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Análisis de la biodiversidad desde una perspectiva socioambiental en Las Vigas, Guerrero, México

***Biodiversity analysis from a socio-environmental perspective in Las Vigas,
Guerrero, México***

***Análise da biodiversidade a partir de uma perspectiva socioambiental em
Las Vigas, Guerrero, México***

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Resumen

El término *biodiversidad* hace referencia a la variedad de vida en la tierra, lo cual incluye a plantas, animales, etc. Este estudio se enfocó en el estado de la *biodiversidad* en la comunidad de Las Vigas, Guerrero, México. Este asunto puede ser analizado desde distintos campos científicos y enfoques. Este trabajo surge en respuesta a la creciente preocupación sobre las actividades humanas —agricultura, construcción y contaminación— que están afectando negativamente la biodiversidad en la región. El objetivo principal fue llevar a cabo un análisis de la biodiversidad desde una perspectiva socioambiental en Las Vigas en la Costa Chica del Estado de Guerrero. Se empleó un enfoque mixto que combinó la observación directa en diferentes áreas de la localidad, una encuesta realizada a 38 ciudadanos seleccionados por conveniencia y entrevistas a 42 informantes clave.

Los resultados de la observación revelaron la riqueza biodiversa presente en Las Vigas, aunque también evidenciaron que las actividades humanas están amenazando su preservación. La encuesta puso de manifiesto deficiencias socioeconómicas entre los habitantes, y el 63 % de los encuestados mostró tener conciencia del impacto negativo en la biodiversidad. A pesar de este conocimiento, existe una brecha entre la conciencia y las prácticas de conservación; por ello, el 68 % indicó una falta de cultura ambiental, y el 46 % reconoció la importancia de la biodiversidad. Por último, las entrevistas profundizaron en aspectos sociopolíticos y socioambientales, subrayando la gravedad del problema. En conclusión, se destaca la amenaza que enfrenta la biodiversidad en Las Vigas y la necesidad urgente de implementar medidas de protección.

Palabras clave: diversidad biológica, medio ambiente, social, educación, comunidad

Abstract

The term *biodiversity* refers to the variety of life on Earth, including plants, animals, and other organisms. This study focused on the state of *biodiversity* in the community of Las Vigas, Guerrero, Mexico. This issue can be analyzed from various scientific fields and perspectives. This work emerged in response to the growing concern about human activities—such as agriculture, construction, and pollution—that are negatively affecting biodiversity in the region. The main objective was to conduct an analysis of biodiversity from a socio-environmental perspective in Las Vigas, in the Costa Chica region of the State of Guerrero. A mixed approach was employed, combining direct observation in different areas

of the locality, a survey conducted with 38 convenience-selected citizens, and interviews with 42 key informants.

The results of the observation revealed the biodiversity richness present in Las Vigas, although they also evidenced that human activities are threatening its preservation. The survey highlighted socio-economic deficiencies among the inhabitants, with 63% of respondents showing awareness of the negative impact on biodiversity. Despite this awareness, there is a gap between awareness and conservation practices; thus, 68% indicated a lack of environmental culture, and 46% recognized the importance of biodiversity. Finally, the interviews delved into socio-political and socio-environmental aspects, emphasizing the seriousness of the problem. In conclusion, the threat facing biodiversity in Las Vigas is highlighted, and there is an urgent need to implement protective measures.

Keywords: biological diversity, environment, social, education, community

Resumo

O termo *biodiversidade* refere-se à variedade de vida na Terra, incluindo plantas, animais, etc. Este estudo concentrou-se no estado da *biodiversidade* na comunidade de Las Vigas, Guerrero, México. Este assunto pode ser analisado a partir de diferentes campos científicos e abordagens. Este trabalho surge em resposta à crescente preocupação sobre as atividades humanas - agricultura, construção e poluição - que estão afetando negativamente a biodiversidade na região. O objetivo principal foi realizar uma análise da biodiversidade a partir de uma perspectiva socioambiental em Las Vigas, na Costa Chica do Estado de Guerrero. Foi utilizado um enfoque misto que combinou a observação direta em diferentes áreas da localidade, uma pesquisa realizada com 38 cidadãos selecionados por conveniência e entrevistas com 42 informantes-chave.

Os resultados da observação revelaram a riqueza da biodiversidade presente em Las Vigas, embora também evidenciassem que as atividades humanas estão ameaçando sua preservação. A pesquisa destacou deficiências socioeconômicas entre os habitantes, e 63% dos entrevistados mostraram ter consciência do impacto negativo na biodiversidade. Apesar desse conhecimento, existe uma lacuna entre a consciência e as práticas de conservação; assim, 68% indicaram uma falta de cultura ambiental, e 46% reconheceram a importância da biodiversidade. Por fim, as entrevistas aprofundaram-se em aspectos sociopolíticos e socioambientais, sublinhando a gravidade do problema. Em conclusão, destaca-se a ameaça

que a biodiversidade enfrenta em Las Vigas e a necessidade urgente de implementar medidas de proteção.

