**WORLD HERITAGE PROPERTY**

**ANCIENT MAYA CITY AND PROTECTED TROPICAL FORESTS**

**OF CALAKMUL, CAMPECHE**

United Nations
Educational, Scientific and
Cultural Organization

**Ancient Maya City and Protected Tropical Forests of Calakmul, Campeche** inscribed on the World Heritage List in 2002

# UPDATE ON THE STATE OF CONSERVATION OF THE ANCIENT MAYAN CITY AND PROTECTED TROPICAL FORESTS OF CALAKMUL, CAMPECHE 2022-2023

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## 1. Executive summary of the report

This presentation includes the actions and results obtained by the National Institute of Anthropology and History (INAH) during 2023, for the protection and conservation of the natural and cultural attributes that make up the Outstanding Universal Value of the Mixed Property Ancient Mayan City and Protected Tropical Forests of Calakmul, Campeche, in accordance with the request made in Decision 45 COM 7B.99 of the World Heritage Committee.

This report addresses the recommendations made in the above-mentioned Decision, including actions relating to the delimitation of monuments and their buffer zone, to include additional and relevant cultural sites; maintenance procedures; conservation, documentation and monitoring of all structures of the nuclear area of the site, as well as the periphery, and updated detailed information on the Tren Maya project and its trajectory in the area near the Mixed Property.

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## 2. Response to Committee Decision 45 COM 7B.99. Activities carried out by the National Institute of Anthropology and History

### 2.1 Financial Resources (for the implementation of the Management Plan for the World Heritage Property)

The diverse works carried out by INAH to implement actions of research, conservation, dissemination, maintenance and operation of the archaeological zone and other sites and monuments registered within the limits of the Property, come from different sources of funding, although almost all of them came from the Federal Government. A table of current projects and their funding sources is provided below:

| Project | Source of financing |
|---|---|
| Operation and maintenance of the Calakmul archaeological site | INAH |
| Visitor Service Centre (CATVI) | Federal Government (SEDENA) |
| PROMEZA (research, conservation, infrastructure and museography) | Federal Government (SEDENA) |
| Archaeological salvage in the route of the Maya Train | Federal Government (SEDENA) |
| Bajo Laberinto Project | Calgary University (Canada) |

### 2.2 Follow-up to the Management Plan for the Property

#### 2.2.1 Conservation and restoration

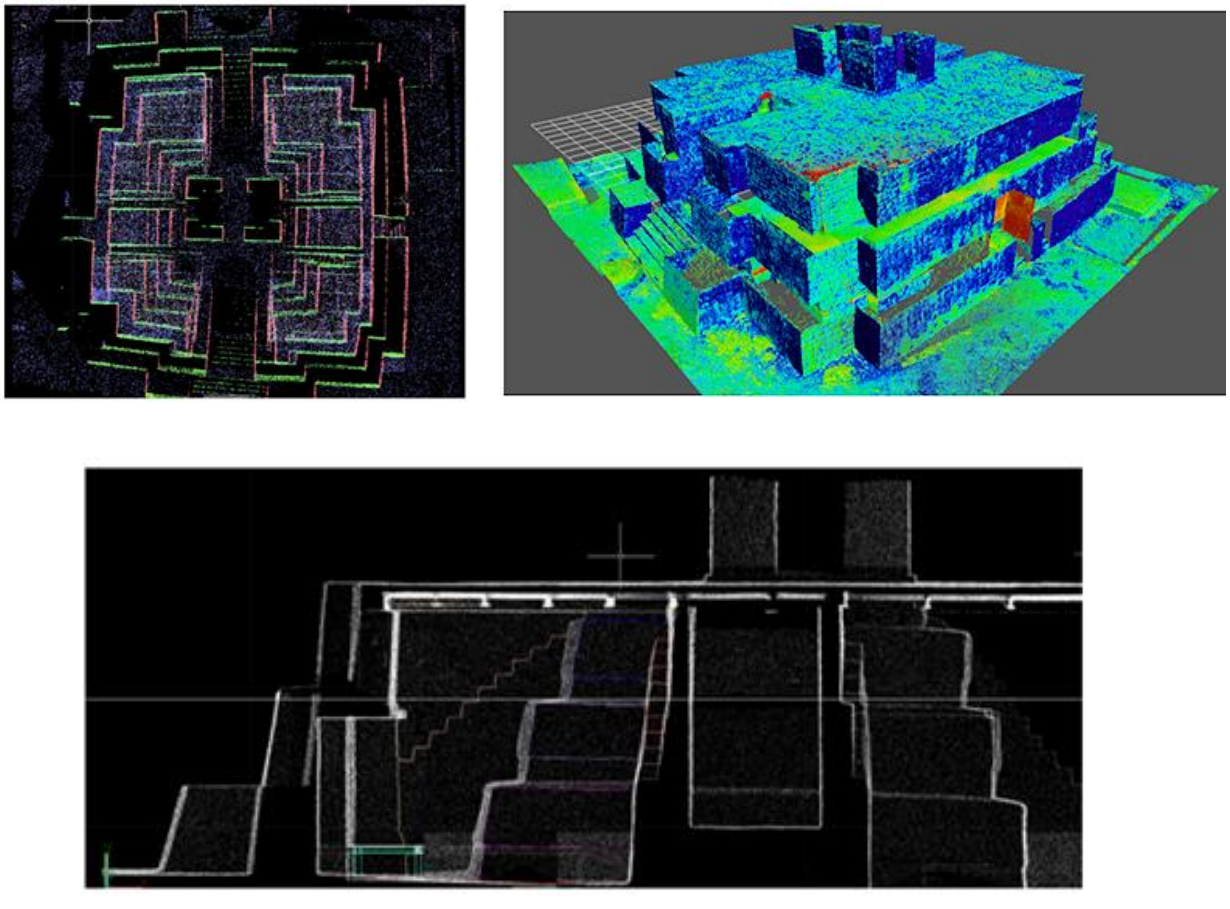
As of July 2023, the National Institute of Anthropology and History (Instituto Nacional de Antropología e Historia), Campeche headquarters, appointed conservation staff for the permanent care of the archaeological site of Calakmul and sites in the southern region of Campeche; through a program that reinforces the implementation of the actions established in the Management Plan. The initial execution of the conservation program is federally funded under the Archaeological Zone Improvement Program (PROMEZA) of the Tren Maya Project.

During the last quarter of 2023, the development of the documentation protocol established within the framework of the conservation program in the Calakmul Archaeological site began. The first phase, that is expected to be completed in the third quarter of 2024, includes three-dimensional surveys georeferenced by laser scanner and photogrammetry for the detailed registration of stelae, stone reliefs, stucco elements and mural painting, located in the Central Plaza, Structure I, the Great Acropolis and the Chiik Naahb Acropolis; as well as the documentation of their constituent materials, manufacturing technique,

conservation condition (structural, physico-chemical and mechanical alterations).

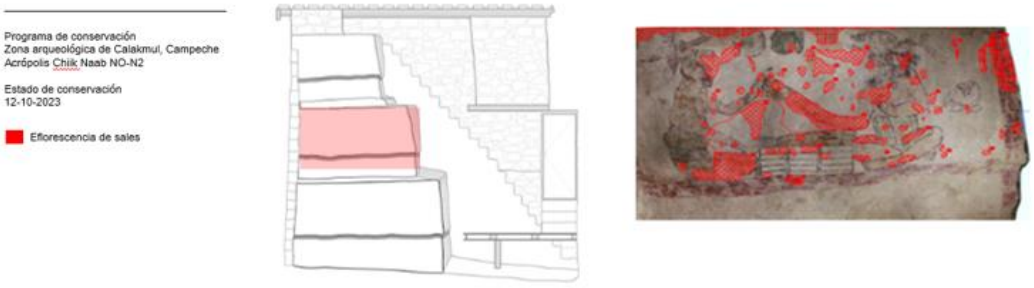
In addition to the above, systems and protocols were designed for the permanent micro environmental monitoring of the mural paintings in the Chiik Nahb Acropolis, the Substructure IIC and the stelae exposed at the site, which are expected to be in full operation in the first quarter of 2024. This will expand the scope of previously implemented protocols.

The information obtained is being integrated into a conservation information system that will serve as a tool for consultation and analysis of vulnerability to the impact of climate change, as well as a tool for the design and evaluation of sustainable conservation strategies.



Example of advances in the processing of three-dimensional laser scanner surveys of Structure I of the Acropolis Chiik Nahb for analysis of deformation and other alterations, proposal of adaptations and integration of monitoring system.

a

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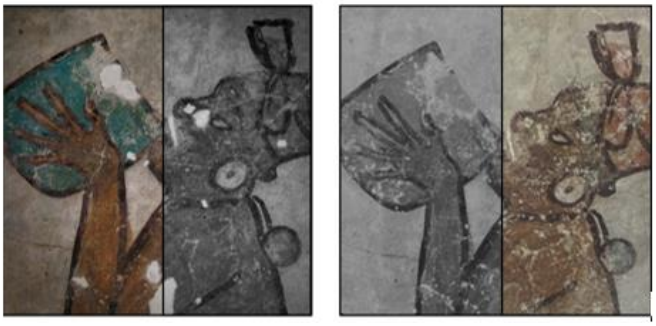
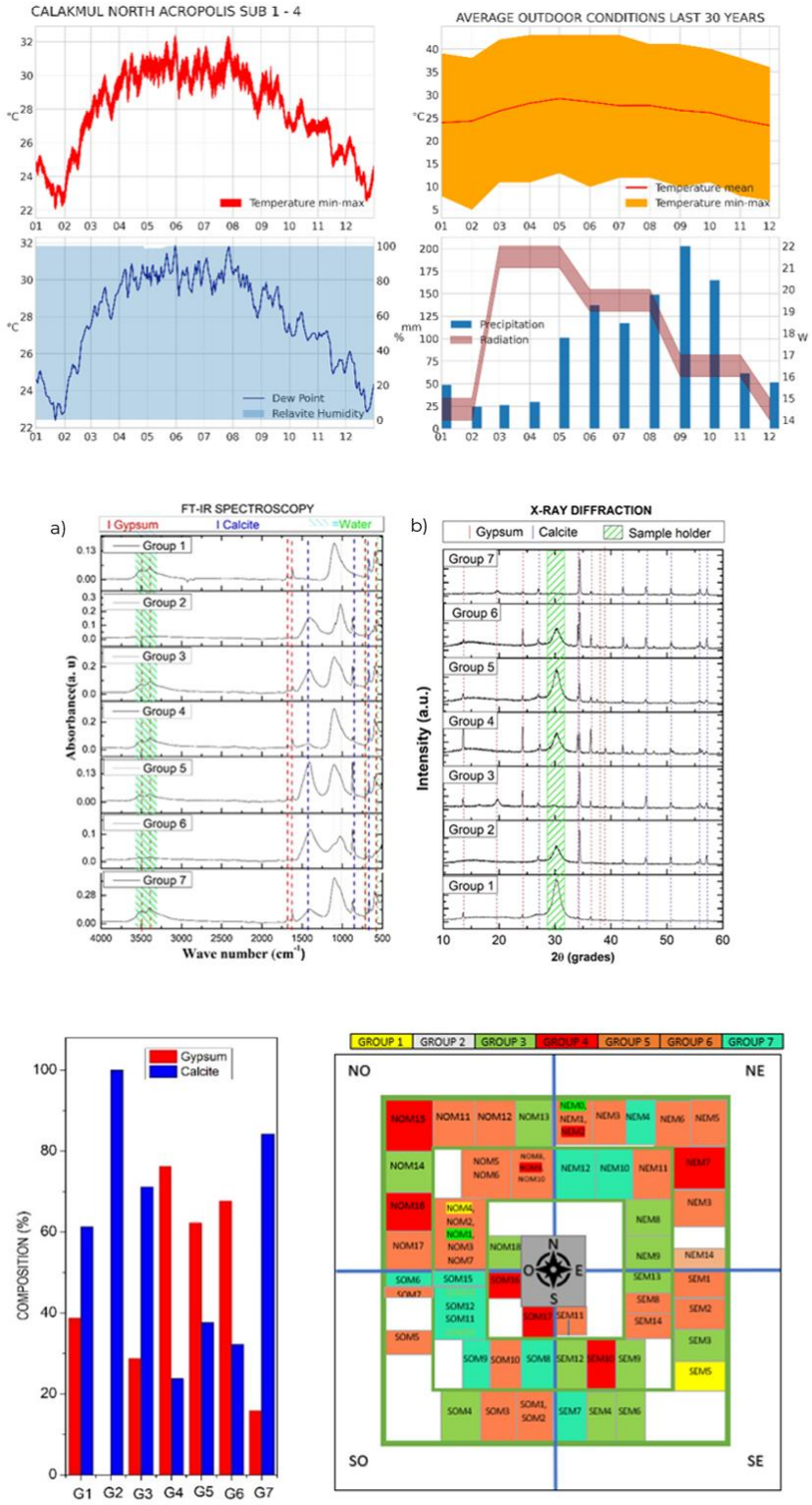
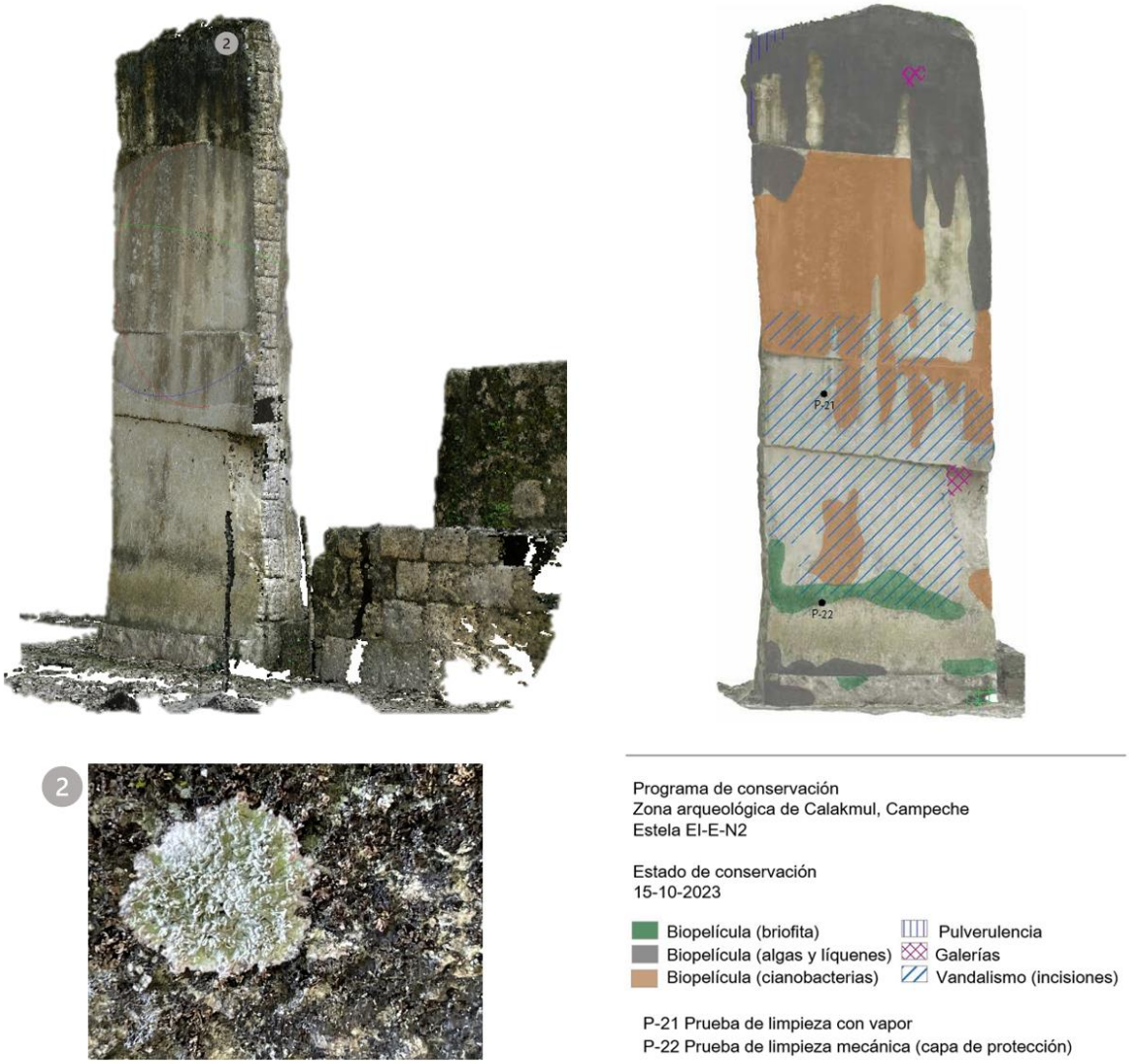


