Chapter 5 Rurality and multifunctionality in the “El Veladero” National Park, Acapulco, Mexico

Capítulo 5 Ruralidad y multifuncionalidad en el Parque Nacional “El Veladero”, Acapulco, México

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Abstract

Multifunctionality and the new rurality explain a large part of the population, economic, social and environmental problems that are currently developing in emerging countries in Africa, Asia, Latin America and peri-urban areas of developed countries in Europe, Oceania and North America. Hence the importance of synthesizing the characteristics contemplated by the Sustainable Development Goals at a global level. In the case of the countries of the global south such as Mexico, and particularly the southern state of Guerrero, it is urgent to contribute with physical-geographical and economic-social information that allows decision-making by the current municipal management of Acapulco de Juárez, Guerrero, Mexico. The central objective was to elaborate the socioeconomic and environmental synthesis in three human settlements in the "El Veladero" National Park. The methodology is of a mixed nature since qualitative techniques were used at the beginning and later complemented with quantitative techniques of information collected in the field. The main results are: 1) population pillar is made up of 1,028 inhabitants grouped in three towns within the park 2) economic pillar focused on the development of economic activities such as agriculture, livestock, shearing and hunting; 3) social pillar the population has minimal basic municipal services as a result of the irregularity of the terrain 4) environmental pillar the deciduous forest vegetation of greatest scenic beauty is reduced to the core area of the "El Veladero" National Park. Conclusions: a) the rural multifunctionality is a modern strategy that allows options for the development of places and population that wishes to progress and b) an updated analysis of the population, economic, social and environmental variables was carried out where the multifunctionality and the new rurality are viable strategies for reorient the development of sites located in emerging countries.

Biodiversity, Geographical, Multifunctionality, Rurality, Tourism

1. Introduction

At the global level, the European school of thought coined the term "agrarian multifunctionality" in the 1990s and in parallel in Latin America the construct called "new rurality" was developed (Flores et. al., 2022). Within this context, in Mexico there is a bibliography published in printed and digital form on the characterization and application of these theoretical-methodological concepts by various authors (Niño-Gutiérrez & Segrelles, 2013); (Sandoval et. al., 2021).

In this order of ideas, rurality in the study area is approached by taking up and sustaining the conventional indicators of rurality such as: total population, economically active population, economically inactive population, the size of the locality, where primary activities play a fundamental role. All of the above refers to a complex analysis that allows linking rurality, multifunctionality and religious tourism, which is grounded in Praderas de Guadalupe, municipality of Acapulco, Guerrero, Mexico. This enclave is located in the upper part of "El Veladero" National Park, located in the north-central portion of Santa Lucía Bay (Castellanos et. al., 2021). This enclave is of interest because, according to Art. 44 of the General Law of Ecological Balance and Environmental Protection (LGEEPA), Natural Protected Areas (NPA) are areas of the national territory over which the Nation exercises sovereignty and jurisdiction, in which the original environments have not been significantly altered by human activity, or whose ecosystems and integral functions require preservation and restoration. Therefore, these would be subject to the regime established in the LGEEPA and other applicable regulations (CONANP, 2021a).

Another important aspect to highlight is the religious aspect, since the Catholic religion in Mexico was conceived after the conquest, which is why it would dictate the norms and values of the majority of Mexicans at the time. For its consolidation, the crown in charge of the country imposed Catholicism through war, economic and political power, this religion was the predominant one even after the independence of Mexico, which is confirmed by the Constitution of 1824, where it is indicated as the only one in the country, without tolerating any other, which limited the emergence of other religions or ideologies (Rosas, 2012). According to data from the last population and housing census conducted by INEGI in 2020, there was a decrease of five percentage points in those who claim to be Catholics, which went from 82.7 to 77.7 percent with respect to the 2010 census, so it can be said that Catholicism remains the predominant religion in the country (Rodriguez, 2022).

Table 1 History of the protection of National Parks in Mexico

Epoch or period of Mexican history	Event related to the history of the conservation of natural areas in Mexico.
Pre-Columbian Period	Botanical gardens and public parks created under the order of King Nezahualcoyotl of Texcoco (1402-1472).
Colonial Period	The Spanish Crown decreed laws in favor of the conservation of timber resources (1679).
Period after the Independence of Mexico	Benito Juárez established the first laws for the protection of Mexican flora and fauna, among them the Forestry Law (1870). The first natural area for conservation and public recreation, El Desierto de los Leones was decreed under the order of Lerdo de Tejada (1876) (SEMARNAT, 2018).
Porfiriato	Porfirio Díaz decreed the Monte Vedado del Mineral del Chico National Forest (1898).
Mexican Revolution and post-revolutionary period	The Department of Forests was created (1910). Venustiano Carranza decreed the Desierto de Los Leones as a National Park (1917). Guadalupe Island was decreed as a Reserved Zone for Hunting and Fishing of animal and plant species by Plutarco Elías Calles (1928).
Government of Lázaro Cárdenas	During this period, Miguel Angel de Quevedo sponsored the creation of 39 National Parks (1935).
Government of Miguel de la Madrid (1982-1988)	The Secretariat of Urban Development and Ecology (SEDUE) and the National System of Natural Protected Areas (SINANP) were created. More than three million hectares of ecosystems were protected and the General Law for Ecological Balance and Environmental Protection (Ley General del Equilibrio Ecológico y la Protección del Ambiente, LGEEPA) was enacted (1988).
Government of Carlos Salinas de Gortari (1988-1994)	The National Commission for the Knowledge and Use of Biodiversity (CONABIO) was created. Ten Biosphere Reserves, two National Marine Parks and 11 other reserves were opened (1992).
Ernesto Zedillo Ponce de León (1994-2000)	During his term, the LGEEPA was amended to strengthen the National System of Natural Protected Areas (SINANP).
Vicente Fox Quesada (2000-2006)	The islands of La Pajarera, Cocinas, Mamut, Colorada, San Pedro, San Agustín, San Andrés and Negrita and the islets of Los Anegados, Novillas, Mosca and Submarino, located in Chamela Bay, Municipality of La Huerta, State of Jalisco, with an area of 1,981,439.2 ha, were declared a protected natural area (ANP) with the category of Sanctuary.
Felipe Calderón Hinojosa (2006-2012)	It declared the area known as Balandra in the state of Baja California Sur as an ANP with the category of Flora and Fauna Protection Area, given that it is a coastal wetland, making these ecosystems unique at the national level.
Enrique Peña Nieto (2012-2018)	Declared the Revillagigedo Archipelago as an ANP with the category of National Park on November 24, 2017, making it the largest in North America.
Andrés Manuel López Obrador (2018-2024)	On March 22, 2022, the Ecological Park of Lake Texcoco in the State of Mexico was declared a NPA with the category of Natural Resources Protection Area.