Palavras-chave: diversidade biológica, meio ambiente, social, educação, comunidade

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Introduction

Currently, biodiversity is defined as the variation of the hereditary basis at all levels of organization, from the genes in a local population or species to the species that make up all or part of a local community, as well as the communities themselves that They constitute the living part of the multiple ecosystems of the world (Wilson, 1997, cited by Nuñez *et al.*, 2003). That is, this concept encompasses a wide range of life forms and is fundamental to the life support system on Earth.

Biodiversity, therefore, forms the resource on which families, communities, nations and future generations depend, since it is a fundamental piece for the balance of the global ecosystem and the survival of the planet. In fact, it provides essential environmental services for humans, such as fresh water, fertile soil and clean air, as well as the pollination of flowers, the cleaning of waste and the provision of food. Furthermore, it plays a vital role in the regulation of natural processes, such as the plant growth cycle, animal reproduction seasons and climate systems (Spellerberg , cited by Plascencia-Luna *et al.* , 2011).

However, national biological biodiversity is a capital threatened by the disappearance of species and ecosystems (Jiménez-Sierra *et al.*, 2010), which is closely related to the daily anthropogenic activities carried out by humanity (Martinez-Meyer *et al.*, 2014). In this sense, it is worrying that, despite the crucial importance of biodiversity for life on Earth, humans continue to contribute to its loss without fully understanding the consequences. Therefore, it is imperative to become aware of the interdependence between humanity and biodiversity, as well as the urgent need to conserve and protect this biological wealth for present and future generations.

The degradation of biodiversity, caused by the exploitation of natural resources and the alteration of plant and animal habitats, represents a significant threat to life on the planet. Biodiversity - which encompasses plants, animals and all living organisms on the planet - is closely related to the enjoyment of human rights, since nature provides human beings with

food, medicine, water and other essential resources to satisfy their needs. their basic needs (CNDH México, 2016).

For all of the above, the analysis of biodiversity from a socio-environmental perspective highlights the importance of understanding this issue within the framework of sustainable development. This implies considering the interrelationship between the environment, the social and the economic to understand the reasons why human activities affect biodiversity.

From a conventional social science perspective, it is striking that such relevant normative issues arise when investigating the relationship between society and the environment. This demonstrates the deep interconnection between these concepts which, although traditionally treated as separate areas of study, are in fact closely intertwined. In this sense, it is completely pertinent to address reality as one of a socio-environmental nature (Irwin, 2002, cited by Aliste and Rabi, 2012).

Having explained the above, it can be indicated that the objective of this study was to carry out an analysis of biodiversity from a socio-environmental perspective in the community of Las Vigas, located in la Costa Chica in the state of Guerrero (Mexico). To do this, a mixed approach was used that included direct observation in some areas of the community to evaluate the impact on biodiversity. Likewise, a survey was carried out that addressed socioeconomic, environmental, social and economic-political variables, applied to 38 citizens selected by convenience, as well as interviews with sociopolitical and socioenvironmental variables to 42 key informants, also selected by convenience.

Overall, this analysis highlighted concern for biodiversity from a socio-environmental perspective in Las Vigas, Guerrero, and highlighted the need to take measures for its protection. Identifying actions and strategies to be implemented by residents and authorities is essential to address environmental challenges and conserve biodiversity in Las Vigas region.

Background

An investigation - carried out by Ruiz-Lopez and Suárez-Roman (2018) with the objective of identifying the valuation of biodiversity by local communities near forest fragments in the city of Armenia - indicated that the appreciation of biodiversity must transcend the utilitarian value to also consider its intrinsic value and the thinking in favor of biodiversity by social groups, since it constitutes a fundamental aspect for the conservation of biological diversity.

On the other hand, Bedolla (2018) carried out a study to identify the relevance given to environmental education for sustainability in the care and protection of biodiversity through the curriculum. The research results highlighted that the inclusion of environmental issues, including biodiversity, in the academic curriculum lacks clarity. This means that the focus on the environment and related issues, such as the preservation of flora and fauna, has not yet been adequately incorporated for analysis from a sustainable perspective.

Likewise, in a work carried out by Acosta-Naranjo and Rodríguez-Franco (2014), the specific forms of rural production and the redefinition of territories in contemporary societies were explored, as well as the content of the associated political agendas. The main objective was to analyze the interests and actions of various groups involved in this process, based on two research projects carried out in the south of Spain. This analysis, carried out through participant observation and interviews, revealed the possibility of establishing alliances between various social actors for the defense of the rural environment, using biodiversity as a field of dispute and negotiation. Likewise, he highlighted that biodiversity is a key element for the survival of life and one of the main assets of rural society in the search for a new social contract with the countryside.

Problem Statement

The United Nations Environment Program (UNEP) has identified 12 countries with outstanding biological wealth, hence classifying them as “megadiverse.” These countries include Australia, Brazil, Costa Rica, Colombia, China, Ecuador, New Guinea, Mexico, Indonesia, Kenya, Papua and Peru. Together, these countries are home to approximately 70% of the planet's species in terms of biodiversity, which, however, is threatened by various processes, most of which are of human origin and transform the environment in which we live (Badii *et al.*, 2015a).

