning that defines the areas intended for the different uses that are made in the community.
- Capulálpam de Méndez is part of the Union of Forest Production Communities Zapotecos-Chinantecos de la Sierra Juárez (UZACHI), which advises and provides technical assistance to train the staff of the ecotourism company in relation to the monitoring of natural resources and biodiversity.
- Capulálpam de Méndez in addition to the ordering and forest management plan has an anual harvesting program delimiting the areas of use, conservation and restoration. As well aswatershed protection, wildlife protection and forest reserve.

Specific objective 3. Contribute to the knowledge and exchange of information on biodiversity management in the communities of the Sierra Norte of Oaxaca with ecotourism activitiesIt strengthens the knowledge of the

community in the following areas:

- Research strategies support the Forest Management Plan and its land use land use order based on its vocation, current use, biologicand ecological complexity. Recognizing the productive potential and everything to do with the usufruct, protection and management of communal land, having to respect the objectives, criteria and limits established within the plan which is approved by the General Assembly of Communes.
- With regard to the diagnosis of the diagnosis is strengthened the conservationist attitude of both communities expressed in the first place in the ordering of their territory, being a type of active protection on which there are agreed community rules and agreements involving resources and efforts. As part of the ecotourism project there are areas designated by community agreement for the conservation and reproduction of the white-tailed deer, which is located 1.6 km from the community center, there are tours where adults and children can have contact with these animals. On the other hand, in order to fulfill the objectives of the ecotourism activities carried out by the company, an area of the communal territory of Capulálpam was determined in order to carry out restoration activities in one of the areas that was impacted by a forest pest. Currently the area has been reforested and the activities that are planned to be carried out in its maintenance through pruning and clarifications.

## 6. Conclusions

The main integral development activities carried out by two communities in the Sierra Norte of Oaxaca (Santa Catarina Ixtepeji and Capulálpam de Méndez) were identified in the sustainable use of the biodiversity of ecotourism activity through a management (framed in its system of uses and customs) that guarantees the use, conservation, protection and recovery of biodiversity without the activity generating negative effects on the territory.

By analyzing the correlation of the variables sustainable management and sustainable development of the municipalities of Santa Catarina Ixtepeji and Capulálpam de Méndez, it was obtained that for the variable sustainable management the dimensions of use, protection, preservation and recovery have a positive impact on the development, being that for the case of community ecotourism the dimensions that most affect the development are the asociatividad and its organization.

Despite the difficulties and constraints faced by municipalities, social structures have played a key role in developing new organizational structures such as community business operations, ecotourism committees, commissary of communal goodsand municipalauthorities, with which the participation of the population has been achieved. But it is necessary to strengthenthem with modern actions in technical and specialized aspects that allow to maintain the permanence and growth of economic activities, generate decent jobs and achieve a balanced regional development, all with the clear objective that the deterioration of habitat and biological processes of native species must be avoided, and propose the use of renewable energies.

#### Glossary

Compañía Maderas de Oaxaca: Oaxaca Wood Company. CONAFOR: National Forestry Commission. COPLADE: General Coordination of the State Planning Committee for the Development of Oaxaca. FAPATUX: Tuxtepec Paper Factory. INEGI: National Institute of Statistics, Geography and Informatics.

ODRENASIJ: Organization for the Defense of Natural Resources and Social Development of the Sierra Juárez.

PROFECO: Federal Consumer Attorney.

SEDESOL: Ministry of Social Development.

SEMARNAT: Ministry of Environment and Natural Resources.

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