Source: Prepared by the authors based on CONANP, 2022.

To address the issue of protection of natural spaces in Mexico, it is important to know that it is a fairly broad topic historically speaking, since since the time of the Mesoamerican cultures there was already an awareness towards the care and preservation of natural spaces. This can be seen through some important cultures that were part of pre-Hispanic Mexico, such as the Maya and Mexica civilizations, which as part of their worldview incorporated the worship of nature and paid tribute to elements such as rain, the sun, plants and animals; many of these elements had a deity that the population associated with each one and were represented in different ways, such as in sculptures made from different materials, of which there are several vestiges today (González, 2001).

In pre-Hispanic Mexico, society was involved with nature, so much so that they venerated multiple aspects of it, since they felt part of it and not superior. From this period it is also known that the indigenous people took walks for recreational purposes in areas of natural spaces (Soto, 2016), it is even known that one of the rulers, King Nezahualcoyotl of Texcoco ordered several ahuehuetes plantations in order to carry out recreational activities and landscape appreciation (Castañeda, 2006). Therefore, similar to what happened in the United States, the conservation of natural areas occurred through the search for recreational activities, at least in Mexico's pre-Hispanic era.

Officially, the government of Mexico starts from the 1996 law, regarding the Natural Protected Areas SEMARNAP (1996), where it seeks to promote the conservation of endemic species of the country along with the conservation of its ecosystems, so it is essential to promote environmental education so that each citizen acquires a responsible environmental behavior, together with the government participating with the private sector in matters of protection so that the NPAs can be managed based on specific and effective programs and management plans (Niño-Gutiérrez, 2017).

With the above, it is possible to glimpse the notable difference regarding the basis on which the NPAs were conceived, which initially sought only to conserve primary natural resources for their subsequent exploitation and use for recreation, and then to move towards something more complex such as a generalized environmental education of its population.

In the particular case of Mexico, the Secretariat of Tourism (SECTUR) defines rural tourism as "trips that are made with the purpose of witnessing activities of coexistence and interactions with rural communities, all the social, cultural and daily production expressions of the same". According to the Secretary of Tourism (SECTUR, 2002), activities that could be carried out in rural tourism include artisan workshops, mystical experiences, dialect learning, ethno-tourism, eco-archeology, agro-tourism, rural photography, gastronomic workshops, and preparation and use of traditional medicine.

As a result of the effects of COVID-19 in Mexico, several rating agencies have downgraded the annual growth forecast from 1 to 0.9%, while the economic contraction should be approximately 1.5%. In this sense, the Economic Commission for Latin America and the Caribbean estimates that the GDP will be close to 10% by the end of the year. At the national level, estimates were made by INEGI, where in 2019 there were 1.8 million companies under five years old. This newly created business sector was the most vulnerable during the pandemic (ECLAC, 2020). As a result of the aforementioned, there was a sharp drop in employment, especially in the industrial and services sector between March and April, in contrast to the agricultural sector, which showed resilience. For its part, the Bank of Mexico estimated that around 1.7 million official jobs would be lost by 2020 as a result of the pandemic in the country. The International Monetary Fund made a projection forecasting that Mexico will suffer a 10.5% drop in GDP, where 2 million formal jobs could be lost and up to 17 million informal jobs by 2020, according to Enoch Castellanos, president of the National Chamber of the Transformation Industry (Agencia Reforma, 25/06/2020), which would also have a negative impact on the tourism sector.

Within the National Park "El Veladero" there have been several attempts made by different municipal administrations to induce a religious eco-tourism, since this is not yet recognized by much of the population of Acapulco or by tourists, which is sought through the construction of a landmark similar to the Corcovado Christ in Brazil, which measures 38 meters high. For the particular case of the area under study, the monument to be built would be called "Cristo Rey de la Paz" (Christ King of Peace), which would be approximately 80 meters high, which would be of greater proportions with respect to the reference monument. This project would be located northwest of the park's western polygon, which is approximately 700 meters above sea level (INEGI, 2020c). There is information that the genesis of this project has been in consolidation since 2000 and is still being considered (Ramírez, 2021).

Table 2 Local fauna in danger of extinction

Common name	Scientific Name	Protection category
Boa	*Boa constrictor imperator*	Threatened
Garrobo	Ctenosaura pectinata	Threatened
Iguana verde	*Iguana iguana*	Special protection
Gavilán pescador	*Pandion haliaetus*	Out of risk
Escorpión	*Heloderma horridum*	Threatened
Cojolite	*Penelope purpurascens*	Threatened

Source: Mexican Official Standard NOM-059-SEMARNAT-2010.

The municipal presidency has sought to detonate a local tourism development in the community of Praderas de Guadalupe by taking up factors such as the rural landscape along with the climate, flora and fauna species, to promote an improvement in living conditions in this locality, parallel to the development of the municipality of Acapulco. Some authors that reinforce these ideas are Niño-Castillo & Niño-Castillo (2018) in Latin America, as well as Niño-Gutiérrez (2014 and 2020), CONANP (2021b) and Niño-Gutiérrez *et al* (2015) in Ibero-America.

The study is important because it offers: a) a synthesis of the population-environmental pillar and b) interrelates the economic-social pillar. This contributes to a current global vision of the socio-territorial, economic and environmental dynamics in the upper part of Acapulco Bay.

This is in order to lay the foundations for the formulation of concrete actions aimed at improving infrastructure and accessibility to the site under study, in addition to formulating in the medium term a religious tourism program specifically in Praderas de Guadalupe located in the northern polygon of the National Park. The added value of this study lies in the provision of updated statistical information so that the appropriate and pertinent municipal authorities have reliable information to make timely decisions regarding this geographic enclave.