Among the notable threats are land use change, invasive species, environmental pollution, climate change, the exploitation of natural resources and the growth of human populations (Badii *et al.*, 2015b). Furthermore, Plascencia-Luna *et al.* (2011) also refer to the various anthropogenic processes that threaten biodiversity, such as habitat loss and fragmentation. The loss of biodiversity, of course, is not only a global problem, but also a local one, with adverse impacts on the health of ecosystems, as well as on social, economic and, ultimately, the survival of humanity.

Aim

The objective of this study was to carry out an analysis of biodiversity from a socio-environmental perspective in the community of Las Vigas, located in la Costa Chica of the State of Guerrero, for which the participation of some inhabitants and key informants was of utmost importance.

Theoretical justification

This research was based on the principles of sustainable development, human rights and environmental education for sustainability (EAS). Sustainable development involves a close interrelation between the environment, the social and the economic, while environmental education for sustainability aims to promote in individuals knowledge, skills and values that make them responsible in terms of care and preservation of the environment. environment, which in turn contributes to the protection of biodiversity. For its part, the concept of *sustainable development* arises from the growing awareness of the global links between environmental problems, socioeconomic issues, the fight against poverty, inequality and the aspiration for a healthy future for humanity. This approach closely links the environment with socioeconomic issues (Hopwood *et al.*, 2005). However, it is worth highlighting that, despite this recognition, human activity continues to affect biodiversity.

Now, the conservation of a healthy environment requires addressing these effects through sustainable actions and measures, among which the strengthening of biodiversity plays a crucial role. Indeed, the environment, as a central element for sustainable development, must be a priority, since other sectors, such as the social and economic sectors, depend on its state.

From a legal perspective, the environment is a fundamental human right. In this sense, individuals have the inherent right to enjoy a healthy environment that contributes to their well-being, especially in terms of health, access to clean water and sustainable use of natural resources. Maintaining a healthy environment means preserving it and preventing its deterioration, although it is worth mentioning that human activities, known as anthropogenic, usually lead to environmental deterioration.

In the Political Constitution of the United Mexican States (2023), particularly in article 4, it is established that every person has the right to a healthy environment for their development and well-being, and the State is obliged to guarantee said principle. Likewise, it is established that environmental damage and deterioration will generate liability for those who cause it, in accordance with the provisions of the law.

In accordance with this idea, in recent years there has been a significant strengthening of the constitutional protection of the environment in Mexico and in Latin America in general, a trend that reflects increasingly solid and unified regulation in the region.

In the specific case of Mexico, a series of reforms have been carried out at different times that have allowed an expansion of constitutional regulation in this area. In fact, the decade of 2010-2020 has been especially fruitful for the strengthening of environmental law in the country. By including the environment as a human right, it is expected that governments at the national, state and municipal level in our country will take more serious and effective measures in caring for the environment and, therefore, in protecting biodiversity (Revuelta, 2022).

However, in the context where this research was carried out, a lack of effective application of legislation and sanctions on environmental matters is observed. This leads to people affecting the environment and biodiversity without fully understanding the implications of their actions or how they negatively impact the environment.

The focus on environmental education and its relationship with the environment, including biodiversity, is essential to intervene in the promotion of awareness, skills and attitudes in individuals in favor of the environment. It is also crucial that people perceive, reflect and analyze the importance of caring for biodiversity, and that they take actions accordingly, since, in many cases, there is a lack of knowledge or perception about the risks that certain practices represent (Vargas, 1994), such as land use change, the introduction of invasive species, environmental pollution, climate change, the exploitation of natural resources, among others.

Faced with this reality, environmental education, in its beginnings, sought to promote attitudes of curiosity, respect and appreciation towards all components of the natural heritage. However, over time it expanded its focus to address a variety of environmental problems, including socioeconomic aspects, while maintaining its closeness to the mechanisms that govern natural ecosystems and defending the value and affective and formative interest of contact with nature (Alcantara -De la Fuente and Bourrut Lacouture, 2006).

Finally, in the case of education for sustainable development (ESD), UNESCO (2022) states that it provides people of all ages with the knowledge, skills, values and power of action necessary to address the interrelated global challenges we face, such as climate change, loss of biodiversity, unsustainable use of resources and inequalities.

Method

The research carried out was mixed. According to Mendizabal (2018), “the use of mixed methods It involves the combination of theoretical and epistemological perspectives, points of view, and qualitative and quantitative methods in a study, by a researcher or team of researchers” (p. 1).

Population

The research was carried out in the community of Las Vigas, which until a few years ago was part of the municipality of San Marcos. However, currently it has been incorporated into a new municipality that bears the name of Las Vigas. This community has been designated as the municipal seat, although the research is delimited in this space.

Decree number 864, by which the municipality of Las Vigas, Guerrero, was created, was published in the Official Newspaper of the State Government no. 78, scope II, on Tuesday, September 28, 2021. This decree establishes that the managing group proposed the town of Las Vigas as the municipal seat, which—according to the INEGI 2020 Population and Housing Census—has 4762 inhabitants. In addition, a total of 19 communities joined this municipality.

According to a socioeconomic study, Las Vigas district has a wide range of health services and institutions, piped water supply, drainage and sewage system, a garbage dump, an oxidation lagoon, among others. In addition, it houses the Secretariat of Agriculture and Rural Development and the National Water Commission, and has a municipal and communal

property police station, among others. This area is rich in natural resources due to its agricultural, livestock, fishing and commercial activity.