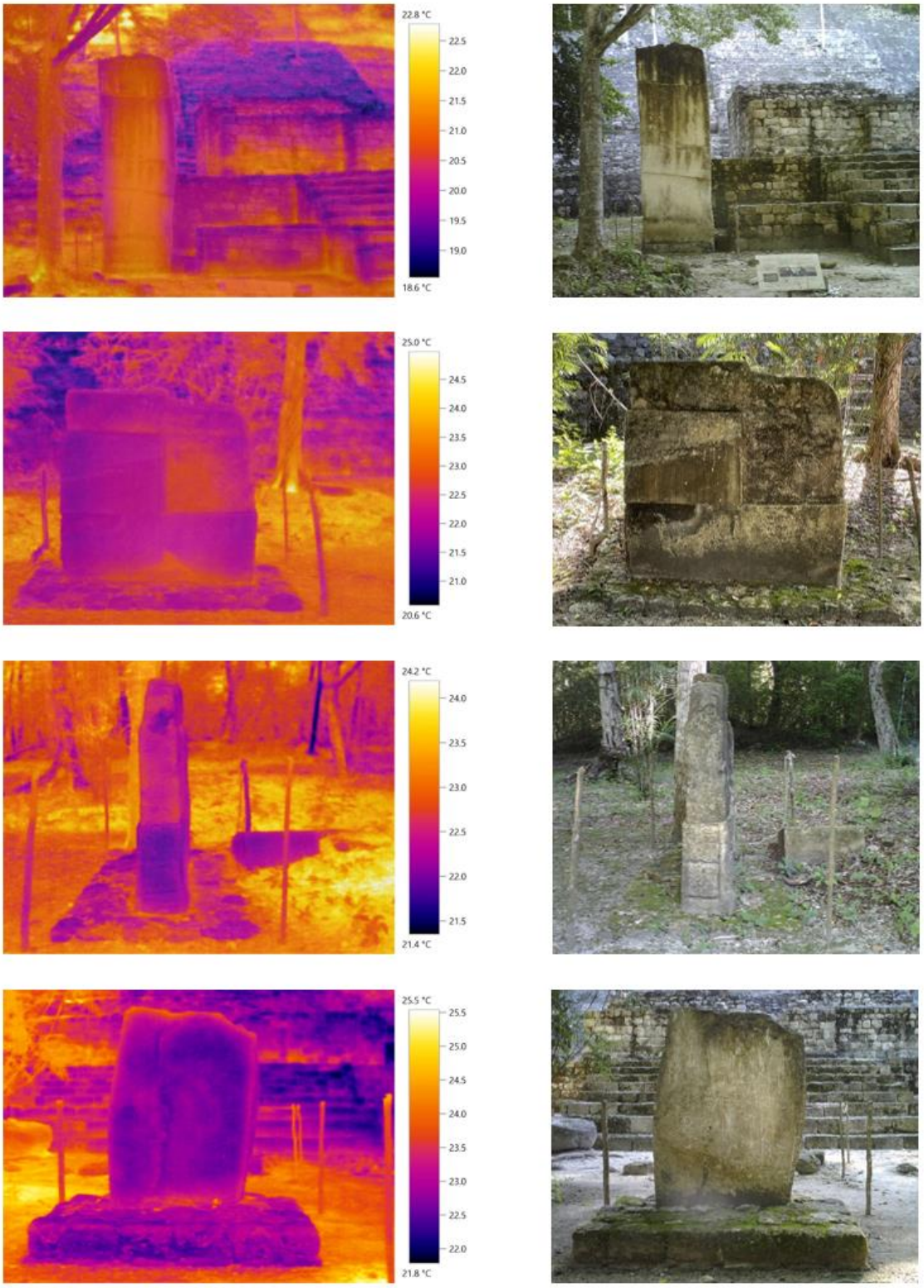
Examples of integration of conservation information derived from various analyses. Distribution scheme of salt efflorescence (a), integration of different levels of documentation: structural elements, factories, finishes (b); simultaneous display of photographic image and graphic record (Martin, 2012) (c); time series with simultaneous display in false color (PAC, 2014 - Conservation Program 2023).




Systematization and integration of information from studies initiated in 2019 of environmental conditions inside and outside Structure I of the Chiik Nahb Acropolis (upper); characterization of saline efflorescences by FRIT and XRD (middle); proportion and distribution of the groups identified on each front (lower).




Example of photogrammetric models for stelae documentation of conservation analysis.




Analysis of thermal and hygroscopic behavior of stelae located in front of Structure I, using infrared thermography.

Based on the progress made in the documentation and integration of information, priority conservation actions have been established to be carried out in the first quarter of 2024.

Regarding the archaeological structures released and consolidated within the framework of the Calakmul Archaeological Project that began in 1993, it was found that most of them are in stable conditions. Some of them have structural alterations in their basements such as cracks, mainly due to settlements, as is the case of Structure VII; or partial landslides associated in most cases with the growth of tree vegetation. Loss of joints and cavities are also observed in some structures, as is the case of the Ball Court on the Great Acropolis. The archaeological project will address these effects during the first half of 2024.

Detail of Structure VII of Calakmul with minor structural damage (left) and the Ball Court in the Great Acropolis with loss of joints and displacement of elements (right).

In the case of Structure II, the conservation treatments for the stabilization of the stone masks and the replacement of the metal access doors to Substructure IIC to improve its operation and presentation, are expected to be executed in the first quarter of 2024. The conservation problems previously reported in the stucco masks and frieze of Substructure IIC (cracks, detachments, and corrosion stains) will also be addressed, and the analysis of the structural reinforcements will continue to evaluate stabilization alternatives.

Detail of the stone mask of Structure II (upper left), current condition of the access door (upper right) and detail of stucco mask of Substructure IIC (lower).

At the Chiik Nahb Acropolis, conservation treatments to be executed in the first quarter of 2024 on the mural painting of Substructure I-IV include stabilization of the pictorial strata affected by salt crystallization, runoff, cavities, pulverulence, among other alterations. At the same time, some measures will be implemented to improve indoor environmental conditions, the effectiveness of which will be evaluated based on the results of permanent monitoring. It is expected that these actions, together with the permanent attention to conservation, will contribute to the stabilization of the complex in the short term.

At the same time, a reburial plan will be designed as an alternative strategy for the long-term preservation of the mural painting to be evaluated. Likewise,

research will continue on the technique and properties of the constituent materials in collaboration with specialists from the National Autonomous University of Mexico.

The stelae and altars documented so far in the Central Plaza, Structure I and the Great Acropolis, present, in addition to erosive processes related to their lithological type and exposure, biocolonization, stains derived from biological processes and in some cases, fragmentation and damage due to looting and vandalism, particularly in the stelae associated with Structure I. These stelae suffered loss of sections due to looting prior to the scientific exploration of the site, so their current state makes it difficult to understand them.

Stelae in front of Structure I, showing loss of sections due to looting prior to the scientific exploration of the site and damage due to vandalism.

Elements at risk were also observed due to their exposure to unstable areas of the surrounding structures, as well as the growth and fall of trees. The ongoing diagnosis of these elements includes an individual and overall assessment to determine the conservation treatments and the characteristics of the protection system required in each case.

*Ficus maxima* wrapping stela located in the Central Plaza of Calakmul.

Similarly, work is being done on the design of communication strategies for the Exceptional Universal Values of monuments and their surroundings, in order to promote a better understanding of the elements that are difficult to interpret in their current state; as well as in the design of complementary monitoring initiatives with citizen participation and risk management articulated with the Program for the Prevention of Disasters in the Field of Cultural Heritage (PREVINAH), instituted with the National Center for Disaster Prevention (CENAPRED).

Through the aforementioned actions, the program contributes to the fulfillment of the objectives established in the Management Plan regarding the diagnosis, monitoring, maintenance and conservation of heritage.

Stela 1 of Calakmul (c.721), located in the Central Plaza, in which the ancient name of this city was identified as Uxte' Tuun, affected by loss of sections, erosive processes and biological colonization, among other alterations.

Stela 8 (c.721), located in the Central Plaza, erected by Yukno'm To'k' K'awiil, last of the three great rulers of Calakmul. It partially preserves its reliefs and remains of polychromy, the alterations it presents, in addition to putting its integrity at risk, hinder its legibility.

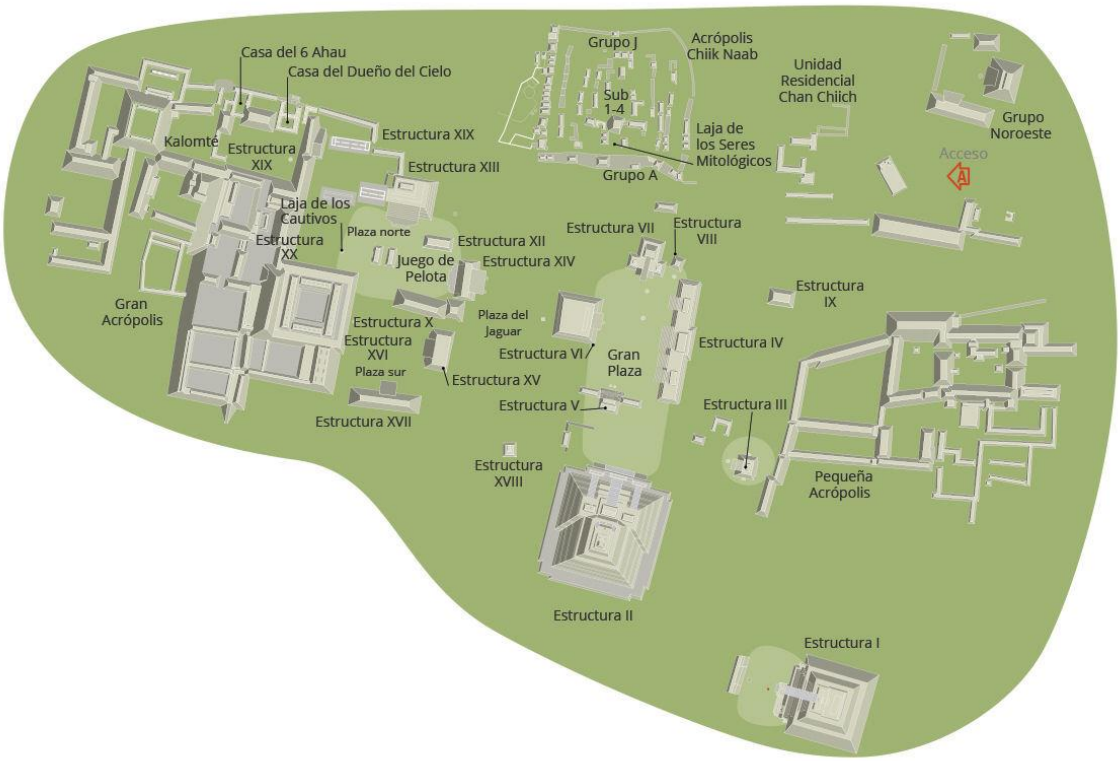
Stela located in front of Structure II in the Central Plaza, affected by severe erosion processes.

Structure XIV located in the Great Acropolis, affected by root growth (upper); and Stela 61 located on the west side of Structure XIV, affected by losses, erosive processes and microorganisms (lower).

Stela 66 whose fragments were found in the excavation of the corners of the Ball Court (upper). Details of the preserved reliefs that show deterioration and losses due to erosion processes, as well as microorganisms (bottom).

In order to deal with these problems, a large-scale project has been initiated to do conservation works in virtually all the pre-Hispanic buildings that have been explored since 1993, some of which have deteriorated over time, the intense rains and storms that fall annually in the region, climate change and, to a lesser extent, the impact of the public visit.

In particular, emphasis will be placed on the intervention of buildings and complexes denominated as Great Square (Structures I, II, III and VII); Great Acropolis (Structures XII, XIII, XIV, XV, XVI, XVII, XIX, XX, XXI, House of 6 Ajaw, House of the Owner of the Sky, Kalomté, Ball Game, and Slate of the Captives; as well as the structures of the Acropolis Chiik Nahb.




Map of the archaeological site of Calakmul, where the structures to intervene are shown as part of the PROMEZA program

For the realization of these works, the guidelines for the archaeological interventions approved by the Council of Archaeology of the INAH will be followed punctually, in order to preserve the integrity and originality of the pre-Hispanic buildings. For the masonry cores supporting the architectural elements, a mixture of consolidator, in proportions 1 to 2, with slaked quicklime in the area and stone dust to which water will be added in the amount required to facilitate masonry work. For the joints between stone blocks, the mixture used will be 1 part of slaked quicklime on site by 2 parts of fine powder, as this allows a better grouting, with the use of wedges for a proper joining of the parts.

Walls that present deformations very marked by the accumulation of moisture will be dismantled after registration to consolidate them properly, including masonry cores that are not in adequate condition due to the entry of moisture that has generated the loss of adhesion. Each row of ashlars will be marked with lime; the facing stones will be removed and the masonry core will be reworked to be able to reposition the covering ashlars.

Some of the deterioration in pre-Hispanic structures that will be addressed through the PROMEZA - Calakmul project

### 2.2.2 Climate change

It has been widely documented that factors associated with climate change, mainly precipitation, temperature and relative humidity, air pollution and biological activity influence the processes of degradation of the stones that are part of the archaeological monuments, which if not addressed, can lead to a process of loss of structures.

With the support of the Autonomous University of Campeche (UACAM), samples have been taken in order to know precisely the characteristics of the deterioration agents and to find solutions to slow their progress; among the most common are the common salts crystallized on ashlars and monuments, which originate during the dissolution/crystallization cycles of the materials themselves or external compounds of the environments; these salts are an important cause of deterioration that compromises the stability of the monuments and the loss of plaster and paint layers, where are still preserved.