The techniques on which the study was based included: i) conceptual mapping, ii) thematic mapping and iii) documentary research within the INEGI platform (Digital Map of Mexico, Mexico in Figures and DENUE). The above was complemented with field work where we resorted to: a) in-depth interview technique and b) participant observation. In order to contribute to fill the information gap, comprehensive information is provided in the hope that the managers on duty will have data, figures and evidence that will allow them to contribute to the preservation and care of the green lung located in the highest part of the city of Acapulco. The guiding question of the study was: what is the current situation of rurality and multifunctionality in El Veladero National Park? This document is integrated by the following sections: introduction, methodology, results, acknowledgements, conclusions and references.

2. Methodology

The methodology used was of a mixed nature, since qualitative techniques were used at the beginning and later complemented with quantitative techniques, through the information gathered in the field. In such a way that the qualitative technique applied during the documentary research involved the review of relevant publications in the form of articles, books and book chapters, in printed or digital format, so that after their compilation, they were read, analyzed and selected according to the variables under study, on topics related to: rurality, multifunctionality, tourism, geography, biodiversity. For this purpose, reference digital databases were consulted, such as: Latindex, Redalyc, SciELO, Google Scholar, among others, together with the consultation of printed thematic cartographic material and digital satellite images from INEGI, which are updated to 2021 on the area under study.

The use of quantitative variables enriched the case study, which was also complemented with field work carried out between April 22 and May 17, 2022, where we had the opportunity to interview nine key informants, who accompanied the authors on three tours of the area under study; six semi-structured interviews were also conducted, in which the use of the field logbook and participant observation was important. It was also possible to take 66 photographs showing the population, economic, social and environmental dimensions in order to establish the interrelation with the objectives of sustainable development from a local level with a global perspective.

During the fieldwork phase in the study area, we visited the three rural towns located within the "El Veladero" National Park, which are: Praderas de Guadalupe, Pueblo Nuevo, Pueblo Nuevo and El Veladero: Praderas de Guadalupe, Pueblo Nuevo and Vista Hermosa. A visit was made to each of the settlements within the study area, where a specific day was dedicated to each of the settlements listed above for a detailed reconnaissance tour. The first visit was carried out on April 22, 2022 in the town of Praderas de Guadalupe, in this place a tour was carried out and several evidences were collected from notes in a notebook, taking photographs and interviews with the help of three people who are inhabitants of the town, who collaborated voluntarily, in addition interviews were conducted to corroborate data obtained. The second visit was carried out on May 5, 2022 in Pueblo Nuevo, where evidence was collected with the help of photographs and interviews with two villagers. The third visit was carried out on May 17, 2022 in the town of Vista Hermosa and a survey of evidence was carried out in the same way, through photographs and interviews with the inhabitants of the town. The main objective was to prepare a socioeconomic and environmental synthesis of El Veladero National Park.

Conceptual framework, the author Arias (2006), who defines data collection techniques "as the set of procedures and methods used during the research process, with the purpose of obtaining information relevant to the objectives formulated in a research" (p. 376).

The data collection technique made possible: (a) documentation, through which the consultation of documentary databases in analog and digital format was carried out, in order to use the information obtained, by following a method to establish an order on the information obtained; b) observation, which was supported by field work, where data were collected through notes in a field notebook, to later be captured in tables, in addition to the collection of evidence in photographic format; c) conceptual mapping, where the "concept maps and diagrams" were taken up again, later in the Latin American context Tobón coined the term conceptual mapping.

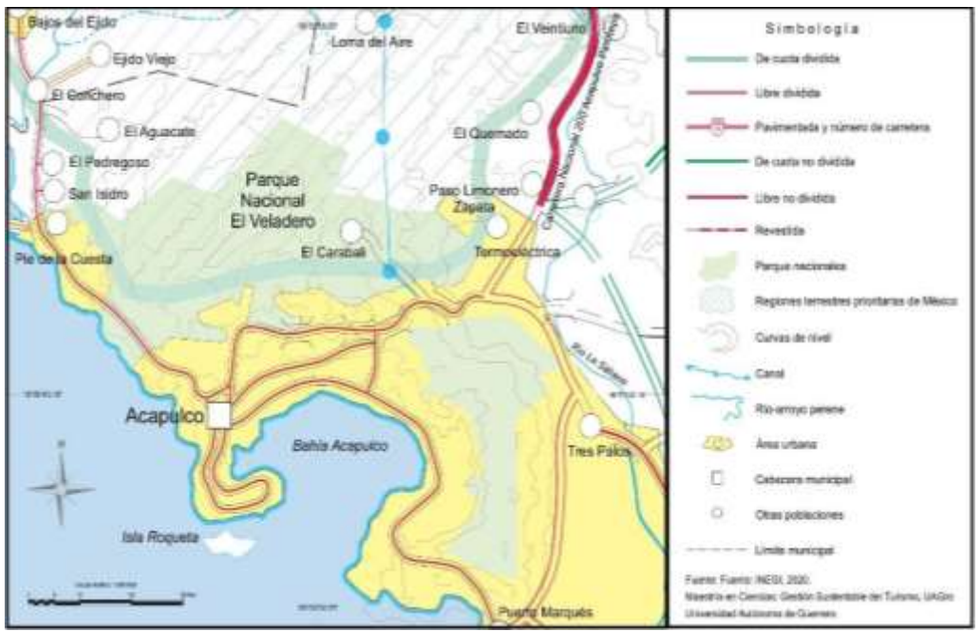
This is conceived as a methodological tool driven by socio-training (Niño, 2020). In Latin America, Sergio Tobón is considered the father of conceptual mapping since 1996. This technique was useful for the analysis and systematization of concepts such as what is intended to be done in this research. At the same time, it becomes a qualitative research strategy. According to Rodriguez (2020), "conceptual mapping seeks to systematize, organize, analyze, construct, communicate and learn concepts and theories, orienting the analysis from different perspectives within the research context" (p. 2).