The flat lands of Las Vigas are irrigated by water from the Mexican Revolution Dam and the Nexpa River, as well as by several streams that feed Las Ramaditas lagoon, which flows into the Pacific Ocean. This lagoon is the main source of supply for the region and is home to a wide variety of lake species. In addition, in Las Vigas various agricultural products are harvested in its irrigated plots and an important livestock activity is carried out, including the raising of poultry, cattle, pigs and goats, which contributes to the economic solidity of the area (Official Newspaper of the State of Guerrero, 2021).

According to the Political Constitution of the Free and Sovereign State of Guerrero, in its article 27, Las Vigas is considered a municipality that is part of the state with number 46. In addition, in article 6, section VII, the right to a healthy environment is established for the development and well-being of its inhabitants, and the State is entrusted with the responsibility of guaranteeing the protection, conservation and restoration of environmental assets.

Sample, data collection techniques and processing of information obtained

A simple or unstructured observation was carried out in several areas or zones of Las Vigas community, mainly in its surroundings, with the purpose of collecting information on the state of biodiversity in this context. Following the guidelines established by Badii *et al.* (2015c), the causes and effects related to the conservation and destruction of biodiversity were considered. The indicators used included topics such as land use change, human populations, invasive species, environmental pollution, climate change and the exploitation of natural resources.

To complement the observation made, some people who were in the areas were interviewed. The processing and obtaining of results with this method were carried out through the analysis of indicators. In addition, a survey consisting of various variables - such as socioeconomic, environmental, social and economic-political - was implemented, which was administered to 38 citizens selected by convenience. In this sampling, the sample is chosen according to the discretion of the researcher, which allows him or her to arbitrarily select the number of participants in the study (Hernandez, 2021).

The survey administration was hybrid, meaning that it was carried out both in person in the community and online. For this last modality, the link was published on a Facebook

profile of a resident of Las Vigas, which allowed the inhabitants of the community to be invited to participate in the survey. The virtual instrument was designed using the Microsoft Forms program, and the results were processed on the same platform, which allowed obtaining percentage data that helped its analysis.

Regarding the structured interviews, variables related to sociopolitical and socioenvironmental aspects were used. These interviews were conducted with 42 key informants, selected by convenience. The method for processing the information obtained from the interviews involved analysis and interpretation by the researcher. In this way, a deeper understanding of the key informants' perceptions and opinions on the topics addressed could be obtained.

Results

The results of simple or unstructured observation on the state of biodiversity in Las Vigas, Guerrero, revealed several significant aspects. The observation was carried out in various areas and zones of the community, mainly in its surroundings. The indicators considered included land use change, human populations, invasive species, environmental pollution, climate change and the exploitation of natural resources. It should be noted that, to enrich the observation, some people present at the scene were questioned.

Regarding the change in land use and human populations, it was detected that in certain areas of Las Vigas biodiversity is being negatively impacted due to the conversion of land for the construction of buildings and the growth of the population or human settlements. Although projects have been carried out to improve roads or highways in Las Vigas and its surroundings, this has implied, in some way, a deterioration of biodiversity. In fact, an expansion was noted in both the area and the population of the community, which has led many people to build their homes in areas that were previously conducive to agriculture, a trend that is evident on almost all shores of community.

The sale of land represents another cause of impact on biodiversity, since it involves the felling of trees in these spaces. Regarding invasive species, the initial observation was not enough to identify their presence in the environment, so it was decided to consult some members of the community to obtain a more complete understanding of the situation. In order to allow people to provide an informed response about invasive species, they were given a detailed explanation of this concept and shown how their presence affects biodiversity.

In this context, residents mentioned the disappearance of fish known as “charras” in the stream and river, which used to be hunted and consumed by the community. They noted that this absence was due to the introduction of carp (another species of fish) by certain people. According to residents, the carp fed on charras and possibly other species that are now difficult to observe in the area. In addition, some mentioned the replacement of native corn with transgenic corn.

Regarding environmental pollution, the presence of urban solid waste (MSW) was detected near the stream, the puddle and the irrigation canal that is close to the community, as well as, in the Nexpa river, belonging to the municipality of Las Vigas. In this regard, keep in mind that water pollution by chemicals seriously affects aquatic life, including fish, amphibians and other organisms. In some cases, contaminated water is not suitable for human consumption or for certain animals.

Furthermore, it was observed that in the plots or orchards where agriculture is practiced, farmers apply agrochemicals, such as herbicides and fertilizers. These substances, although intended to improve agriculture and production, have an adverse impact on biodiversity by causing the elimination of organisms, insects, birds and animals that inhabit the area.

The application of herbicides to control weeds is also carried out in the vicinity of homes. In the area known as the community garbage dump, it was observed that contaminated water infiltrates the soil and deteriorates other bodies of water, which has a detrimental effect on the organisms that inhabit the soil, plants and aquatic life, in addition to making the water unfit for consumption.

Regarding climate change, in the area identified as the garbage dump on the outskirts of the community, open burning of urban solid waste was observed, which emits smoke that is harmful to the environment and has a negative impact on health and The Biodiversity. It was also noted that some people burn garbage in the open without separating the waste, which contributes to air pollution. Even in some homes and food businesses, food is prepared with firewood, which can contribute to deforestation and affect local biodiversity.