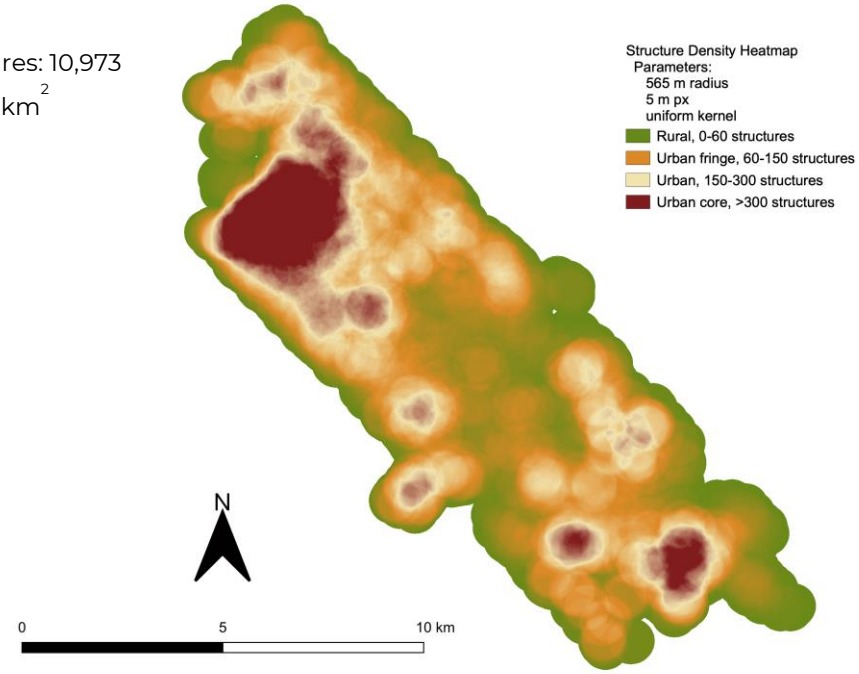
As mentioned above, from 2023 began the permanent monitoring of the microenvironment of mural painting in the Acropolis Chiik Nahb, the Substructure IIC and the stelae exposed on the site, which will allow to know with precision the characteristics of said salts and to begin to work in its removal and in the stabilization of the monuments.

On the other hand, recent works have also experimented with biorestoration based on microbial cells or their products, which compared to traditional chemical, physical and mechanical methods, are not destructive of the underlying substrate, as they only remove unwanted materials, in the case of bioliquidation, or new stone production, in the case of biocalcification.

### 2.2.3 Research and monitoring

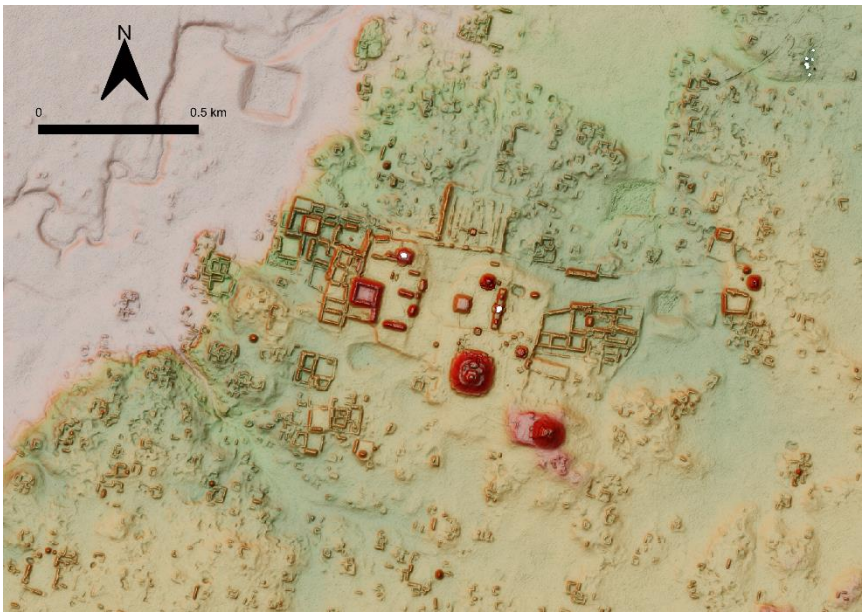
Research on the urban landscape of Calakmul has continued through the Bajo Laberinto project, carried out jointly by INAH, the University of Calgary, UNAM and the University of Campeche; during 2023 various analyses of the recovered information were carried out, which has allowed for more detailed information about the characteristics of the settlement, as shown in the following heat map, which shows the density of existing structures in the area that has LiDAR coverage.

Total area: 93.75 km$^2$
Total number of structures: 10,973
Overall density: 117 str. / km$^2$



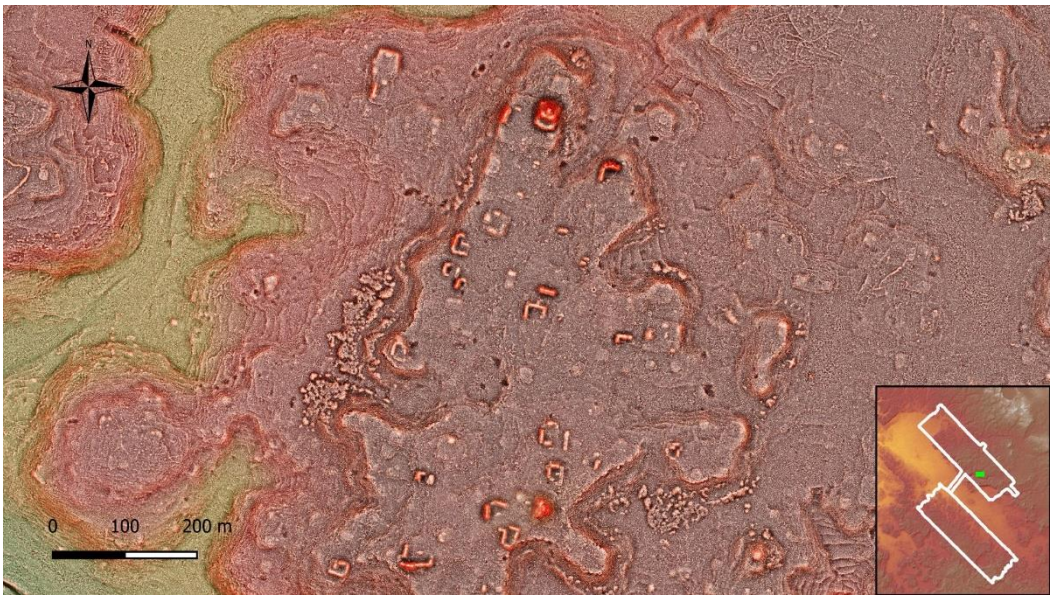

Having this information not only makes it possible to advance hypotheses regarding the functioning and internal organization of the pre-Hispanic settlement, but also to monitor sectors with greater archaeological potential, which may retain exposed architectural elements that are important to record, in order to avoid deterioration or possible looting.

As expected, the highest density is that of the central urban core of Calakmul, where the density is more than 600 structures per square kilometer, as can be seen in the following image; the concentration of structures drops abruptly at the limits of the Lower Labyrinth (top left), although even in these floodable areas features of hydraulic architecture can be observed, such as a large aguada and its water catchment areas.



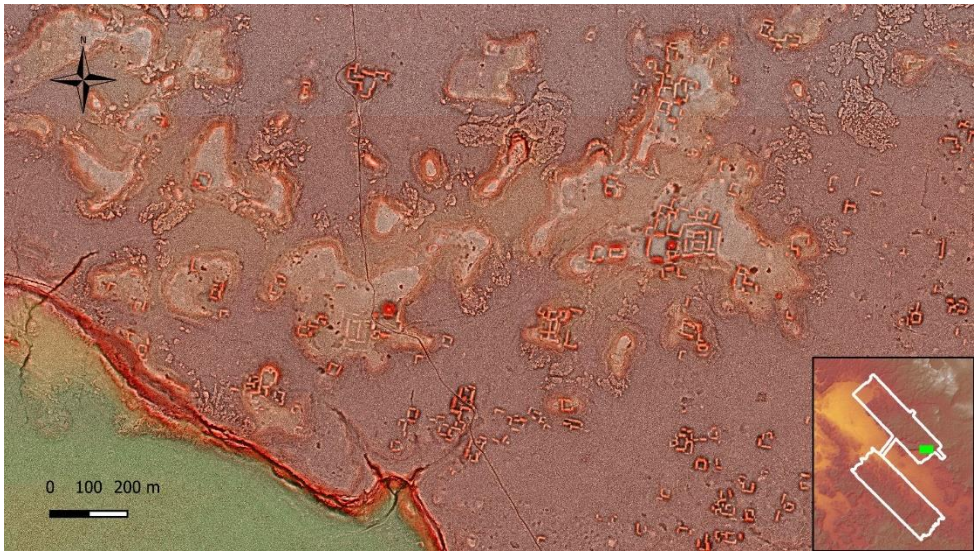

Urban centre of Calakmul

However, LiDAR coverage also identified an urban complex smaller than Calakmul, located southeast of the archaeological site, but with a significant amount of structures (more than 300/km.$^2$); it was considered to be a previously unidentified archaeological site, which was called Taxil, and which appears to have a strong occupational component in the Early Postclassic period.



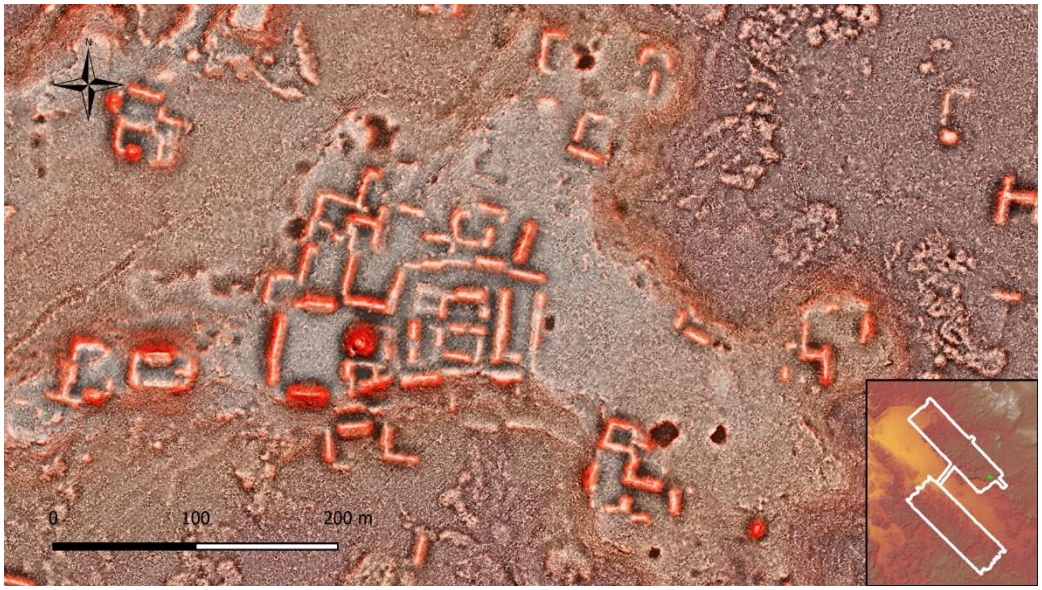

Concentration of structures on high ground, corresponding to the site of Taxil, first recorded in 2023

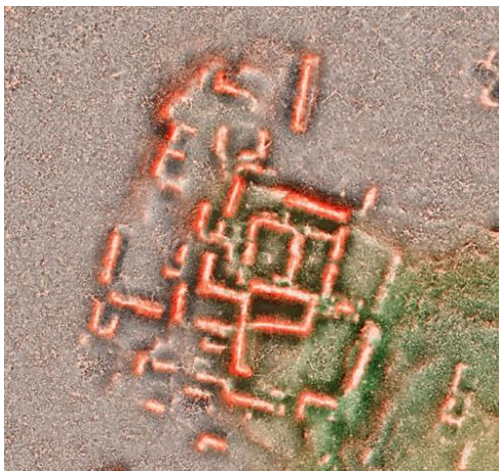
In other sectors close to the limits with the bajo Laberinto, a lower density of structures was observed, but it was observed that for the Early Classic period (ca. 200 AD) a greater occupation begins to be noted in the lower areas, same as during the Late Preclassic (400 BC-200 AD) seem to have been reserved for agriculture (below).



A pattern of housing complexes was also identified, the large number of grouped structures that make up them, which has been called “Laberinto Style”, distinguishes that. Although some structures of this type have been identified in sites such as El Palmar and Dzibanché, here they represent the predominant style in the inventory of housing structures.

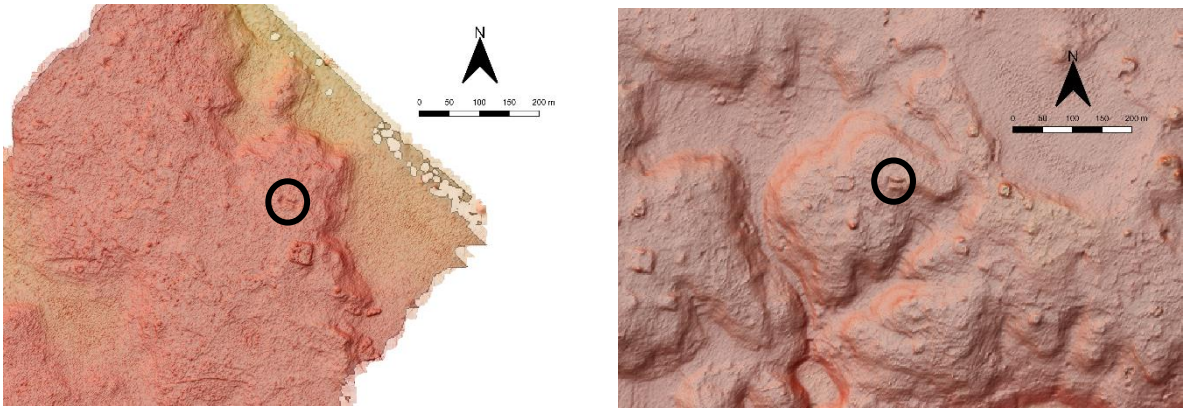
All of these complexes present a large courtyard and what could have been a sanctuary; they seem to have grown organically according to the needs of the group, with more structures being built over time. It is still early to make more advanced proposals, but future excavations may give more information as to whether these sets were associated to corporated groups linked from ties of kinship, place of origin or economic activity.



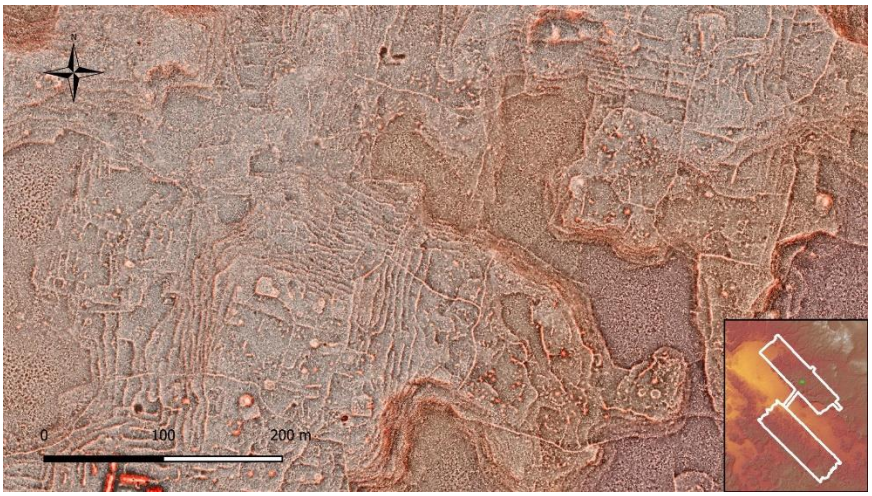
The complex above seems to have had a possible market, although there is also another market type group just 2 kms. to the southeast. Such structures have been identified and proposed as "nested" markets by Thomas Ruhl, Nicholas Dunning and a team from the University of Cincinnati, using LiDAR images from NASA’s G-LIHT project. On the left, a set of 54 individual structures near the central area of Calakmul.