In this sense, concept mapping can be useful to foster concepts and theories. This technique is made up of eight axes, which are: exemplification, notion, category, characterization, differentiation, subdivision, linkage and methodology, each of which is composed of specific questions that make it possible to systematize the information on a given topic (Tobón, 2013). Thus, concept mapping can work together with other tools, such as information and communication technologies. The use of this technique has become a novel and essential way to work with the challenges that new research scenarios may pose, to structure and systematize knowledge. This modern tool connects the complex relationships between concepts and helps to structure or improve the state of the art, analyzes the relationships of each definition between a single concept and at the same time analyzes the definitions individually and their relationship with others (Moreno & García, 2010) and d) Thematic mapping to characterize the research context graphically, which constitutes an instrument capable of being used to obtain real information of the study area at any time and place where it is required. These maps contain information on the environmental, social and economic characteristics of the study area.

Characterization of the study area, was carried out under what was proposed by Niño and Melo in the Niño Sociogeographic Model (MSNiño) for Natural Protected Areas of Mexico (1992-2014) with adaptations to achieve a tourism diagnosis of the study area in question (Niño, 2015). In this model, the guidelines are detailed step by step so that, in a manner attached to the structure of sustainable development, they are applied to comprehensively analyze the geographic enclave in which the research is developed through indicators: social, environmental and economic relevant to sustainable tourism analysis. Therefore, the indicators proposed by the aforementioned model and once applied to the case study, were detailed as follows: Geographic location of "El Veladero" National Park is located south of the municipality of Acapulco, divided into two polygons, one in the western part of the municipality and another of smaller dimensions, in the eastern part. This in turn, by its disposition of the National Commission of Natural Protected Areas (CONANP), is located in the physiographic region known as the Neovolcanic Axis also known as Sierra Volcanic Transversal, along with the Sierra Madre del Sur (CONANP, 2016).

El Veladero National Park is located between 99°49'28" and 99°56'58" west longitude and 16°49'03" and 16°54'51" north latitude with respect to Greenwich (Figure 1). The park's cartographic map was created by the National Institute of Statistics, Geography, and Informatics (INEGI) and is called "Acapulco" at a scale of 1:50,000.

Figure 1 Geographic location of "El Veladero" National Park



Source: INEGI, 2020c.

El Veladero National Park is located in the south of the state of Guerrero, within the territory that corresponds to the municipality of Acapulco (Avilez, 2014). It is distributed in two polygons, the western polygon has an area of 27 379 358 m2, while the eastern polygon has an area of 8 785 584.39 m2 (DOF, 2000). It was decreed as a National Park on July 22, 1980 under the following criteria: "It is the Federal Executive's authority to establish national parks for public use on lands that, because of their location, topographic configuration, exceptional beauty, scientific, educational or recreational value, or when they contribute to the improvement of the community's living conditions and well-being or contribute to tourism development; as well as to carry out the necessary works for their development and organization" (DOF, 1980).

The park under study is in a critical situation due to the growing problem of environmental contamination caused by burning garbage within the natural resource protection area. In addition, there is a severe problem of human encroachment that threatens the western polygon of "El Veladero" to disappear. The efforts of the agencies in charge of protecting the ANP have been insufficient to stop urban expansion. The vertical structure of the ANP includes the biotic and abiotic aspects, which are found within the environmental pillar of Sustainable Development (SD) to obtain more precise data for the research work (Niño-Gutiérrez, 2008).

The horizontal structure of the landscape that makes up "El Veladero" National Park is related to the social pillar that includes in situ characteristics of the population and economic characteristics, which are also part of the sustainable system and have to do with the balance of the municipality of Acapulco. The indicators were approached from a qualitative perspective based on what was originally proposed by the Modelo Sociogeográfico Niño (MSNiño) for Natural Protected Areas of Mexico (1992-2014). The characterization was carried out through pointed questions (see Table 3).

Table 3 Evaluation of indicators

Environmental			Social		Economics	
Fauna Are there endemic, threatened or endangered species within the study area? How to take advantage of the existence of fauna for environmental-tourism education?	Flora Are there endemic, threatened or endangered species? What is the relevance of the flora for tourism?	Hydrology Are there any bodies of water within the study area? Does the study area have any hydrological significance within the municipality of Acapulco?	Soils What is the importance of soils within the study area?	Population What is the ratio of EAP to EIP in the study area? What is the health affiliation situation? What is the education situation? What is the housing situation?	Infrastructure What is the infrastructure like within the study area? Are there basic services?	Economic activities What are the economic activities within the study area? Do these activities generate any type of impact on "El Veladero"?

Source: Prepared by the Company

3. Results

The municipality of Acapulco has a total population of 600,000 inhabitants (INEGI, 2020a), which is directly linked to the social pillar of sustainable development, where the population tends to settle in steep slopes on cliffs, hills, hillsides and natural reserves, as in the case of "El Veladero", where there are three human settlements: Pueblo Nuevo, Vista Hermosa and Praderas de Guadalupe. According to INEGI, 68 Basic Geostatistical Areas (AGEBs) have been identified (INEGI, 2021), where there are 65 colonies with 1,028 inhabitants, of which 15 are located in Pueblo Nuevo, 532 in Vista Hermosa and 481 in Praderas de Guadalupe.

Pueblo Nuevo is a rural town located within the territory of El Veladero National Park, in the western polygon. It is located at longitude 99° 54' 47" west and latitude 16° 53' 24" north, with an altitude of 574 meters above sea level (masl). It is a hamlet town. The primary economic activities in the town include raising and exploiting livestock and agriculture, the main product of which is corn. Water is supplied through hoses and water is obtained by drilling artesian wells (Op. Cit., 2021).

Figure 2 Western polygon of El Veladero National Park.