In the countryside, some residents burn organic waste derived from plants and weeds when clearing their land. Another source of gas emissions, such as smoke, was observed in the places where certain individuals produce tiles and adobe bricks near the area known as El Charco.

Regarding the exploitation of natural resources, the extraction of sand was detected both in the local stream and in the Nexpa river (which is part of this municipality), an activity that also involves the extraction of gravel. Sand is crucial to the balance of rivers and streams, as it helps retain water and ensures its constant flow. These bodies of water support a wide diversity of aquatic life and provide habitats for a variety of plant and animal species. Additionally, they are a vital source of drinking water for the local population.

However, it is worrying that human activities in this region are having a negative impact on these bodies of water and, therefore, on the benefits they provide and the biodiversity that depends on them. In other words, sand and gravel mining, along with other human activities, are seriously affecting these ecosystems and the life they support.

In relation to the felling of trees, it was observed that some people who work in the field proceed to cut or fell palm trees, such as coconut trees, and other types of trees. In the case of palm trees, this action is justified for several reasons, including lack of production, pest infestation, the need to replant or even in order to obtain income through the sale of wood. Regarding other trees, their felling is carried out mainly due to obstructions or because the wood is required for the construction of fences on the plots, among other uses. These observations were provided by some residents working in the field.

In addition, it was noted that in the community of Las Vigas people come from other areas to sell turtle eggs, iguanas and even parakeets. The hunting of birds such as pigeons, doves and the capture of iguanas, pichiches (a species similar to the duck), armadillos, squirrels, among other animals, were also perceived. It is important to note that some people hunt birds and other animals for entertainment, which represents an additional threat to the biodiversity of the area.

Resident survey results

A survey was applied to the inhabitants of the community of Las Vigas, located on la Costa Chica of the state of Guerrero, with the objective of knowing their socio-environmental perception of biodiversity. About 38 people participated, of which 37 (97%) agreed to do so, aware of the purpose of the research, while 1 person (3%) accepted without knowing the reason for the survey.

Regarding the socioeconomic dimension, all the people surveyed stated that they reside in Las Vigas. Regarding the distribution by age, it was found that 3 people were between 6 and 11 years old, 1 was in the range of 12 to 15 years, 1 was between 16 and 18

years old, 9 were in the age range of 24 to 30 years, 2 were in the range of 31 to 40 years, 12 were between 41 and 50 years, 5 were between 51 and 60 years, 3 were in the range of 61 to 70 years, and 2 were 71 years or older.

Regarding gender, 25 (66% of the sample) identified as female, while 13 (34%) identified as male; No person indicated belonging to another gender. In relation to marital status, 18 (47%) stated that they were married, 14 (37%) stated that they were single, 4 (11%) indicated that they were in a common law union, and 2 (5%) were in another marital status.

Regarding the educational level, the results were the following: 1 person had completed preschool, 14 had completed primary education, 10 had secondary education, 7 had completed high school, none had completed a technical degree, 2 had obtained a bachelor's degree, 1 had achieved a master's degree, no person had a specialization, 1 had obtained a doctorate, and 2 had not completed any educational level.

In the workplace, 26 (68% of the sample) stated that they were employed, while 12 (32%) stated that they were not working. Regarding housing, 23 people (61% of the sample) stated that they owned their homes, 5 (13%) indicated that they lived in borrowed homes, and 10 (26%) indicated that they rented their homes; None declared that they had not had their own home.

Regarding the construction materials of the respondents' homes, 36 (95% of the sample) mentioned that their houses were made of partition, 1 (2.5%) mentioned that their home was built with adobe, and 1 (2.5%) referred to other different material; No person said their home was made of wood.

Finally, in relation to health services, 25 people (66 % of the sample) stated that they had access to health services, 11 (29%) said they did not have access, and 2 (5%) were not sure if they had access to health services. medical services.

In the environmental dimension of the survey, statements about socio-environmental data on biodiversity were included, answered with three options: “yes”, “no” and “I don't know”. 34% of respondents (13 individuals) stated that they were familiar with the concept of biodiversity, while 61% (23 people) stated that they were not aware of it. Additionally, 5% (2 people) acknowledged not knowing about the topic (figure 1, question 11, annex).

When asked about the existence of tree felling, 79% (30 people) stated that it does take place, while 21% (8 people) indicated the opposite. Regarding animal hunting, 79% (30 people) stated that it exists, in contrast to 21% (8 people) who said it does not.

Regarding the extinction of wild species, 53% (20 people) recognized their presence, while 34% (13 people) denied their existence and 13% (5 people) admitted that they were not certain about it.

21% of those surveyed (8 individuals) stated that they were familiar with the concept of invasive species, while 58% (22 people) expressed ignorance. 21% (8 people) indicated that they were not certain about the issue. Regarding whether invasive species affect endemic species, 53% (20 people) said yes, 29% (11 people) denied this impact, and 18% (7 people) admitted not having knowledge about it.