On the other hand, the research has also evidenced the existence of six ball games in the periphery of Calakmul and only one, and very small, in the central area of Calakmul. John Fox in the 1990s proposed that in the highlands of Guatemala, these isolated ball games could represent border markers; therefore, one of the objectives of future research is to excavate some of these ball games to know their chronology and spatial relationship with other types of structures.



Examples of ball games identified on the periphery of Calakmul

The research carried out regarding the settlement pattern of Calakmul, has evidenced the complexity of the urban area and the enormous knowledge of the environment that led the ancient Maya to transform and take advantage of the entire landscape. One of the most impressive aspects of these modifications of the territory is the extensive modification of the landscape that took place in the southwest area of Calakmul between the monumental center and the bajo Laberinto. Assuming that the enormous density of structures is evidence of a large population, then there was a compelling need to feed all that population and therefore, it is logical that the areas with good quality soil were maximized, as shown below.




System of dry-laid stone walls (albarradas), terraces and dams in the rural area of Calakmul

On the other hand, a study has also been initiated to estimate aerial biomass (AGB) based on LiDAR data, which is important to serve as a baseline for assessing the timber resources that the ancient Maya could have used for the development of the urban complex, whereas tropical forests are very diverse environments where species are not evenly distributed.

The initial objective is to estimate the potential forest resources that the ancient Maya had to establish and maintain the city of Calakmul. To do this, AGB measurements are being used in the contemporary forest and identified areas selected for the ancient Maya occupation to complement the current vegetation distribution.

As is known, semi perennial tropical forests cover the current landscape surrounding the archaeological site of Calakmul, so the forest is not of uniform composition, and therefore, the various types of vegetation could have offered different resources to the Maya population. To this end, a vegetation classification and stratified sampling is being carried out in which the forest was assigned to four main types of vegetation: uplands, transitional lands, lowlands and wetlands.

When the Maya settled in what is now the southeast of Campeche during the Middle Preclassic period (1000-400 BC), they reached an unoccupied area. The rainforest of the high ground was probably the most affected during the pre-Hispanic era, since the high and well-drained lands were selected for construction of houses, palaces and temples; 62% of the structures of Calakmul are located within areas with this kind of vegetation.

The information available shows that the jungle of Calakmul was never more modified than in pre-Hispanic times, when the Maya practiced a constant transformation of the landscape for agriculture and forestry. The calculations being made will allow us to evaluate the timber resources that the ancient Maya had potentially available for the development of the city. Linear models were used to estimate the relationships between LiDAR metrics and data obtained from a stratified forest survey conducted by measuring trees found in 500 m2 transects.

### 2.2.4 Vigilance

As indicated by the President of the Mexican Republic, from 2022, the archaeological site of Calakmul is guarded by patrols of the National Guard, whose members travel both the access road and the area open to the public during visiting hours. The presence of these elements has discouraged the vandalism that eventually occurred in the archaeological zone, as well as the illegal extraction of wood near the protected area. In order to extend the protection provided by the armed forces, the National Guard has been requested to set up camps at the archaeological sites of Yaxnohcah and Uxul in the areas bordering the Mixed Property, both in the east and the west.

On the other hand, the staff of the CINAH Campeche, accompanied by support staff for the cleaning and gardening areas, maintains the surveillance of the archaeological site 24 hours a day, and serves visitors who arrive at the site.

2.2.5 Education and dissemination

Through its dissemination channels and social networks, the National Institute of Anthropology and History disclose the exceptional values of the site, as well as the measures that visitors must attend, to ensure their personal safety, and to preserve the cultural heritage that is guarded on the site. Brief notes are also published on the history of the site and the characteristics of some of the pieces recovered during the investigations; for prompt reference, the following links are included:

https://bitly.ws/36ukY
Funeral mat

https://bitly.ws/36umk
Ephemeris: Calakmul, one of the 13 wonders of Mexico

https://bitly.ws/36un8
Ephemeris: Calakmul World Heritage

https://bitly.ws/36unD
Promotional Calakmul

https://bitly.ws/36unK
Promotional Calakmul

Similarly, academic publications and content have been generated with respect to the results of the research carried out; the following are the links to the publications produced:

"*Dramatis personae* del programa escultórico de la Subestructura IIC de Calakmul". Daniel Salazar Lama, 2023
https://www.scielo.org.mx/scielo.php?pid=S0185-62862023000100188&script=sci_arttext&tlng=es

"Un lugar repleto de dioses. Nota preliminar sobre el programa escultórico de la Subestructura II C de Calakmul, Campeche, México". Daniel Salazar Lama, 2023
https://journals.openedition.org/jsa/20525

"La representación del espacio en el arte maya y su aplicación a las pinturas de la Acrópolis de Chi'ik Nahb de Calakmul". Rogelio Valencia, 2023
https://www.researchgate.net/profile/Rogelio-Valencia/publication/374688262_La_representacion_del_espacio_en_el_arte_maya_y_su_aplicacion_a_las_pinturas_de_la_Acropolis_de_Chi'ik_Nahb_de_Calakmul/links/6531932c73a2865c7abfc737/La-representacion-del-espacio-en-el-arte-

maya-y-su-aplicacion-a-las-pinturas-de-la-Acropolis-de-Chiik-Nahb-de-Calakmul.pdf

It is also important to mention that, as part of the Programa de Mejoramiento de Zonas Arqueológicas (PROMEZA), a new site museum will be built, showing the recent results of the research in Calakmul.

2.2.6 Social participation

Although there are no contemporary communities within the archaeological zone of Calakmul limits, there is an important participation of people from various neighboring communities, who provide their services in the archaeological zone, performing cleaning, gardening and surveillance activities. Currently, the site is staffed by people from the communities of Carrizal, Conhuas, Xpujil, Becán, Manantial, Venustiano Carranza and Heriberto Jara, among others, who have been given talks about the history of Calakmul and the results of recent work.

Similarly, together with Dr. Jaime Delgado, a social participation day was held with the children of the primary school "Niños Héroes de Chapultepec", of the community of Conhuas, the closest to Calakmul, to propose a research topic that resulted in the production of the program "Archaeologists in Distress: Calakmul", which can be seen on the YouTube platform:


https://www.youtube.com/watch?v=E0gi2C9dbAU

Staff of the Calakmul Biosphere Reserve (CONANP) also participated in this activity, as well as the support of the parents of the children who, despite having always lived in Conhuas, did not know the mural paintings of the site.

2.2.7 Sustainable tourism

The remoteness and geographical location of the archaeological area of Calakmul make mass tourism unfeasible, since it is not possible to have enough water or supplies for the service of a larger number of visitors. Through the Programa de Mejoramiento de Zonas Arqueológicas (PROMEZA), maintenance and improvement of the infrastructure for the visit, including the placement of solar cells, are currently under way to ensure that the services operate with clean energy; This work also includes the development of a waste water treatment plant, which will avoid contaminating the soil with discharges from the sanitary services.

We are also working with CONANP and the tourist guides who provide their services in the archaeological zone, in a campaign so that visitors do not leave waste on the site, and thus avoid contamination of the jungle with single-use plastics, aluminum containers and other materials.

2.2.8 Visitor Service Centre (CATVI)

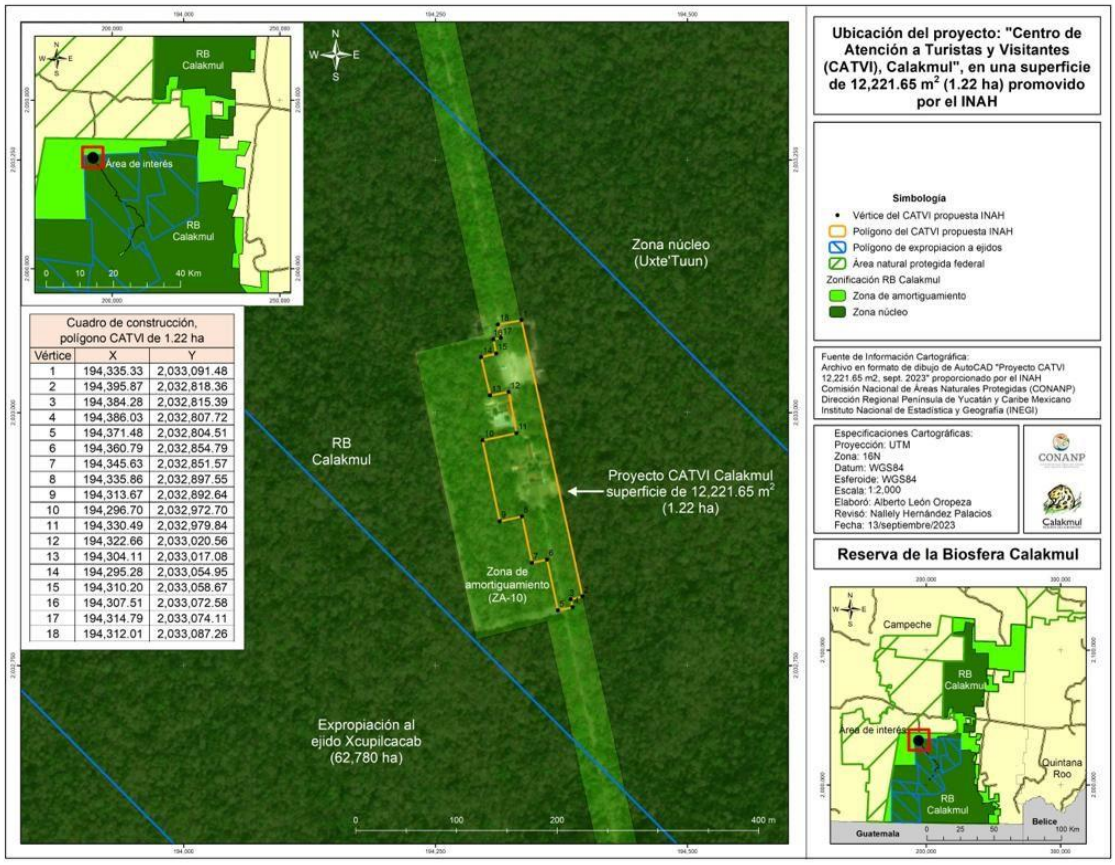
The Visitor Service Centers (CATVIs) are part of the Programa de Mejoramiento de Zonas Arqueológicas (PROMEZA) authorized by the President of the Republic, whose objective is to create physical spaces and promote programs that add value to research, preservation and dissemination of material and intangible cultural heritage in the archaeological zones surrounding the Tren Maya project, while offering ordered and regulated complementary services, where communities adjacent to conservation sites can participate.

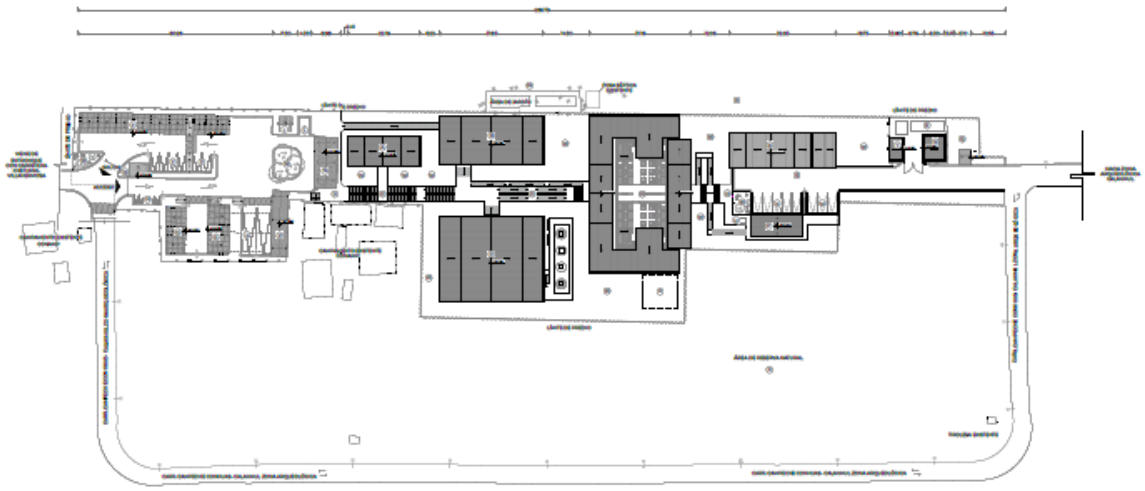
The visitor center is intended to be part of a joint that generates a controlled entrance to the archaeological zone and protected natural area, so one of its main objectives is to have a control of access that allows guaranteeing the mobility and ordering of vehicles entering the road that leaves the federal highway 186, in the town of Conhuas, in such a way as to maximize the parking service and generate a safe distribution area, orientation and arrival to the visitation areas, in anticipation of an increase in visitors expected with the entry into operation of the Tren Maya.

For the specific case of Calakmul, it has been proposed to CONANP that the Visitor Service Centre, which will serve the Calakmul archaeological zone and Biosphere Reserve, be built in the area occupied by the Calakmul Museum of Nature and Archaeology, which is abandoned; in this way, it will be possible to make use of a space that is wasted and will not generate an additional impact on the vegetation cover, since this area was dismantled since the early nineties.

The Calakmul CATVI project includes an interpretation area that will provide information on the cultural and natural heritage, not only of the archaeological site, but of the "Great Calakmul" region, which includes five archaeological sites open to visitors and numerous natural spaces that have facilities for public tours. It will also include craft shops and spaces for the sale of food, so that local

communities can offer products from the region. In the medium term, larger buses and vehicles are expected to arrive at CATVI so that they can be transported to the site and other areas of interest in the Reserve by light vehicles, also operated by the local population.



Location of the site and Visitor Centre project for the Calakmul Archaeological Area

2.3 Governance mechanisms and social participation

2.3.1 Advisory Council and Sub-Councils

At the invitation of CONANP, the INAH Campeche Centre attends meetings of the Advisory Council to discuss matters within the competence of INAH, in particular, meetings were held to discuss the opening hours of the archaeological sites open to the visit, the condition of access roads and services, as well as proposals from some communities to carry out archaeological works or open new archaeological sites to the public.

INAH is always in the best position to share information and participate in the search for solutions to the problems that arise within the Mixed Property and its buffer areas.

## 3. Information on the Tren Maya Project (PFTM)

3.2 Approval of the construction works, INAH

The Tren Maya Project was entered into the INAH through Procedure INAH-05-001 Approval of work in areas of archaeological monuments or in which its existence is presumed, which has as legal basis, articles 42, 43, and 44 of the Federal Law on Archaeological, Artistic, and Historic Monuments and Zones. The actions carried out under this project are within the legal powers conferred on INAH, in the area of protection and research of archaeological monuments at risk of damage by works, as explicitly stated in Article 9, VIII and paragraphs V and VIII of the Regulations of the Organic Law of INAH.