Source: Niño-Castillo, et al., 2020

Praderas de Guadalupe is a rural town located within the territory that corresponds to "El Veladero" National Park, in the western polygon. It is located at the coordinates Greenwich West Longitude 99° 51' 51" and North Latitude 16° 53' 31" with an altitude of 342 masl, the type of locality has characteristics of the last century. There is a Diconsa store and a grocery store where the villagers stock up on basic necessities. The primary economic activities include agriculture, livestock raising and farming, and livestock grazing. The main product of livestock raising and farming is pork. The town's water supply comes from artesian wells. There is public lighting in the town; however, it is present in less than half of the town. There are paved streets in less than half of the town, and garbage is collected and deposited in an open community dump to be buried or burned. Transportation in the town is provided by microbus, combi, individual or collective cabs, and pickup trucks (INEGI, 2021). Of the total of 575 inhabitants, only 488 work in an activity for which they receive a salary. Therefore, they are the ones who sustain the local economy, based on activities such as seasonal agriculture, backyard cattle ranching, poaching and extraction of stone materials for self-construction. Accessibility to this area is rudimentary, consisting mainly of roads, trails and paths (INEGI, 2020b).

Vista Hermosa is a rural town located within the territory of El Veladero National Park, in the eastern polygon. It is located at the coordinates West Longitude 99° 50' 20", North Latitude 16° 51' 35" with respect to Greenwich, with an altitude of 299 meters above sea level. It is a town whose characteristics are from the last century, where there is minimal telecommunications. There is a grocery store in the town that supplies residents with basic necessities such as corn, beans, rice, powdered corn flour, among others. Water is supplied through hoses and is obtained by pumping or artesian wells. Most of the town has electricity; at least half of the town of Vista Hermosa's streets are covered with gravel. A community sports field was observed in the field. In terms of transportation, there is a cab feeder route that connects Vista Hermosa with downtown Acapulco, which provides service from 5:00 am to 9:00 pm (INEGI, 2021).

Figure 3 Eastern polygon of "El Veladero" National Park

Source: Niño-Castillo, et al., 2020

In the economic pillar of sustainable development, of the 1,028 inhabitants are under 12 years of age or are housewives, which is why they do not receive economic compensation for the functions they perform (INEGI, 2021). Housewives and students are considered a vulnerable group because, since they do not have an economic income, it is difficult for them to have access to the social security services to which they are entitled by law. There are a total of 345 dwellings, of which 289 are inhabited and 56 are not permanently inhabited, but we were told in the field that these are occupied on long weekends, year-end vacations and Christmas. Ninety percent of the houses are self-built, so they hardly have good ventilation, lighting and the necessary spatial distribution to accommodate more than four family members (INEGI, 2020b).

Among the basic municipal services, it was observed in the field that less than 50% of the streets are paved. Therefore, it is common to find cobblestone or rustic streets and roads. In part, there is no potable water supply, so the water distributed among the settled population comes from hoses connected to springs, and in the dry season, water is supplied by public and private pipes. Drinking water is obtained from three springs, whose names and locations are omitted so as not to overexploit them. There is no sewage service in the upper part of "El Veladero," so sewage runs by gravity into the bay. Public transportation service is irregular, although there is private access through private automobiles and public-private service concessions (INEGI, 2020c).

In terms of health, the population affiliated with municipal, state and federal health services is 715 inhabitants (Op. Cit., 2020c). This represents 50% of the total population within El Veladero National Park. The unaffiliated population is 312 inhabitants, which represents 25% of the total population living in the study area. The health services observed in the field include a health center in each of the towns, a nurse and a doctor, as well as basic utensils for ambulatory care in case of emergencies, since those who need specialized care are transferred to the center of Acapulco, where there are more specialized public and private health services (INEGI, 2021).

The infrastructure within El Veladero National Park is rural, with access routes in and out of the study area, in the form of roads and trails established by the inhabitants since 1980 (DOF, 1980). Currently, the delimitation of the area that corresponds to the National Park's territory is deficient, because there are areas where there is cyclone netting, and in others there is no delimitation at all because it borders directly with ravines and cliffs that are a natural protection. On the outside, in the middle of 2022, there are no National Park signs indicating the border of the reserve, nor is there an official entrance to access the territory, because the entrance in Carabalí indicates that it goes to "Cerro Encinal", so there is no official entrance to "El Veladero". There is also a sign at the entrance that refers to religious tourism, but there is no other information. The national park is protected by federal authorities (Navy), who patrol the towns surrounding the oak forest. This protected area is marginalized from local sustainable tourism development because there is no map of routes or any type of signage to help follow the main route through the reserve, so it is easy to get lost in "El Veladero".

This park has had several attempts at resurgence, one of which has been through the inclusion of religious eco-tourism, through the construction of a statue of a "Christ King of Peace" (Ramírez, 2021). Religious tourism (Figure 4) refers to religious travel similar to conventional tourism, where trips are made to places considered sacred, without depending on the motivation of visitors (Torres et. al., 2017), while religious eco-tourism represents an industry where a large number of people travel around the world, for economic, religious, cultural and environmental issues (Gómez, 2022).

Figure 4 Local tourism signage

Source: Taken in the field by the authors

Various government agencies such as SEMARNAT, CONANP (2021c), and the federal, state, and municipal governments recognize the existence and territory of El Veladero. At the entrance to the park, near Carabalí, you can see the ejido office where the commissariat is located, along with a Diconsa store, which is abandoned. Within this territory, the inhabitants are digging in the subsoil in order to build artesian wells to obtain water and satisfy their basic needs.

The economic pillar has to do with the primary economic activities in the rural part of the municipality of Acapulco, including agriculture, cattle ranching, shearing, hunting and extraction of stone materials. The inhabitants practice agriculture for subsistence, which is done in a rustic way to plant corn (*Sea mayz*) with an occupied surface of 118.4 hectares (ha), squash (*Cucurbita pepo*), fruit species such as mango (Mangifera indica) comprising 13. 3 ha, lemon (Citrus limon), papaya (*Carica papaya*), beans (*Phaseolus vulgaris*) with 36.01 ha, and even cleared for cultivation inside the national park, which causes both wind and water erosion. In most cases, agriculture is for self-consumption because the edible products are stored for the local population. Most of the fields used for planting and harvesting corn, mango and beans are located in the central southern part of the western polygon of "El Veladero" National Park near the town of Praderas de Guadalupe.