In relation to observing forest fires, 61% (23 people) claimed to have witnessed them, while 39% (15 people) had not. No person expressed ignorance in this regard. 74% (28 people) of those surveyed indicated that agrochemicals affect biodiversity, in contrast to 16% (6 people) who denied it and 10% (4 people) who admitted not knowing. Regarding who affects biodiversity, 87% (33 people) considered that they are the same inhabitants, 8% (3 people) denied it, and 5% (2 people) had no knowledge about it (figure 2, question 19, annex).

Finally, 79% (30 people) attributed the loss of biodiversity to change in land use, while 21% (8 people) admitted to being unaware of this relationship.

In the social indicator of the survey, it was evident that 74 % of people (28 individuals) stated that they avoid buying wild animals or plants, while 26% (10 people) stated that they did not do so. No person admitted ignorance in this regard. 100% of those surveyed (38 people) considered reforestation (planting trees) to be extremely important, and no one expressed disagreement or ignorance. 100% of the participants (38 people) stated that it is beneficial to take care of plants.

97% of respondents (37 people) recognized that the deterioration of biodiversity affects human health, while 3% (1 person) denied this relationship. Likewise, 97% of people (37 individuals) stated that it would be good to avoid pollution, as opposed to 3% (1 person) who did not share this opinion.

89% of respondents (34 people) would prefer to see animals free rather than in captivity, while 11% (4 people) did not share this preference. 97% of people (37 individuals) thought that schools and civil organizations should look for mechanisms to conserve biodiversity, while 3% (1 person) were not sure about this. 100% of those surveyed (38 people) agreed that environmental education is needed (figure 3, question 28, annex).

92% of people (35 individuals) committed to caring for plants and animals, while 8% (3 people) did not commit to doing so. No person expressed ignorance on this point. 76% of

respondents (29 people) considered an environmental education program beneficial, but 13% (5 people) did not share this opinion, and 11% (4 people) expressed ignorance about it.

In the economic-political indicator, it was observed that 71% of the participants (27 people) expressed that there is exploitation of wood for commerce or consumption, while 26% (10 people) denied this statement and 3% (1 person) He admitted to not being sure. Likewise, 68% (26 people) affirmed that there is trafficking in species, in contrast to 32% (12 people) who denied this reality. Regarding the trade in turtle eggs, 71% (27 people) indicated its existence, while 26% (10 people) denied it and 3% (1 person) expressed doubts about it.

Regarding the development of projects in the area that in some cases involve affecting nature, 61% (23 people) considered that it does imply such impact, while 29% (11 people) denied it and 10% (3 people) expressed ignorance. Furthermore, 32% (12 people) indicated that sanctions should be applied to those who affect animals or plants, as opposed to 63 % (24 people) who did not share this opinion and 5% (2 people) who expressed doubts about.

In another context, 100% of those surveyed (38 people) agreed on the importance of the Las Vigas authority carrying out actions to care for and protect biodiversity, without any disagreement or uncertainty in this regard. Likewise, 97% (37 people) considered it important to report activities that threaten biodiversity, while 3% (1 person) did not share this opinion and no participant expressed ignorance on this point.

In relation to the economic impact and the loss of biodiversity, 92% (35 people) thought that it would affect the economic sphere, including agriculture, fishing, forestry and tourism, while 3% (1 person) denied this impact and the 5% (2 people) expressed doubts (figure 4, question 38, annex).

Finally, 100% of those interviewed (38 people) agreed that Las Vigas authority should undertake reforestation campaigns and care for endangered species, without any disagreement or uncertainty. Likewise, 100% (38 people) thought that both the authority and society should take care of protected natural areas so as not to affect biodiversity.

It is important to note that some interviewees made additional comments, showing their support for programs and projects for the biodiversity of Las Vigas, hence they expressed their desire to improve their municipality and their concern about feeling abandoned. In summary, the participants demonstrated their willingness to dialogue and receive information, which reflects a common desire to protect and preserve biodiversity, as well as concern for the environment and interest in programs that promote its care and use.

Key informant interview results

The results of the interview with the 42 key informants were grouped into sociopolitical and socioenvironmental indicators. In the sociopolitical sphere, it was highlighted that biodiversity is not considered a primary need for the development of the community, which shows that there is a lack of environmental awareness both among some citizens and among local authorities. Some interviewees, in fact, acknowledged the existence of environmental legislation, but noted that it is rarely applied in this area, resulting in the lack of sanctions for those who deteriorate the environment and biodiversity.

In addition, visible impacts were seen, such as pollution from waste or chemicals used in agriculture, which affects rivers, streams and puddles in the community. The hunting of animals for food and the burning of garbage, as well as the lack of enforcement of penalties for harmful activities such as forest fires and logging, were mentioned as environmental problems.

With the recent independence of Las Vigas as a municipality, the new authorities are expected to design policies for the protection of the environment and biodiversity. However, in general, there is a perceived lack of action on the part of both residents and authorities to protect biodiversity. Although there are laws that address this issue, their implementation is insufficient.

Likewise, a relationship was identified between climate change and activities such as tree felling, forest fires, environmental pollution and the use of chemical substances. To address this problem, some mentioned that environmental education is essential and should be taught in schools, in addition to being promoted from home. Although, Sembrando Vida program is carried out in nearby communities to promote sustainable forest development, it has not been implemented in the community. Therefore, the need for short-term measures by both the community and the authorities is highlighted to address the problems that affect biodiversity in the area and promote its restoration. In summary, the population interviewed recognizes the challenges, but greater awareness and action is needed to protect and restore biodiversity in this area.