The *Guidelines for Archaeological Research in Mexico* and the *Procedure for the Development of Archaeological Investigations - Salvage and Rescue in Areas of Public or Private Work* are the basic documents governing the investigation. In the latter it is mentioned that it is through the technical-legal opinions that the approval of work is granted or, in its absence, the issuance of relevant technical recommendations for the protection of the patrimony; being able to be seen partial or total approvals.

a. Approval is granted.
   Cultural heritage is not affected.
   (Does not exclude archaeological supervision).

b. Approval is not granted.
   Cultural heritage is affected.
   It is feasible to grant approval by the competent authority of INAH, but it requires archaeological intervention (salvage or rescue) or even modification of the track center or work plan.

The criterion for deciding the procedure is that the project does not affect the archaeological, historical or paleontological heritage.

The path of the train and the areas of complementary works have been divided into segments and sections, depending on the technical advice, that is, the presence or absence of monuments, as well as their cultural relevance, according to four criteria:

1. Approval of works. Applies to spaces in which no archaeological monuments were identified on the surface, nor any movable or immovable patrimonial element that could be affected by the construction activities. For these cases, it is considered that there is no inconvenience to be granted Approval of Work for the construction project; however, supervision must be carried out during construction work for the detection of monuments that may be under the surface.

2. Provisional Precautionary Restriction. In these cases, the area is restricted for any kind of construction work or related work and it will be possible to obtain the Approval of Work once the works of archaeological salvage in the monuments to intervene are finished. These works involves the programming and execution of topographic survey works, systematic excavations for the recovery of archaeological materials and related information, as well as supervision and surveillance during the deconstruction of monuments.

3. Provisional precautionary restriction, with preservation of monuments *in situ*. The area is restricted for any kind of construction work or related work and it will be possible to obtain the approval for work, once the work of archaeological salvage in the monuments to intervene is finished. This involves scheduling and executing surveying, systematic archaeological excavations, material analysis, monitoring and surveillance. These particularly prioritize the establishment of technical measures for the conservation and protection in situ of structures in the area of impact of the construction, including among others the right of way and induced works (embankments, bridges, overpasses, shelter in green areas, re-burials, etc.).

4. Total restriction. Restricted area because it contains monuments with high archaeological potential, requires the rethinking of the construction project, protection, programming of subsequent excavation actions, conservation, restoration and analysis of materials. In exceptional cases, a technical measure is requested to ensure its preservation.

In order to measure progress and initiate work in areas that have already been intervened or where there are not presence of archaeological monuments on surface, minutes are drawn up outlining the information of the potential Final Opinion, in these cases, it is made of knowledge to the executors of the work, the existence of monuments, as well as the technical recommendations for their protection.

The salvage project carries out the archaeological intervention necessary to grant the Approval of Work to all the trace of the right of way and the complementary works.

3.2.1 Archaeological discoveries during archaeological salvage

It is important to emphasize that the path and trackage rights of the train, only impact a fraction of the buffer zone; in this confluence around 907 archaeological monuments have been recorded, which were evaluated during the survey to determine the level of intervention or restriction required, according to the following table:

| Review process | Total |
|---|---|
| Provisional precautionary restriction, feasible once the indicated works have been carried out. | 868 |
| Provisional precautionary restriction, viability of the construction project conditional on the implementation of technical measures for the protection and conservation of monuments in the area of the construction project. | 33 |
| Total restriction, modification of the constructive project. | 6 |

Mainly, the registered monuments are foundations, levelling, terraces and low stone walls (albarradas); the data provided by these architectural spaces are related to cultivation and subsistence systems, thus small hydraulic works, so its intervention and understanding of its constructive system does not represent a high level of complexity.

To a lesser extent, buildings have been located such as altars or basements of houses that, in addition to providing information on specialization, social stratification, more complex construction systems, can represent unique examples of architecture, finishes or designs; requiring greater detail in the registration of its elements and, therefore, complexity of intervention. These are usually were ruled with total restriction, with the intention of ensuring the preservation of the monument.

Of this total, 759 monuments have been cleared or registered and 3 have been excavated; in this regard, we believe that the integrity and authenticity of the World Heritage Site have not been compromised. A land area of 2.8 hectares was also prospected for the construction of the Visitor Service Centre, which did not detect architectural structures nor the presence of ceramic or lithic materials, so the work was considered feasible in terms of the protection of archaeological monuments.

It is worth mentioning that the coverage of the Tren Maya project has represented the exceptional opportunity to systematically sample a huge area of the pre-Hispanic occupation of the region, providing valuable information for

understanding the social processes that took place at the settlement and regional levels; in addition, the results of the research will also provide data to expand the knowledge we have so far about the ancient city of Calakmul and its area of influence.

3.2.2 Location and methodology of work in section 7 of Tren Maya project

As already mentioned, the right-of-way of Section 7 flows into a strip of the northern buffer zone of the Mixed Property polygon, as indicated in the map below.

Also, adjacent to the path of the train are some complementary works, mostly installations of the Federal Electricity Commission (CFE) such as poles and retainers, which do not represent a significant impact at a spatial level.

It is important to comment that INAH archaeological salvage project for the Tren Maya Train on a proposal with a comprehensive and multidisciplinary approach, involving the participation of various specialists in the research process, to address and solve problems from different perspectives.

The surface reconnaissance is based on prior spatial analysis in cabinet, through Geographic Information Systems (GIS) and LiDAR data analysis; this allows identifying features with archaeological potential in the territory, expediting the planning of field works.

Derived from the above, the systematic field work was carried out, both the right of way, and the polygons of the complementary works, by means of transects that are defined according to topographic data, vegetation density, prior identification of archaeological potential or other relevant aspects identified in the GIS laboratory.

During these works, the monuments that are identified in the transect were registered and given a unique key formed by the prefix corresponding to the section, followed by the key of the archaeologist who prospected it and a consecutive registration number. This allows the individualization of each element in a spatial database formed by the entire universe of generated information.

For the location within the grounds as well as the registration of monuments, mapping GPS is used with an average horizontal accuracy of less than 1.5 m. This type of GPS allows the display of the user's geographical location with respect to the right-of-way or other reference features, including satellite images of Google Earth and LiDAR shading models. The platform of these devices allows preloading information in AutoCAD or ArcGIS format (*.dwg and *.shp). Archaeological information generated and rectified is stored directly in the GIS.

The coverage of the right-of-way route varies between 100 and 250 m on each side of the train, depending on the potential features found and the

concentration of monuments, since the abundance of these may indicate the existence of pre-Hispanic settlements. In the case of the polygons of complementary work, they are completely covered.

Each monument (structure, altar, etc.) is physically marked through signs so that those in charge of construction tasks can easily identify them and be careful not to damage them. Each one has a card with basic information, according to a particular classification typology, in addition to the spatial and photographic record.

Depending on this register, the type of monuments, their archaeological potential and their risk of being affected by the construction process, the intervention strategy is elaborated. This means that not all monuments have the same intervention strategy; for example, those that are of high archaeological potential may not be excavated intensively because they will not suffer damage by the work; some are sampled, in others it can be performed only fine cleaning and registration of shape and dimension.

Archaeological excavations are carried out with strict stratigraphic control, in addition to the three-dimensional register, the above supported with GIS, topographic and photogrammetric instruments and techniques in order to streamline the tasks of the registry, optimizing the systematization of excavation data, from layer topographies, objects, elements, special contexts, plants and profiles. It is important to highlight the use of drone photogrammetry for the three-dimensional recording of excavations, thus generating models of digital elevation of recovered contexts.

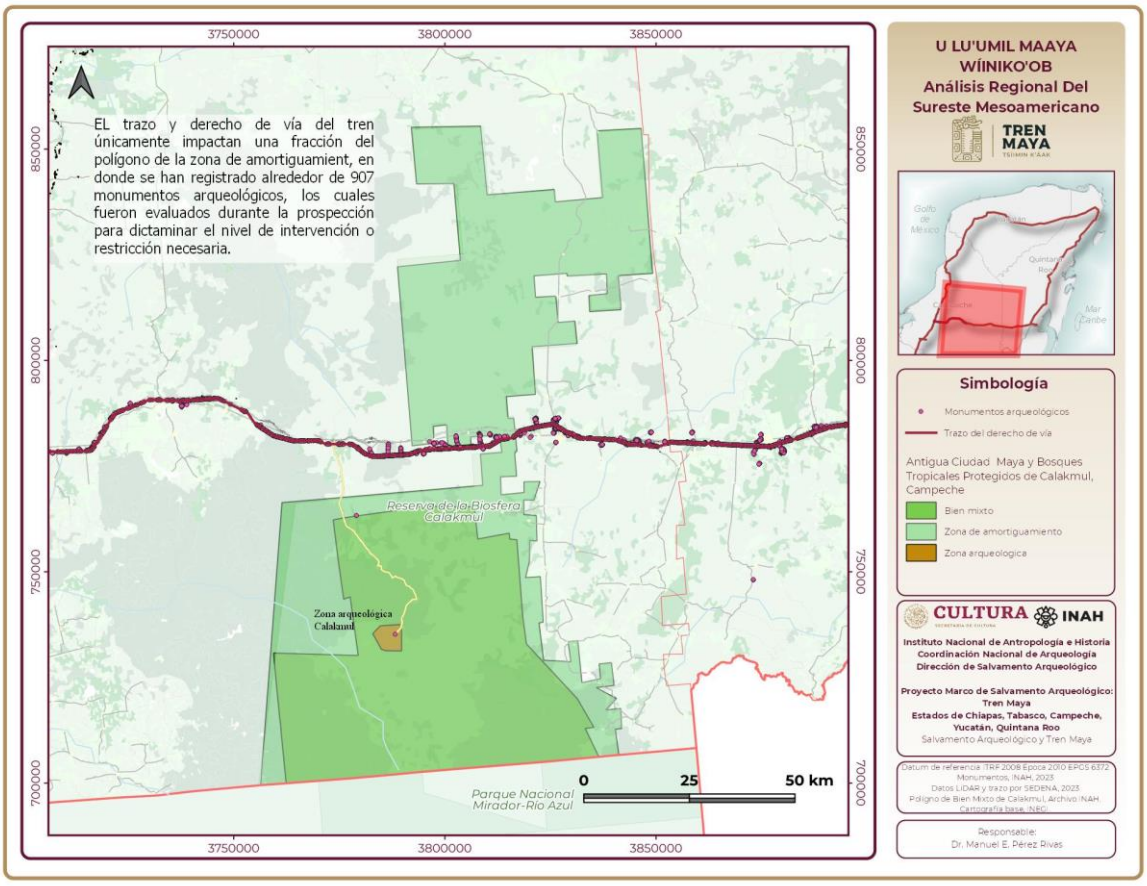
### 3.2.3 Protection and conservation measures implemented for monitoring and safeguarding

The monitoring and safeguarding of the archaeological heritage are implicit in the methodology and objectives proposed in the salvage project, for surface recognition and intervention, a fact that is reinforced through the supervision of work, post-intervention. In addition to the ruling, measures have been established throughout the train line that guarantee the safeguarding of archaeological monuments, such as the modification of the path, pivoting on the right of way, covering monuments under embankment with geogrid, viaducts or bridges.

At the beginning of the project, a request was made to amend the first path proposal in order to protect a significant concentration of archaeological monuments; It also requested the placement of geosynthetic protections on nine monuments located within the right of way, guaranteeing their protection, so that the integrity of the property has not been compromised at any time.

It is important to stress that, throughout the process involved in the construction of the Tren Maya, INAH has been careful in applying the Practical Guidelines,

although, as can be seen, the train line does not affect the surface of the Mixed Property.




Location of the Tren Maya, the Ancient Mayan City and Protected Tropical Forests of Calakmul and the archaeological monuments recorded in the archaeological salvage project

# STATE OF CONSERVATION REPORT OF THE WORLD HERITAGE PROPERTY

## ANCIENT MAYA CITY AND PROTECTED TROPICAL FORESTS OF CALAKMUL, CAMPECHE

MARCH 2024, MEXICO

ATTENTION TO THE DECISION 45COM 7B.99

# Contents

## 1. Executive Summary

This State of Conservation Report of the Mixed Property Ancient Maya City and Protected Tropical Forests of Calakmul, Campeche, is presented in response to Decision 45 COM 7B.99 adopted by the World Heritage Committee at its 45th Expanded Session in Riyadh, Kingdom of Saudi Arabia in September 2023, with recommendations aimed at adopting the necessary measures to maintain the Outstanding Universal Value in the face of possible impacts from the construction of infrastructure related to the Tren Maya Project, Tramo 7.

As it is a mixed property, there is coordination between the National Institute of Anthropology and History (INAH) and the National Commission of Natural Protected Areas (CONANP), for the follow-up of the application of the Convention, therefore, the information provided regarding cultural aspects is the competence of INAH, while the information on natural aspects is the responsibility of CONANP and other areas of the Environmental Sector. Hence, this SOC complements the report sent by INAH to the World Heritage Center on January 24, 2024.

It should be noted that this updated SOC is regarding the activities carried out for the management, conservation and protection of the natural values of the Property and its buffer zone, in compliance with the Property's Management Plan, which covers the period from April 2022 to December 2023, based on the report submitted for 2021 and 2022 (delivered extemporaneously to the World Heritage Center in April 2023) which mentions some of the changes that the construction of the Proyecto de Infraestructura Ferroviaria Tren Maya, Tramo 7 Chetumal-Escárcega, in its crossing through the buffer zone of the property, could cause.

It also explains some of the actions that SEMARNAT and CONANP implemented to achieve the publication in the Official Journal of the Federation on September 1, 2023 of the Presidential decree that reforms, derogates and adds, among other provisions, the polygonal and zoning of the Calakmul Biosphere Reserve, which maintains the limits of the Property and expands its buffer zone, thus contributing to connectivity in the region.

## 2. Response to the Decision of the Committee 45 COM 7B.99

### *2.1 Financial Resources (For the Implementation of the Property Management Plan)*

By the National Commission of Natural Protected Areas, there was a substantial increase in financial, human, and operational resources during the period, as indicated in the following table:

| Concept | Measure/Unit of Measure | Quantity/Amount | Source |
|---|---|---|---|
| Personnel | Number of people | 16 | Fiscal Resources |
| | Number of people | 7 | Other Sources |
| Operating Expense | pesos | | Fiscal Resources |
| Operating Expense | pesos | 1,120,000.00 | Natural Protected Areas Fund (FANP) |
| Subsidy Resources | pesos | 32,407,354.00 | Fiscal Resources |

Table 1. Budget Allocated in the Mixed Property

There are 23 permanent staff members dedicated to surveillance, consultation, and support for 34 communities surrounding the Mixed Property.

### *2.2 Implementation of the Property Management Plan*

2.2.1 Conservation and Restoration

Regarding the natural component, the mature forests of Calakmul, with their current structure and floristic composition, stand as extraordinary evidence of the long interaction between humans and nature. Largely the result of ancient agricultural and forestry practices of the Maya, combining complex processes of human selection and natural system regeneration. The traditional management practices of indigenous communities still residing in the region, outside the Property, are evidence of ancient Maya practices.