Livestock farming includes raising various species of animals for self-consumption, such as cattle, goats, pigs, poultry, horses and donkeys. INEGI (2019) reports exclusively cattle grazing in an area of 4.28 ha. Specimens of the aforementioned type of livestock are mostly fed through natural vegetation within the area, so it is common to find them in various locations within the study area, this type of feeding has caused the loss of leafy vegetation cover. Livestock activities in the study area are not regulated, but rather are activities for self-consumption and small businesses that are not commercially registered, so in the field it was observed that there are poultry, pig and cattle farms, which are located in rural areas and in rustic facilities. However, songbirds (Table 4) with colorful plumage and different songs can also be observed with the naked eye.

Table 4 Bird species and their types of local uses

Common name	Scientific name	Use	
		Edible	Medicinal Medicinal
Paloma morada	*Patagioenas flavirostris*	X	
Chachalaca	*Ortalis poliocephala*	X	X
Zopilote	*Coragyps atratus*	X	
Cucucha	*Columbina picui*		X
Zanate	*Quiscalus mexicanus*		X
Calandria dorso amarillo	*Icterus chrysater*	X	
Codorniz	Coturnix coturnix	X	

Source: Own Elaboration

Within the area that corresponds to "El Veladero" there is a field for cattle raising and exploitation in the town of Praderas de Guadalupe. Due to the increasing invasion and use of the land for agricultural and livestock activities, especially in areas without vegetative cover, this has caused severe erosion, which can be seen in several areas of the land within El Veladero.

Logging is a common activity in the area. Villagers begin by cutting down areas of the forest using tools such as machetes and axes; large tree trunks are used for construction and firewood because many villagers do not have gas stoves. Later, the smaller vegetation is burned and removed to use the space for planting. Most of the planting is done during the rainy season, because most of the year the climate and soil conditions do not allow for the development of plant species.

Within the study area, as it is a natural area, there are animal species such as: raccoon (*Procyon lotor*), badger (*Nasua narica*), rabbit (*Sylvilagus cunicularius*), hare (*Lepus flavigularis*), squirrel (*Sciurus aureogaster*), green iguana *(Iguana iguana*), black iguana (*Ctenosaura pectinata*), masacuata (*Boa constrictor*), rattlesnake (*Crotalus durissus*), coralillo (*Lampropeltis triangulum*) (SEMARNAT, 2016), some are used in edible form or medicinal use that are prone to be hunted and inhabit the ecosystem normally; however, the various human settlements have displaced the species and at the same time have engaged in poaching activities.

These hunting activities are almost entirely for self-consumption; however, there are indications that some species are being sold, such as iguanas and parakeets, which is a serious situation because these species are under special categories of protection. These activities as a whole within the municipality of Acapulco contribute 0.99% of the municipal economy, which indicates that in general terms they are activities dedicated to self-exploitation by the inhabitants of the study area.

Tertiary economic activities are of vital importance for the subsistence of the inhabitants; retail trade represents 45.5% of the municipality's total economy, making it an important source of income. The inhabitants have to travel during the day to get to the places where they work in commerce, either as business managers or as workers in tourist activities and informal commerce. Some of the inhabitants came to the municipality of Acapulco from other parts of the state of Guerrero, due to the economic boom caused by tourist activities. This caused a large part of the population of tourist service providers to migrate to the port of Acapulco, and some parts of "El Veladero" National Park were invaded by these people, who still live there today. Acapulco stands out in terms of tourism; temporary lodging services and food and beverage preparation represent 18.7% of the municipal economic activity. Other activities: health and social assistance services (3.49%), real estate services (1.02%), recreational services (0.94%), educational services (0.89%) (INEGI, 2020c).

The environmental pillar of sustainable development refers to the biotic and abiotic aspects that support economic activities such as tourism and environmental education in order to contribute to local sustainable tourism development. The low deciduous forest located in the higher parts of the park plays a fundamental role in the infiltration of water into the phreatic mantles that supply the springs from where the settled population transports water to their homes through hoses. The vegetation also has the function of protecting the soil from water and wind erosion, it also represents a green lung for the permanently settled population and for tourism it is an element of scenic beauty and visual amplitude.

The geology that makes up this site is from the Mesozoic era, and although the rocks are ancient, they remain over time as true monoliths distributed throughout the protected natural area. The youngest rocks belong to the Quaternary period, some examples are boulders, gravels, sands and silts, which are found in the almost flat and flat part of Acapulco Bay. This configures soils with different fertility quality, the most fertile are located in the upper part (wild land use) and the less fertile in the lower part, hence it has been destined for residential land use (Cruz Vargas & Niño-Gutiérrez, 2013).

In terms of hydrology, runoff moves from the higher parts of the relief to the lower areas, a situation that during the rainy season drags with it garbage, soil, silt, and trees that sometimes hinder transit from this site to downtown Acapulco. This in turn causes high vulnerability and risk for the settled population, since landslides, landslides, and landslides, among others, are frequent. These events are documented in the local press. The physiographic province to which the region where the study area is located belongs is the Sierra Madre del Sur, in the granitic trunks of Acapulco.

The outcropping rocks in the park correspond to a complex called "Xolapa", made up of metamorphic rocks such as: biotite schists to biotite gneisses, with quartzite and marble; intrusive rocks, granitic rocks from the Cretaceous; and sedimentary and recent deposits. "El Veladero" has several geomorphological units, which are distributed throughout the area of the ANP territory. The highest part that surrounds the city are the mountain ranges; between the contour line that ranges from 200 meters to 500 meters, is the piedmont. Above 50 meters are the valleys and alluvial plains, which are of fluvial origin (Vargas, 1997).

El Veladero's hydrological administration belongs to Hydrological Region 20 (RH-20), known as Costa Chica. The watershed is made up of a series of rivers such as Papagayo (which is closer to El Veladero National Park), Nexpa, Marquelia, Ometepec, among others. During the rainy season in "El Veladero" some water runoffs are formed and even give rise to the formation of springs, which can store water at least 10 months a month; in turn, water infiltrations are important in the runoff of groundwater bodies that are of high importance for the municipality of Acapulco. During the peak of the rainy season, the streams flow down with such force that they can cause small-scale disasters, such as vehicle rollovers and drainage flooding (Ibidem, 1997).