Discussion

Observation and consultation with some inhabitants in the community highlighted a series of environmental challenges that are affecting biodiversity in the region, among which the need for conservation measures and environmental awareness stands out.

On the other hand, the survey results showed a diverse demographic and socioeconomic profile among the 38 people surveyed in Las Vigas, although the majority were residents of Las Vigas, with an age range that spanned from children to older adults.

The majority identified as female, and regarding marital status there was a variety of responses, with the majority married or single. In terms of education, there was a varied distribution, from people with low educational levels to those with higher levels. Most respondents were employed, but a significant percentage were not working at the time. As for housing, the majority owned their homes, mainly built with partition walls.

Regarding health services, the majority had access to medical services, but a smaller percentage stated that they did not have access or were not sure about it. Together, these data provide a snapshot of the population of Las Vigas and may be useful in better understanding the demographic and socioeconomic characteristics of the community.

Regarding the survey results on the environmental indicator, they provided valuable information on the knowledge and perception of Las Vigas community in relation to biodiversity and its associated problems. In this regard, it is encouraging to see that a significant percentage of people are familiar with key concepts such as tree felling, animal hunting and biodiversity loss due to land use change.

It is also positive that the majority recognize that agrochemicals affect biodiversity and that local inhabitants are responsible for the degradation of biodiversity. However, there are areas of concern, such as the fact that a high proportion of people are not familiar with important concepts such as biodiversity and invasive species. Additionally, some do not know if invasive species affect endemic species.

These findings indicated a combination of awareness and ignorance in relation to biodiversity in Las Vigas, suggesting that it could be beneficial to implement environmental awareness and education programs to address these knowledge gaps and promote greater understanding and conservation of biodiversity in the area. community.

On the other hand, in the social indicator of the survey, a generally positive attitude towards the conservation of the environment and biodiversity by the community of Las Vigas was reflected. In fact, it is encouraging that a high percentage of people avoid buying wild

animals or plants, consider reforestation extremely important, and value the importance of taking care of plants. Furthermore, the majority of respondents recognize that the deterioration of biodiversity affects human health and agree to avoid pollution. The preference to see animals in the wild rather than in captivity is also notable.

However, there are some divided opinions regarding the need for an environmental education program and its benefit, suggesting that it could be useful to provide more information and awareness about the importance of environmental education and its benefits to the community.

In the economic-political indicator, a strong awareness of the importance of biodiversity in Las Vigas was also evident. The majority of respondents are aware of problems such as logging, wildlife trafficking and the trade in turtle eggs. There is also a high level of support for action by authorities to protect biodiversity and sanction those who affect it. The community is even open to dialogue and willing to receive information on these issues, and there is a common desire to improve the municipality and protect its natural environment.

Additional comments from some interviewees reinforce this commitment and show their concern about perceived neglect in the region. That is, the community of Las Vigas appears to be actively involved in the conservation of its biodiversity and shows a clear desire to take measures to protect and preserve its natural environment. Overall, the results indicate a positive disposition toward environmental conservation in Las Vigas, but also point to areas where work could be done to strengthen environmental awareness and commitment in the community.

Regarding the interview, the results underline the importance of increasing awareness and action at both community and government levels to protect and restore biodiversity in Las Vigas. This requires more effective implementation of environmental legislation and greater emphasis on environmental education to address the identified challenges.

The results of this study coincided with those of Alvarez and Shany (2012), where it is established that the Peruvian Amazon Research Institute (IIAP), Nature and Culture International (NCI), together with local communities, the regional government of Loreto and other private organizations, have been developing in the last decade a model of community co-management of Amazonian biodiversity with very promising results. Among the conclusions, it is noted that, although local communities may not be the perfect model for managing the Amazon forest, the results of the projects promoted by the IIAP and some other organizations show that it is possible to improve the quality of life and the economy. of these

populations while reversing the processes of forest loss and habitat degradation. This contributes, therefore, to effectively and sustainably conserve biological diversity in large natural spaces.

Undoubtedly, communities can manage more effectively than the State, at least in the context of the lower Amazon of Peru. However, it is evident that these communities currently require solid support and training to free themselves from the extractivist cycle in which they have been immersed for two or three generations, which has led to the progressive impoverishment of the population and greater pressure on the available resources. .

This point of view coincides with the work of Perez-Mesa (2019), who presented the results of his research carried out with students of the Bachelor's Degree in Biology and residents of the Uitoto-Muruy ethnic group of the Chorrera-Amazonas (Colombia). The objective of their study was to recognize the conceptions of biodiversity and care practices that contribute to the discussion about the country's biocultural memory and to the reflections necessary for the training of biology teachers. Pérez-Mesa used a methodology that included field diaries, participant observation, semi-structured interviews, in-depth interviews, visual recording and identification of social actors as techniques and tools. These strategies allowed us to establish an open dialogue about the ways of conceiving biodiversity, care practices and their relationship with the territory.