These humid and subhumid tropical forests thrive in a geological province under dry conditions and karstic soils. Given the particular environmental conditions of the region, such as limited water availability, dryness, the presence of fires, and hurricanes, the flora and fauna species of humid ecosystems have developed adaptations to these dry conditions. However, the Property is a crucial water catchment area, a key factor as it represents a critical habitat for a large number of endemic and threatened species.

It is also an area with a high abundance of wildlife. Several species distributed in the Property are threatened and endangered. The Property has the highest diversity of mammals in the Maya region, housing two of the three primate species, two of the four edentates, and five of the six species of wild felids found in Mexico.

The Property's location also enhances its importance as the connectivity hub of the Maya Jungle, with corridors providing ecological continuity to the forests of the region (Mexico, Guatemala, and Belize). This allows for the conservation of biodiversity and the development of ecological dynamics and evolutionary processes of species. It also helps maintain populations of species with high space requirements, as well as animals with local migrations (butterflies, parrots, waterfowl, bats), and large predators with great mobility, such as jaguars, pumas, as well as various birds of prey.

**Conservation and Protection of the Property in Natural Matters**

In terms of the conservation of the Property, on October 1, 2023, the modification to the Decree creating the Calakmul Biosphere Reserve was published in the Official Gazette of the Federation, highlighting the change in zoning.

In the 1989 Calakmul Biosphere Reserve Decree, 60% of the Property's surface was within the buffer zone in the Controlled Utilization subzone, and 40% in the core zone (Figures 1 and 2).

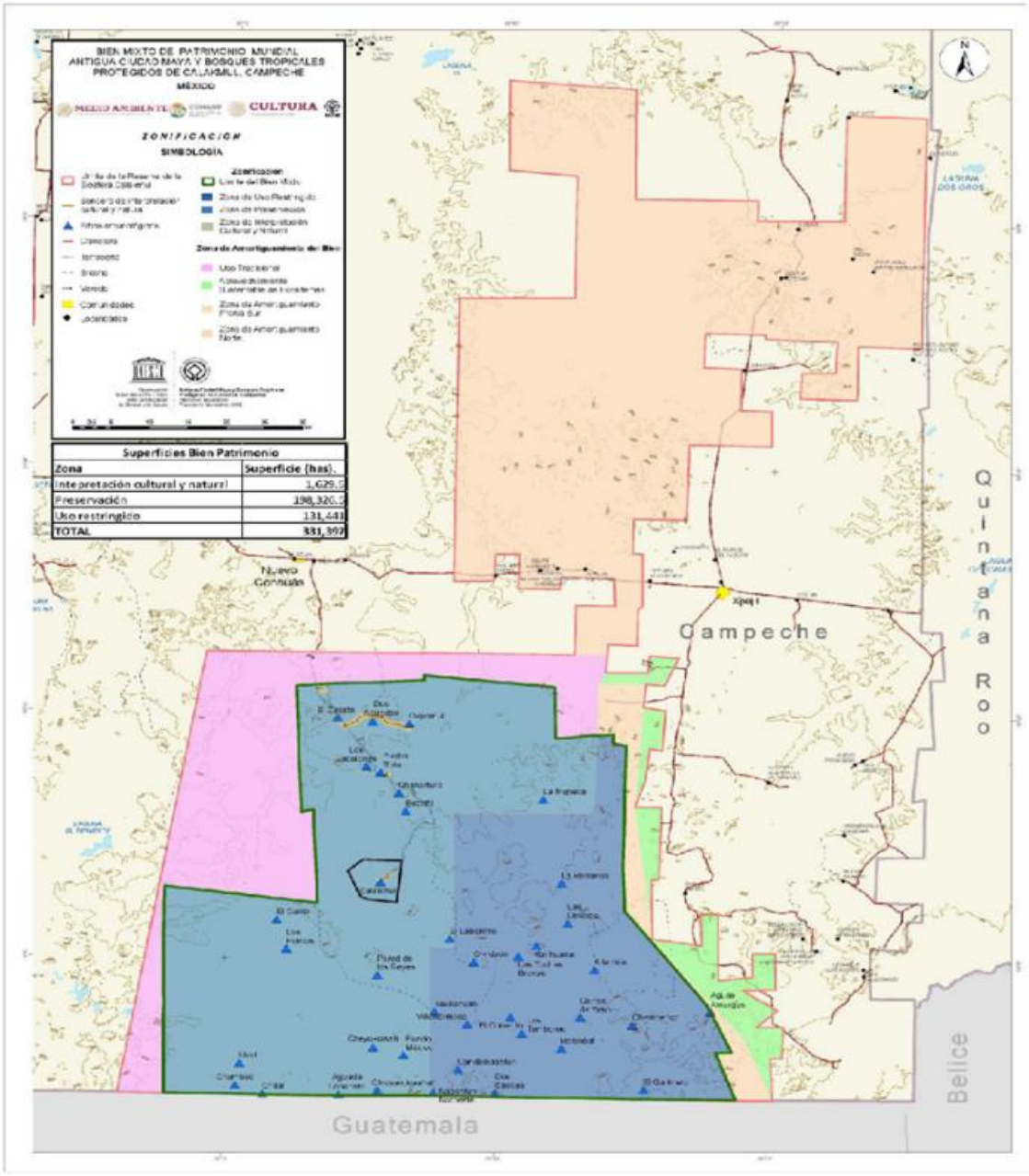



Figure 1. Zoning of the Property

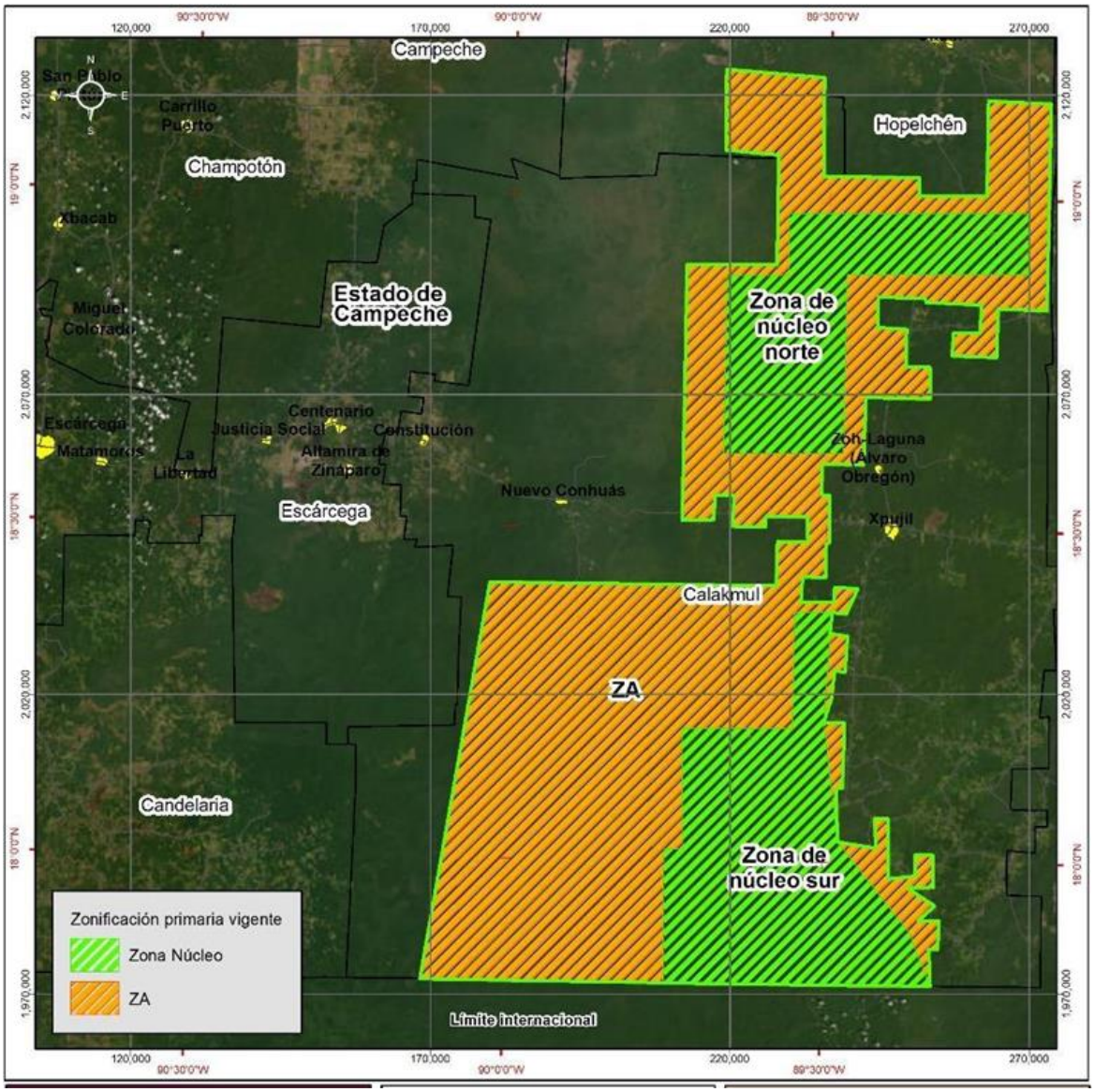



Figure 2. Zoning of the Calakmul Biosphere Reserve.

With the modification to the Calakmul Biosphere Reserve decree, 99% of the Property's surface is now located in the core zone, with only 1% in the buffer zone (Figure 3), significantly enhancing the level of protection for the Bien Mixto.

The 1% of the Property in the buffer zone corresponds to the public use zone, in accordance with the sub-zoning of the natural protected area and the Property. This area is designated for visitation, as outlined in the objectives of the Calakmul Biosphere Reserve and the management plan of the Mixed Property (Figure 3).

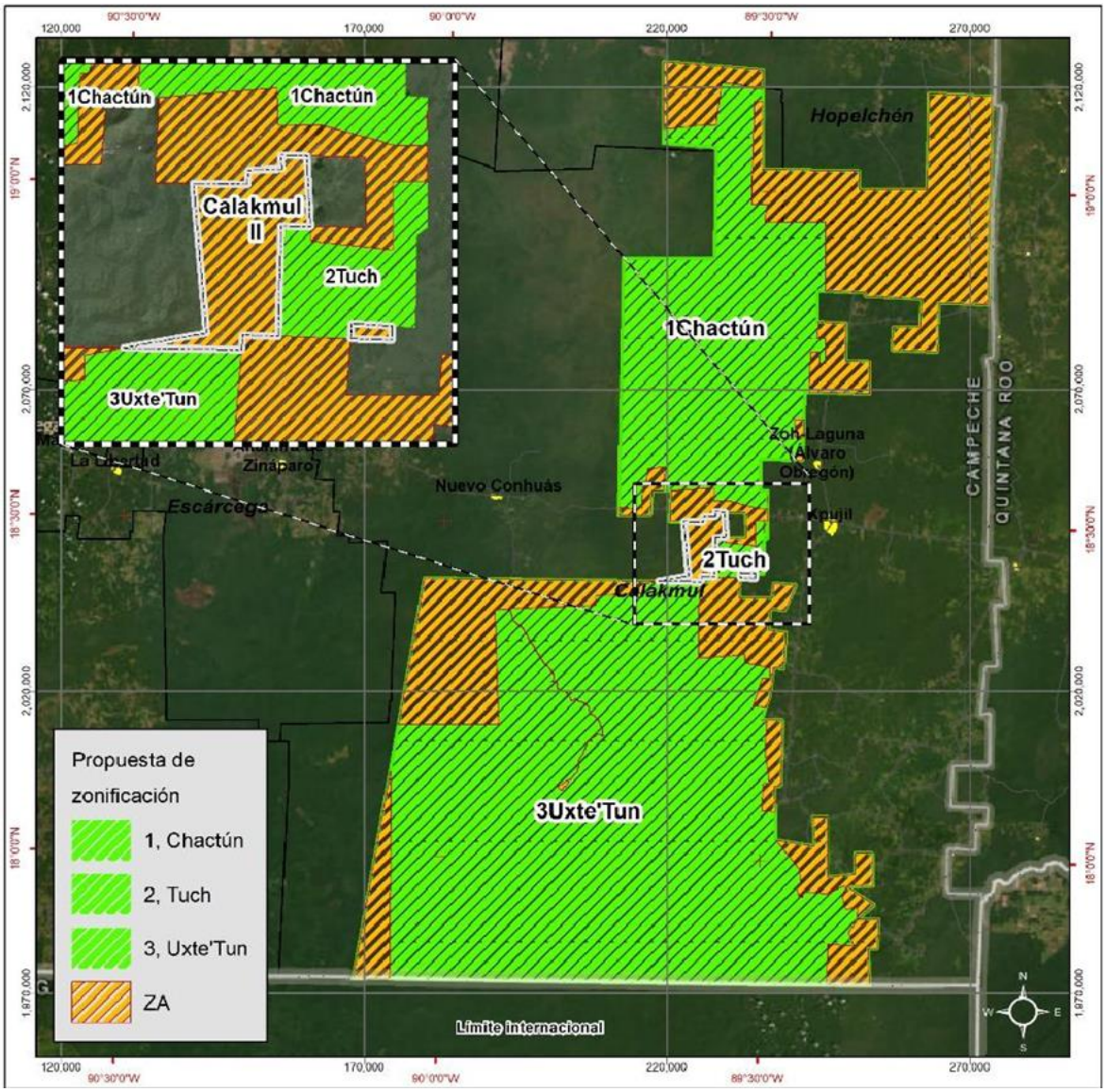



Figure 3. Zoning of the Calakmul Biosphere Reserve, 2023 amending decree.

Based on the 2023 Amending Decree of the Calakmul Biosphere Reserve, the following zones, subzones, and their respective surface areas are presented:

| **Zones** | **1989 Decree (hectares)** | **2023 Decree (hectares)** | **Differences (hectares)** |
|---|---|---|---|
| **Overall Polygon** | 722,764.577976 | 728,908.576313 | +6,143.998337 |
| **Core Zone** | 247,892.258887 | 519,844.123166 | +271, 951.864279 |
| **Buffer Zone** | 474,872.319089 | 209,064.453147 | -265, 807.865942 |

Table 2. Comparison of Zoning Surface Areas.

### 2.2.2 Climate Change

The National Water Commission (CONAGUA) has carried out studies to verify the characteristics of the aquifer in Calakmul, in order to define the hydrogeological characteristics of the site, define the potential of the water in both quantity and quality, and verify the availability for different uses, including the environmental flow rate.
CONAGUA, from its attributions, is in charge of authorizing groundwater concessions and discharge permits in accordance with the National Water Law, likewise, through inspection visits, it is in charge of monitoring compliance with the corresponding regulations in order to prevent the overexploitation of the aquifer and its contamination from compliance with NOM 001 SEMARNAT 2021; Establishing permissible limits of pollutants in wastewater discharges into nation-owned water receiving bodies On the other hand, it periodically monitors the proper use of the nationally owned assets represented by the bodies of water.

In the Calakmul region, a decrease in precipitation has been recorded in recent decades (Mardero *et al.*, 2020; Pérez-Flores *et al*., 2021). In 2019, a drought period was recorded, during which Central American tapir (*Tapirus bairdii*), a species highly dependent on water sources, ventured onto roads, approached villages, and apiaries in search of the resource (Pérez-Flores *et al*., 2021).