"El Veladero" has an important function within the municipality of Acapulco in terms of water catchment and management. Below the two polygons, there is a whole network of subway water bodies that supply water to the entire municipality, which in turn denotes the water ecosystem services provided by this study area. Most of the water flows in the municipality of Acapulco, both subway and surface, are distributed within the two polygons that make up "El Veladero". This is evidence of the hydrological importance of the ANP.

The general climate of the entire municipality of Acapulco is tropical and sub-humid (Aw), with predominant rainfall in summer and dry winters. This climate has an average annual temperature of 27.8°C, with a maximum temperature of 29°C in August and a minimum of 26.5°C in January. The temperature varies during the year by at least 2.5°C. Annual precipitation is 1,411.1 millimeters. The rainiest month is September, which is usually the month when the rainy season begins, with 386.7 mm, and the least rainy months are February and March, with about 0.9 millimeters (INEGI, 2020c).

The main soil types are represented by the gleyic Solonchak (Kg), the eutric Regosol (Re), the dominant soil within the study area is the Leptosol or Litosol (L) and the gleyic Feozem (Pg) (INEGI, 2021). Solonchak soils are characterized by being found in areas with low slopes and susceptible to flooding, where saltpeter accumulates, so the main quality that characterizes them is their high salt content. It also has an alkaline pH and can have an A horizon, a B horizon or a gleyic horizon or one with excess moisture, such as the one found in the study area, within the first 50 cm of depth (SEMARNAT, 2008).

Regosols are mostly very young soils, which are located on unstable material, are light-colored and have very little organic matter. They are found in most climates and on all types of slopes, commonly in arid, semi-arid, dry tropical and mountainous regions (INEGI, 2001). Lithosols are very thin soils, with a high amount of stony material and may also contain a high amount of calcareous material, in addition to being poorly developed. They are the soils most commonly found worldwide and are associated with sites with quite complex relief, so it is very common to find them in Mexico (Correa & Niño-Gutiérrez, 2016). These soils are found in all types of climates and particularly in mountainous areas. Due to their shallow depth, stoniness and calcium content that can immobilize mineral nutrients, their agricultural use is very difficult, to the extent of being limited, so it is preferred to keep them with their original vegetation (SEMARNAT, 2008).

Feozem soils are formed on unstable material. They are found in temperate and humid climates, with natural vegetation of tall grasses or forests. They are dark soils with a high amount of organic matter, which is why they are highly valued in agriculture; they are mainly used for planting cereals such as soybeans, wheat and barley, as well as for planting vegetables. In Mexico, they are distributed mainly in various portions of the Neovolcanic Axis, the Sierra Madre Occidental, the Yucatan Peninsula, Guanajuato and Queretaro (Idem, 2008). The dominant soil in the municipality of Acapulco is Leptosol, so it can be found in most of the territory of "El Veladero".

The vegetation found within "El Veladero" corresponds to medium sub-deciduous forest, which is distributed throughout the NPA in the form of patches or small spaces, within which there is also the presence of low deciduous forest. The deciduous and sub-deciduous forests are characterized by vegetation dominated by trees of different deciduous species. They develop in warm environments with rainy summers, where annual precipitation varies between 1,000 and 1,229 mm, with well-defined and extensive dry seasons. Similar to the evergreen forests, they are divided into medium and low, depending on the height of the dominant tree vegetation (SEMARNAT, 2020).

Another important characteristic is the height of the canopy of the trees that make up these forests, the canopy rarely exceeds 15 meters in height, although in exceptional cases, they reach up to 30 meters. These forests are known as subcaducifolia or caducifolia depending on the proportion of trees that lose their foliage in the dry season. Some of the trees that make up this type of vegetation have adapted to store water in their stems, as in the case of copales (*Bursera*), pochotes (*Pachira quinata*) ceiba (*Ceiba pentandra*), parota (*Enterolobium cyclocarpum*) and several species of columnar cacti. This vegetation is often subject to slash-and-burn agriculture and extensive cattle ranching. These activities severely degrade it, which is why it is considered one of the most threatened tropical ecosystems in the world (SEMARNAT, 2010).

Within the study area, this vegetation has been affected by the presence of clandestine cattle ranching, which is managed by the population located around "El Veladero". The dominant plant species in the ANP are oaks *Quercus affinis* and *Quercus laurina*, while in areas disturbed by anthropogenic presence, acacia species predominate: carnezuelo or cornizuelo (*Acacia cornígera*) and guizache (*Acacia cymbispina*), in the herbaceous stratum, which is defined as plants of a height less than or equal to 10 cm (Madrigal & Vargas-Chacón, 2016), there are grasses (*Bouteloua sp.)* and zacate colorado or zacate barba negra (*Heteropogon sp*.) (Vargas, 1997). The wild vegetation zones within the municipality of Acapulco correspond to deciduous, sub-deciduous and evergreen forests, which are present within the study area, where the oak forest is the vegetation that stands out within the territory of the NPA.

The fauna in "El Veladero" consists mainly of songbirds, reptiles such as iguanas and snakes, including the boa (Boa Constrictor imperator), black iguana (Ctenosaura pectinata), green iguana (*Iguana iguana*), fish hawk (*Pandion haliaetus*), scorpion (*Heloderma horridum*) and cojolite (*Penelope purpurascens*) (SEMARNAT, 2016). Within the territory, one species has also been found in the category of endemic species, it is the Pata de Res gecko (*Phyllodactylus lanei*) (CONANP, 2022); however, this has been the only endemic species found within the ANP and given the lack of studies related to flora-fauna research and a management plan for "El Veladero", it is difficult that another species can be found and categorized in this way (Data Mexico, 2019).