The results highlighted the importance of culture and the various ways in which social groups attribute meaning to biodiversity, as well as their way of coexisting with other forms of life in the territory. Care practices were also highlighted, which are reflected in the understanding of the world, the way of inhabiting it, producing it and preserving it.

In summary, in Las Vigas area a significant contribution could be made to the care of biodiversity if the community and local authorities worked in a coordinated manner to protect it. For this, it is essential to recognize that individuals and society are an integral part of nature, and that affecting biodiversity as part of the natural environment has direct repercussions on the socioeconomic dimensions of the community.

Conclusions

Data collected from the research techniques used to gather information in Las Vigas highlighted a number of environmental challenges that are having a significant impact on the biodiversity of the region, particularly in this specific area. Despite the diversity in the demographic and socioeconomic profile of the community, there is a clear alarm signal about the need to take conservation measures and promote environmental awareness.

In this sense, the demographic records reveal a diverse community in terms of age, gender, marital status, educational level and employment status, which provides a comprehensive view of the population of Las Vigas and its potential to address environmental problems in the area. region.

Regarding environmental indicators, the results show a variable level of knowledge and awareness about biodiversity in the community, since, although many are familiar with key concepts—such as tree felling and soil degradation—there are still knowledge gaps. that must be addressed. Therefore, the need for environmental education stands out as a crucial area to promote the conservation and understanding of biodiversity.

In the social sphere, a generally positive attitude is observed towards the conservation of the environment and biodiversity, since those surveyed show a strong willingness to avoid harmful practices and value the importance of reforestation and the care of biodiversity.

In the economic-political aspect, there is a high degree of awareness about the problems that affect biodiversity and significant support for government action to protect it. Specifically, the community of Las Vigas demonstrates a strong will for dialogue and collaboration, as well as a shared desire to improve their municipality and protect its natural environment.

Ultimately, these results underscore the importance of increasing awareness and action at both community and government levels to protect and restore biodiversity in Las Vigas. To achieve this, a more effective implementation of environmental legislation and greater emphasis on environmental education are required to address the identified challenges, since the community is willing to take concrete measures to protect and preserve its natural environment.

Future lines of research

The study of biodiversity from a socio-environmental perspective in Las Vigas will lay the foundation for future research in various fields, such as environmental sciences, environmental education, human rights, among others. These research areas will play a crucial role in understanding biodiversity, as they will allow the development of strategies and policies for its protection and conservation.

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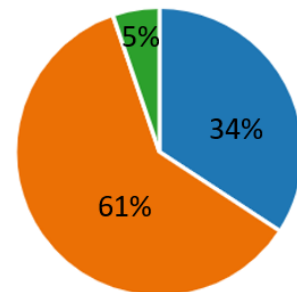
Annexes

Annex: Graphic representation of some survey results (figure 1, question 11, figure 2, question 19, figure 3, question 28, figure 4, question 38), related to the knowledge and socio-environmental perception of biodiversity in inhabitants of Las Vigas Community.

Figure 1. Knowledge about biodiversity

11. Conozco que es la biodiversidad.

| | |
|-------|----|
| Si | 13 |
| No | 23 |
| No sé | 2 |

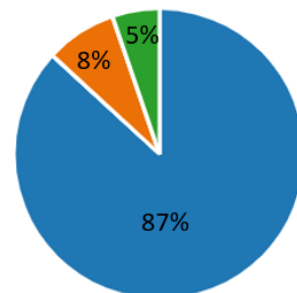


Source: self made

Figure 2. Impact on the environment and biodiversity

19. Las personas son las que afectan el medio ambiente y, por ende, a la biodiversidad.

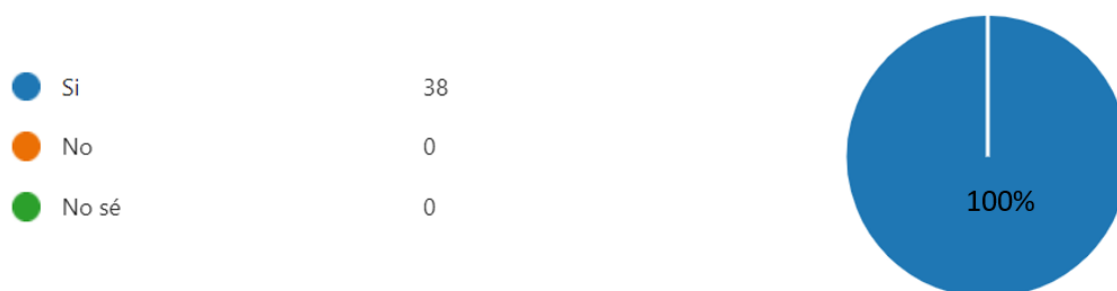
| | |
|-------|----|
| Si | 33 |
| No | 3 |
| No sé | 2 |



Source: self made

Figure 3. Environmental education for the care of biodiversity.

28. Hace falta educación ambiental en las personas de Las Vigas para la biodiversidad.



Source: self made

Figure 4. Affects in the economic sphere due to the loss of biodiversity

38. La pérdida de la biodiversidad afectará en el ámbito económico, por ejemplo, en la agricultura, pesca, silvicultura, turismo, etc.



Source: self made