Since 2019, the World Wildlife Fund (WWF) in collaboration with the Calakmul Biosphere Reserve has been maintaining artificial water troughs as part of a strategy implemented by the National Commission of Natural Protected Areas (CONANP) to counteract the water scarcity characteristic of the Calakmul region. However, it has also proven to be a tool benefiting wildlife (Contreras Moreno *et al*., 2024) against the effects of climate change, such as changes in precipitation patterns and longer drought periods.

As part of this strategy, in 2023, the cleaning and filling of 18 containers, each with a capacity of 300 liters, were carried out. The water troughs are located every two kilometers, at a distance of 50 to 100 meters from the road leading to the Calakmul archaeological site (Figure 4). The water troughs were inspected monthly to keep them clean and maintain an adequate water level. During the dry months, they were checked two to three times a month to ensure water availability for wildlife. The Calakmul Biosphere Reserve placed four camera traps that operated for most of the year at four different water troughs, and WWF placed 10, but only during the dry season.

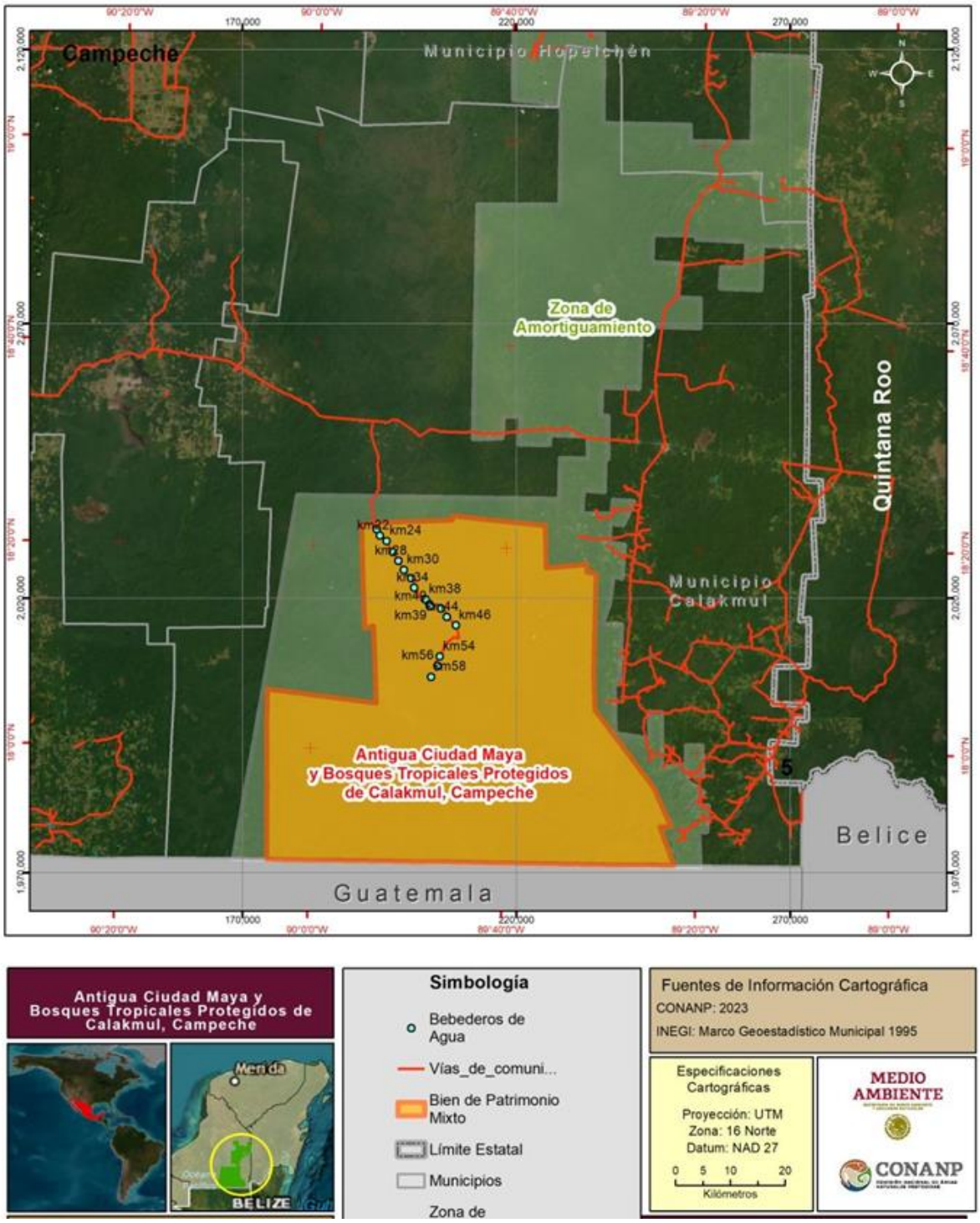



Figure 4. Geographical location of water troughs and camera traps in the watering holes within the Mixed Property.

There is no in-depth analysis of the data obtained during camera trapping; however, a total of 31 species have been identified. Among them are three of the five felids recorded in the Mixed Property *(Panthera onca, Puma concolor, and Leopardus pardalis*), four of the six ungulates recorded for the Calakmul region,

such as the collared peccary (*Pecari tajacu*), Central American red brocket (*Mazama pandora*), white-tailed deer (*Odocoileus virginianus*), and Central American tapir (*Tapirus bairdii*). Additionally, some birds of prey, such as the ornate hawk-eagle (*Spizaetus ornatus*) and the collared forest falcon (*Micrastur semitorquatus*), as well as large birds like the great curassow (*Crax rubra*), crested guan (*Penelope purpurascens*), and ocellated turkey (*Meleagris ocellata*) have been recorded, which are in some conservation status according to NOM-059-SEMARNAT-2010. It is important to highlight that three species of vultures have been recorded, including the king vulture (*Sarcoramphus papa*), a priority species for conservation (Figures 5 and 6).

Figure 5. Tayra (*Eira barbara*) photographed at a water trough installed within the Mixed Property.

Figure 6. Pair of Jaguars (*Panthera onca*) photographed at a water trough located within the Mixed Property.

The tapir is a species dependent on water sources. In 2023, its presence was recorded at the water troughs during the months of July and August; for the rest of the year, rainfall was sufficient to fill the water sources (Figure 7).

Figure 7. Tapirs (*Tapirus bairdii*) at a watering hole in the Mixed Property. Photograph: Edwin L. Hernández Pérez.

The objects of permanent monitoring are:

Aguadas

Aguadas are surface water bodies of variable size and generally temporary. They originate from erosion processes in which rainwater accumulates in topographic depressions with impermeable soils (Reyna-Hurtado *et al*., 2010). They provide ecosystem services such as water availability for wildlife, mainly during the dry season (Delgado and Mendoza, 2020), and supply varied species of freshwater fish for human consumption, serving as a significant source of protein for the local population (SEMARNAT, 2007).

In the Selva Maya region, these water bodies have been recorded and monitored due to their importance as key elements for biodiversity conservation. Within the Mixed Property, the density of these bodies is extremely low, one per 535 hectares (Delgado and Mendoza, 2020). In 2023, monitoring has allowed the recording of 76 bird species and 29 native mammals, accounting for 44% of medium and large terrestrial birds and 100% of the mammals in the region (*Op.cit*, CONANP, 2023). Among the mammals, endangered species such as the jaguar (*Panthera onca*), puma (*Puma concolor*), ocelot (*Leopardus pardalis*), margay (*Leopardus wiedii*),

jaguarundi (*Puma yagouaroundi*), Central American tapir (*Tapirus bairdii*), and white-lipped peccary (*Tayassu pecari*) are highlighted. Birds recorded at the watering holes include the king vulture (*Sarcoramphus papa*) and the great curassow (*Crax rubra*), the ornate hawk-eagle (*Spizaetus ornatus*), among other species (Reyna *et al.*, 2010; Delgado and Mendoza, 2020).

The desiccation of watering holes and the reduction of water availability for wildlife are threatened by risk factors such as illegal and selective logging of commercially valuable species, leading to a reduction in water capture and storage. Additionally, factors like water extraction for human use, removal of original vegetation for livestock, and the use of aguadas by livestock to meet their water needs contribute to the desiccation of aguadas and reduced water availability for wildlife (Delgado and Mendoza, 2020).

Furthermore, the effects of climate change are becoming noticeable in aguadas, as changes in precipitation levels and temperature increase promote their desiccation (CONANP, 2011), which is expected to continue and intensify under various climate change scenarios.

High and Sub-evergreen Jungle

Its presence is related to average annual precipitation of 1,600 mm and altitudes ranging from 0 to 1,000 meters above sea level (Rzedowski, 2006; INE, 1999). It develops on undulating reliefs and plains with slopes ranging from 12% to 1%, as well as rendzina-type soils with good drainage. The dominant stratum has 30 meters or more in height (some individuals reach 45 meters), and approximately 25% of trees from dominant species lose their leaves during the dry season. Epiphytes and vines are scarce (Martínez and Galindo-Leal, 2002; INE, 1999).

Among these species, the Mexican felids stand out: the jaguar (*Panthera onca*), puma (*Puma concolor*), ocelot (*Leopardus pardalis*), margay (*Leopardus wiedii*), and jaguarundi (*Puma yagouaroundi*), as well as ungulates like the Central American tapir (*Tapirella bairdii*), an endangered species, and the white-lipped peccary. Regarding birds, the use of watering holes by the king vulture (*Sarcoramphus papa*) and the great curassow (*Crax rubra*) has been recorded, among other species (Reyna et al., 2010; Delgado and Mendoza, 2020).

Despite their importance, aguadas are at risk of disappearing due to various pressure factors, including illegal and selective logging of species with high commercial value, leading to a reduction in water capture and storage. Additionally, factors like water extraction for human use, removal of original vegetation for livestock, and the use of aguadas by livestock to meet their water needs promote the desiccation of aguadas and the reduction of water availability for wildlife (Delgado and Mendoza, 2020).

In addition to these pressure factors, the effects of climate change are becoming noticeable in the aguadas, as changes in precipitation levels and increased

temperature promote their desiccation (CONANP, 2011), which is expected to continue and intensify under various climate change scenarios.

For the year 2023, the first atmospheric observatory was installed in Calakmul, with the support of the Mexican Space Agency (AEM) and the collaboration of the Institutes of Atmospheric Sciences of the Universidad Nacional Autónoma de México (UNAM) and the National Institute of Ecology and Climate Change of SEMARNAT. It will provide initial data in March 2024. It will serve as a validation point for satellite observations, contributing to the analysis of land observation data from satellite platforms against surface measurements, providing more knowledge about the effects of climate change.

Observatorio Mexicano del Clima y la Composición Atmosférica (OMECCA) will record molecular lines at different wavelengths up to the radiation level to quantify concentrations of greenhouse gases and systematize atmospheric chemistry and its changes in data. Additionally, they concluded that it aims to channel professionals in atmospheric and environmental sciences and engineering towards ecological conservation and monitoring programs for the protection of the population against the effects of climate change.

For this interdisciplinary cooperation on climate, the environment, and the carbon cycle in Mexico, OMECCA will be enriched with data for the validation of OCO-2 and 3 satellites, GOSAT, and Sentinel 5P from the American (NASA), Japanese (JAXA), and European (ESA) space agencies, among others.

The importance of the project in the conservation of the Property is to understand the real role of jungles in absorbing greenhouse gases and quantify the gas exchange that occurs in tropical ecosystems.

### 2.2.3 Research and Monitoring

The National Commission of Natural Protected Areas (CONANP), in collaboration with academic institutions and civil society organizations, conducts research and biodiversity monitoring actions in the Mixed Property, mainly in water bodies and trails, as described below.

#### Monitoring of Aguadas

The Colegio de la Frontera Sur (ECOSUR), together with the organization PRONATURA A.C., and with the support of the Calakmul Biosphere Reserve, have maintained wildlife monitoring associated with water bodies, mainly aguadas and streams, for over 15 years (Figure 8).

Figure 8. Installation of camera traps for recording wildlife associated with aguadas within the Mixed Property.

In 2023, 17 aguadas were monitored using camera traps, where the Central American tapir (*T. bairdii*), jaguar (*P. onca*), great curassow (*C. rubra*), white-lipped peccary (*T. pecari*), and deer (*Odocoileus* and *Mazama*) were frequently recorded (Figure 9). The information from this monitoring has been translated into scientific publications (Seres *et al*., 2022; Jiménez-Sánchez *et al*., 2024; Reyna-Hurtado and Arias Domingues, 2024), presentations at national and international congresses (Sánchez-Pinzón *et al*., 2022), as well as educational and environmental outreach materials (Reyna-Hurtado *et al*., 2022).

Figure 9. Ornate Hawk-Eagle (*Spizaetus ornatus*) on the edge of an aguada within the Mixed Property, Campeche, Mexico. Photograph: Edwin L. Hernández Pérez.

The biological monitoring conducted by ECOSUR is maintained year after year, and based on this, the importance of aguadas for wildlife in the Calakmul region, Campeche, has been revealed (Delgado-Martínez *et al*., 2021a and b; Pérez-Flores *et al*., 2021; Seres *et al*., 2022; Delgado-Martínez *et al*., 2023; Jiménez-Sánchez *et al*., 2024; Reyna-Hurtado and Arias Domínguez, 2024), as well as understanding some movement patterns of emblematic and charismatic species such as the Central American tapir (Reyna-Hurtado *et al*., 2016).

Figure 10. Mother and ocelot cub (*Leopardus pardalis*) in a sarteneja (rock cavity) within the Mixed Property. Photograph: Carlos Delgado Martínez.

The Universidad Nacional Autónoma de México (UNAM), in conjunction with the Universidad Autónoma de Campeche (UACam), have been monitoring fauna since 2023, using cavities in rocks called "sartenejas" and tree cavities known as "dendrotelmata" (Magyar *et al*., 2027); (Figure 10).

Between 2021 and 2024, camera traps have been installed in sartenejas (rock cavities) to assess the usage pattern of these water bodies by birds and mammals. The main objective of this study is to compile a list of fauna species utilizing these sites and evaluate the activity pattern of these species between the dry and rainy seasons (Delgado-Martínez *et al*., 2021 and 2023).

Figure 11. Birds and mammals in water bodies of the Mixed Property. a-b: Aguadas, c-d: Sartenejas (Rock cavities), e-f: Tree cavities. Photographs: Carlos Delgado Martínez. Delgado-Martínez, *et al*. 2023.

Species Conservation

Over the past 20 years, Reyna-Hurtado has conducted research on ungulate ecology and aguadas monitoring. In 2023, in collaboration with WWF, telemetry was used to track an individual of Central American tapir (*Tapirus bairdii*) in RB Calakmul; geographic coordinates were sent through a GPS attached to a radio collar in April 2022.

Through satellite technology, over 200 georeferenced points of the individual were obtained until August 2022. However, tapir tracking continued through camera traps and telemetry efforts until early 2023. The individual was observed in good health on two occasions at water holes located at kilometers 17 and 23 (Fig. 12). Additionally, tourist guides from the Nuevo Conhuas community reported sighting the individual with the radio collar. Finally, on January 25, 2023, the individual was searched for using the VHF antenna, but only the radio collar with the drop-off mechanism activated was found. The day before, a search had been conducted with no signal detected, indicating that the individual visited the site during the night, causing the radio collar to fall off.

Figure 12. Tapir (*Tapirus bairdii*) with a radio collar at a water hole in the Mixed Property. Photograph: Rafael Reyna.