As a diagnostic, it was found that "El Veladero" National Park is made up of low deciduous forest vegetation preserved in 50% concentrated in steep slopes and cliffs with scenic beauty and visual amplitude that covers 100% of the lagoon of Coyuca de Benítez to the north, to the northwest the bay of Santa Lucía and to the south Puerto Márquez, The remaining 50% of the vegetation in the national park is underconserved, especially in the areas surrounding the three towns that have been in this federally protected natural area since 1993, where the population practices primary subsistence economic activities, in addition to serving as dormitories for employees of the tourism and commercial sectors of the city and port of Acapulco. If the observed trend of concentration and expansion of the rural-urban zone towards the lands of "El Veladero" National Park continues, the deterioration of the landscape will accelerate dizzyingly, which would lead to think about a recategorization of the area under study more in accordance with a management category that allows the rational use of the still existing natural resources, according to the following analysis of Strengths, Weaknesses, Opportunities, and Threats (SWOT):

Strengths:

1. The destination of Acapulco has a variety of natural, scenic and historical resources, traditions, living culture, among others. Some of them have been declared Federal Protected Natural Areas, as is the case of "El Veladero" National Park since 1980, and in other cases, cultural heritage that represents an important potential for the diversification of national and foreign tourism.
2. Existence of tourism and handicraft products with potential for commercialization in the tourism sector.
3. Existence of the Fideicomiso Acapulco (FIDEACA), the International Tourism Fair (FITUR), for cooperative publicity campaigns, business appointments with wholesalers and tour operators, among others.
4. Existence of tour operators and travel agencies in Acapulco.
5. Growing interest on the part of businessmen in tourism development, which is demonstrated in greater commercial actions for press trips and support for attendance at national and international fairs.
6. Positive degree of satisfaction on the part of national and foreign tourists.
7. Deep sense of rootedness in the inhabitants, which facilitates their incorporation into sustainable tourism development.

Opportunities:

1. World tourism trends oriented towards cultural, nature, and business tourism segments, among others.
2. Existence of the Municipal Secretariat of Citizen Security and Civil Protection, Tourist Police and intersectoral agreements in the area of tourist security.

3. Interest of international organizations in the conservation, recovery and enhancement of the natural and cultural heritage.
4. Importance of tourism as an activity that generates jobs and foreign exchange.
5. Air, sea and land communications to contribute to the fluidity of national and foreign tourism.
6. Important indexes of massification and saturation of the tourism in other sites of Acapulco.
7. The use of new technologies will allow low-cost promotion.

Consolidate mechanisms for the development and innovation of regional products with emphasis on nature tourism products, ecotourism and avi-tourism or even adventure tourism.

Weaknesses:

1. Insufficient development of the process of planning, implementation and monitoring of tourism in natural protected areas.
2. Insufficient human resources, tools and competencies among professionals and professionals to manage and lead sustainable development in NPAs.
3. Lack of an information system for tourists and visitors to "El Veladero".
4. Weak research and management competencies of human resources focused on NPAs.
5. Lack of potable water supply, electricity, sanitation, wastewater treatment and solid waste, which increases local environmental disturbance.
6. Incomplete statistical information and outdated Tourism Satellite Account.
7. Alteration and damage to the landscape due to the presence of buildings outside of "El Veladero" National Park.
8. Low demand for nature tourism.

Threats:

1. Strong competition from the national market due to the existence of tourist sites with better tourism planning in ANPs, quality offers, variety of services, and more aggressive tourism promotion strategies.
2. Insufficient connectivity, telecommunications and basic services that promote accessibility to "El Veladero.
3. Insufficient protection of Palma Sola's natural, forest and even cultural resources, which generates a significant risk of loss of natural and cultural heritage.
4. Social conflicts, citizen insecurity and drug trafficking that deteriorate the image and discourage investment in Acapulco.
5. High levels of informal commerce, which generates conditions that affect the security and quality of tourism.
6. Climate change, vulnerability to natural disasters and poor planning generate problems and delays for national and foreign tourists.
7. Lack of adaptation to technological innovations and new market structures in tourism training.

From 1980 to 2019 a rudimentary tourism was developed in an incipient way from the public educational sector in the municipality, given that teachers and students made field visits to "El Veladero", however, as of January 2020, as a result of the pandemic, such tours were suspended and possibly will be suspended permanently according to the evolution of COVID-19, reason for which there is no tourism as such in said Natural Protected Area. Therefore, the proposal is as follows: i) it is important to protect and conserve the low deciduous forest so that the neighboring community can promote environmental education, which may include soil conservation and construction of terraces to counteract the laminar water erosion that is triggered every rainy season.

Bench terraces are a series of platforms or steps (like "benches") that are built with the purpose of modifying the slope of the land to favor water absorption and increase production, thus allowing the sustainability of land use over time. They have a flat part (embankment) that is used for cultivation, and a cut part (*slope*) to provide stability; ii) the vegetation must be preserved over time through the planting of trees that grow in this place, such as: acacia (*Acacia sp*.), oak (*Quercus sp*.), ceiba (*Ceiba pentandra*), amate (*Ficus insipida*), tepehuaje (*Lysiloma acapulcensis*), bonete (*Jacaratia mexicana*), cazahuate (*Ipomoea murucoides*) and pochote (*Bombacopsis quinata*), among others.

This will happen to the extent that the population becomes involved in the creation of a community nursery composed only of native vegetation and iii) fire prevention in "El Veladero" National Park, to include: (a) legal prevention, apply laws, regulations and norms that require support in the use of regulatory sanctions by the agencies in charge of monitoring and sanctioning infractions to the regulations, (b) cultural prevention, the analysis of situations in each identified area, will be the main idea to modify human behavior regarding the use of fire in the specific areas, which will lead to a change in people's attitude, making them more reserved, protective and respectful of natural resources. Include a persuasive campaign through education and information (community education programs using mass media and originality: radio, television, newspapers, films); popularized by outdoor advertising; publication and distribution of printed materials; conferences and press releases, lectures in urban and rural schools, courses for the rural population, celebration of festivals, exhibitions and fairs, personal contact and problem solving through the conciliation of interests, among others and c) physical prevention, physical prevention actions and forest or silvicultural management for preventive purposes.

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5. Conclusion

Multifunctionality in the new rurality is a modern strategy that allows options for the development of places and population that wish to progress, so that, through the conservation of "El Veladero" by means of local citizen participation, it can propitiate the diversification of Acapulco's tourist offer, which shows as a focal node the conventional tourism of sun and beach. However, by means of an updated analysis of the existing population, economic, social and environmental variables in the NPA, it is feasible that multifunctionality and the new rurality are strategies that allow reorienting the local development of sites such as "El Veladero" National Park, located in emerging countries.

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