With the generated data, the home range of this tapir individual was estimated (Table 3) using Minimum Convex Polygon methods (Fig. 13), Fixed Kernel Method (Fig. 14), and Autocorrelated Kernel Method (Fig. 15).

| Method | % of Observations | Area (km2) |
|---|---|---|
| Minimum Convex Polygon | 100 | 97.36 |
| Minimum Convex Polygon | 95 | 39.88 |
| Minimum Convex Polygon | 50 | 10.87 |
| Fixed Kernel | 95 | 74.70 |
| Fixed Kernel | 50 | 16.33 |
| Autocorrelated Kernel | 100 | 116.44 |

Table 3. Estimation of the home range of an individual tapir (*Tapirus bairdii*) using different methods.

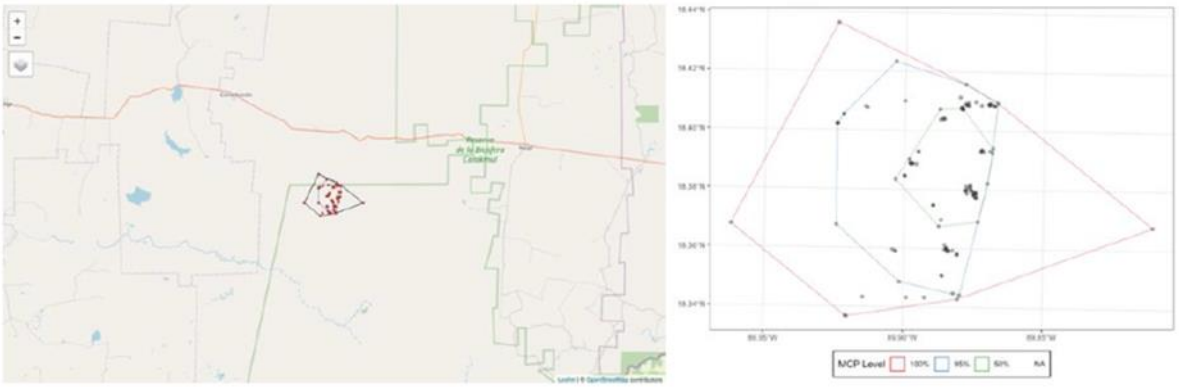


Figure 13. Minimum Convex Polygon at 100, 95, and 50% of tapir (*Tapirus bairdii*) observations in the Mixed Property during 2022

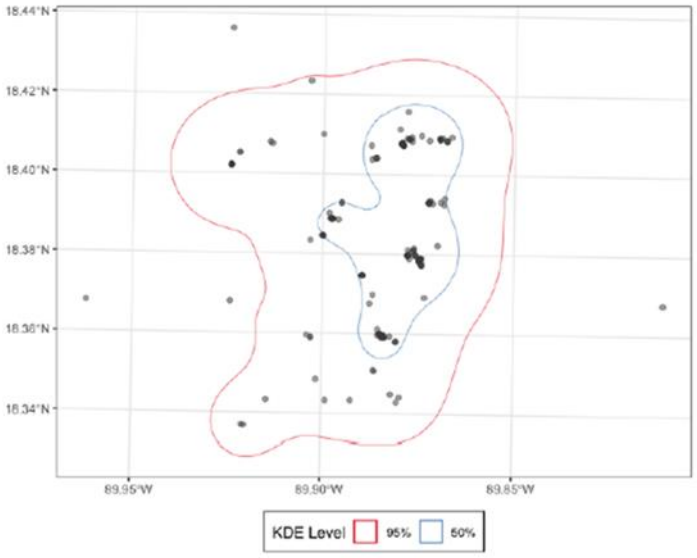



Figure 14. Fixed Kernel at 95 and 50% of tapir (*Tapirus bairdii*) observations in the Mixed Property during 2022.

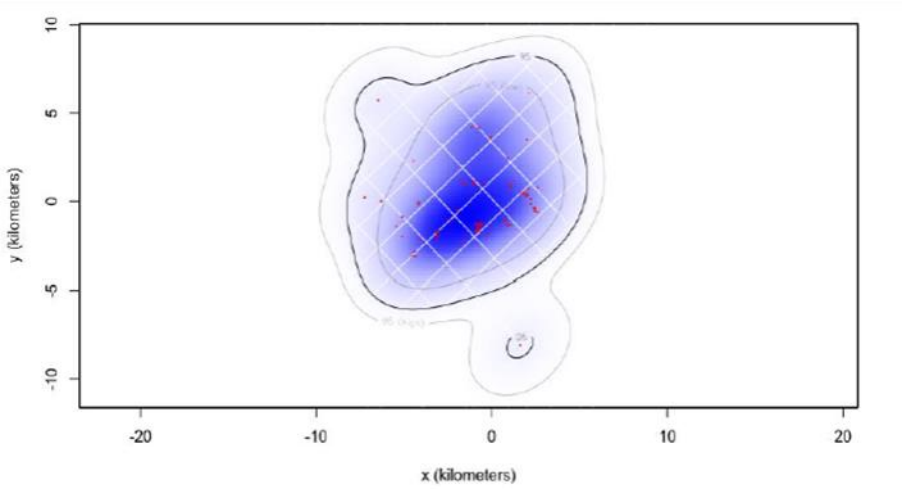



Figure 15. Auto-correlated Kernel at 100% with confidence intervals of tapir (*Tapirus bairdii*) observations in the Mixed Property during 2022.

Reyna and collaborators consider that the most accurate estimation is the fixed Kernel method at 95% and 50% with a home range of 74.7 km² for 95% and 16.3 km² for 50% of observations. It is noteworthy that this individual moved in larger home ranges reported for a Central American tapir, as home ranges of more than 20 km² had not been reported throughout its distribution. These movements could likely be explained by the animals' displacement in search of water.

Trail Monitoring

The international organization Operation Wallacea (OpWal) conducts annual monitoring at various sites within and around the RB Calakmul, during the June-August period.

Figure 16. Spider monkeys (*Ateles geoffroyi*) sighted on one of the monitored trails in the Property. Photograph: Edwin L. Hernández Pérez

In the Mixed Property, it maintains a network of trails where it conducts: footprint counting, installation of camera traps, nets for birds and bats, intensive search for amphibians, reptiles, and primates (Figure 16). The monitoring results by OpWal are shared with Calakmul BR, in addition to the development of undergraduate and postgraduate thesis and scientific publications (Slater 2021; Argudin-Violante *et al*., 2023; Barão-Nóbrega *et al*., 2019, 2020, 2022).

### 2.2.4 Surveillance

#### Calakmul Biosphere Reserve

On September 1, 2023, the modification of the decree of the Calakmul Biosphere Reserve located in the municipalities of Calakmul and Hopelchén, Campeche, was published in the Official Gazette of the Federation (Second publication) (SEMARNAT, 2023). This includes an increase in the protected natural area's surface from 723,185-12-50 ha to 728,908-57-63.13 ha.

> *ARTICLE FIRST.-* The Calakmul, with the character of a biosphere reserve, is declared a natural protected area with a surface of 728,908-57-63.13 hectares (seven hundred twenty-eight thousand nine hundred eight hectares, fifty-seven areas, sixty-three point thirteen centiares), which, according to the Geo-statistical Framework, 2022 version of the National Institute of Statistics and Geography, is located in the municipalities of Hopelchén and Calakmul, state of Campeche. It has three core zones with a total surface of 519,844-12-31.66 hectares (five hundred nineteen thousand eight hundred forty-four hectares, twelve areas, thirty-one point sixty-six centiares), and fourteen buffer zones with a total surface of 209,064-45-31.47 hectares (two hundred nine thousand sixty-four hectares, forty-five areas, thirty-one point forty-seven centiares).

With the support of donations made by the international organization mainly dedicated to the protection of parks and ecosystems in conservation (Global Conservation) to the Mixed Property, from 2021 to 2023, it was possible to hire 10 park rangers who conduct surveillance patrols in areas where there is a higher number of environmental crimes such as illegal logging and poaching within conservation zones.

This region deserves special attention due to its great biological diversity, including over 80% of the plant species throughout the Yucatán Peninsula, as well as 350 bird species and almost 100 mammal species. It is home to several endangered larger vertebrate species in Mexico.

The following are the various patrols and activities conducted in 2023, by month, along with participants and visited locations.

| MONTH | PARTICIPANTS | LOCATION | OBJECTIVE | RESULT |
|---|---|---|---|---|
| **January** | National Guard and CONANP | Supervision in the communities of 11 de mayo, Dos Lagunas Sur, Arroyo Negro, and Pioneros del Río, Municipality of Calakmul. | Detection of illicit activities and dissemination of conservation information | Relevant information is obtained regarding unauthorized entry into the NPA, and surveillance by park rangers is maintained at the mentioned points. |
| **February** | Four Park rangers from Calakmul BR (CONANP), four individuals from SOSETEC and HOLCIM SERVICE | Supervision in the Property in the southern zone of Calakmul BR bordering the community of 11 de mayo | Analyze a 4-hectares area known as 22 de abril, affected by fire and undergoing restoration. | Consideration is given to implementing an ecosystem restoration project. |
| | Park Rangers from Calakmul BR (CONANP) | Supervision of the border area adjacent to Arrollo Negro, Calakmul BR, and Guatemala | Maintain the presence of park ranger personnel at the Guatemalan border limit adjacent to the Mixed Heritage Site. | During supervision tours, community members from Arroyo Negro were engaged to emphasize the importance of conservation. |
| | International Boundary and Water Commission (CILA), CONANP, and CONAP from Guatemala | Mexico-Guatemala coordination for surveillance and supervision at strategic points of Calakmul BR in the Property | Inform about the regulations and guidelines that must be followed while being within a Natural Protected Area (NPA). | The integrity of the protected ecosystem is maintained. |
| | National Guard of Mexico and Calakmul BR (CONANP) | Joint tour in the northern zone of Calakmul BR, from the community of Dos Lagunas Norte, and 3 km along a road entering the BR polygon | Monitor to detect irregular camps and illegal activities. | Presence and surveillance are maintained to eradicate poaching and logging of precious woods protected by NOM-059. |
| | WWF Mexico | Training: human rights and social safeguards-first aid | Strengthening of capacities for Calakmul BR and Balam-Ku personnel and community guards of the ADVC | Trained personnel capable of executing and conducting activities effectively. |
| **March** | Park Rangers ofCalakmul BR (CONANP) | Northern zone of BR starting from the community of Zoh Laguna, towards the community of Porvenir through various trails. | Supervision tour where no recent impacts affecting the integrity of the BR ecosystem were detected. | Presence of park ranger personnel is maintained in areas considered buffer zones. |
| | Biosphere Resources | Trinational surveillance and | Planning, coordination, and | Trinational collaboration of |

| | | | | |
|---|---|---|---|---|
| | Guards from Selva Maya, Program for Belize (RíoBravo); CONANP, CECON, and FUNDAECO from Mexico | supervision. Begins in the community of Arroyo Negro, Mex., bordering Guatemala, and moves to the Xcan Río camp of the Selva Maya Biosphere Reserve, in Guatemala. | feedback to disseminate knowledge, awareness, and environmental education of each of the three countries' agencies to Arroyo Negro and neighboring communities. | institutions sharing a common objective is maintained |
| **April** | Park Rangers Calakmul BR (CONANP) | Monitoring of artificial water troughs located within the Property along the road, from km 20 to km 60 | Monitoring and filling of 20 artificial water troughs with a capacity of 300 liters each, for wildlife, as a mitigation measure against the drought affecting the region. | Wildlife life within the Mixed Property is preserved. |
| | Park Rangers Calakmul BR (CONANP) | Tour of the WH Property, from the surveillance booth at km 20 to the Central Villahermosa booth | Supervision tour over 10 km to verify the presence of people. On this occasion, ejidatarios (community landholders) from Yohaltún were encountered, and they were informed about being in an BR and the existing conservation restrictions. | No actions were detected that would harm the state of the protected ecosystem. |
| | Park Rangers Calakmul BR (CONANP) and personnel from the Global Conservation project | Supervision tour of the Northern Zone of Calakmul BR. Departure from the Zoh-Laguna offices to the town of El Refugio, through the BR. | Permanent supervision and surveillance to reduce the impact of illegal activities, such as logging, hunting, fishing, pollution in water bodies, and accumulation of solid waste, improperly conducted in the core zone of the BR. | No actions were detected that would harm the state of the protected ecosystem. |
| **May** | Eight Park rangers from Calakmul BR (CONANP) and Balam-Ku State Reserve, and 11 resource guards from the Dos Lagunas Biotope Reserve of CONAP, Guatemala | Binational tour Mexico-Guatemala, for patrolling the border line. Departure from booth km 20 located within Calakmul BR and transfer to the Nachtun camp in Guatemala, used | During the border tour, no recent activities considered illicit were observed, favored by the poor road conditions that impeded access. Aguadas (watering holes) were visited: Zapote Bobal, a lively aguada at 70% capacity, constantly | No activities considered illicit and harmful to the state of nature were recorded. |

| | | | | |
|---|---|---|---|---|
| | | by Guatemalan resource guards during their patrols in the border area. | visited by wildlife. La Venada, with an approximate extension of 10 hectares, showed no signs of human presence. Unnamed aguada in Balam-Ku. Finally, back to the Nachtun camp to conclude the patrol. | |
| **June** | | | | |
| | Park Rangers CalakmulBR (CONANP) | Supervision tour of the WHProperty in the southern zone of Calakmul BR. Start of the tour from the Calakmul BR office in the Zoh-Laguna community to the booth at km 20. From there to the Central Villahermosa site, passing through the locations Bonfil, Pared de Reyes, El Blanquizal; Yohaltun, and Paraje Crucero Arroyo Seco. | The objective of the tour was to detect unauthorized activities within Calakmul BR and the World Heritage Site. Perform maintenance activities at the Central Villahermosa. No presence of unauthorized persons in the 430 km tour. | No illicit actions were detected, and surveillance is maintained to preserve the integrity of the protected area. |
| | Secretaría de la Defensa Nacional (SEDENA) and park rangers of Calakmul BR (CONANP) | Tour towards the Central Villahermosa booth in the World Heritage Site, stopping at the archaeological site Pared de Reyes. | Supervision and recognition of archaeological sites to prevent and detect illicit activities. No illicit activities were detected during the tour. | Close collaboration is maintained to carry out surveillance actions in the Mixed Property. |
| | Park Rangers Calakmul BR (CONANP) and WWF personnel | Within Calakmul BR, area bordering the communities of El Refugio and Dos Laguna Norte. | Monitoring and maintenance of 23 trap cameras out of the 28 placed. Information and images collected by trap cameras are analyzed by WWF personnel. | |
| | Park Rangers Calakmul BR (CONANP) | Tour of the southern zone Uxul, in the southern part of | Supervision, finding signs of illicit activity in the Zapote Bombal area, | Illicit activities were found, and evidence was collected for the corresponding |

| | | | | |
|---|---|---|---|---|
| | | Calakmul BR, a World Heritage Site, bordering the state reserve of Balam-Ku, passing through the following points: Esperanza booth, Uxul, and Aguada Zapote Bombal. | logging of four Tzalam trees (Lysiloma latisiliquum); in Uxul, an old archaeological camp, evidence of a camp of poachers of hoatzin, ocelated turkey, and white-tailed deer were observed. | environmental complaint issued to PROFEPA. |
| **July August** | Park Rangers Calakmul BR (CONANP) | Northern zone of the community of El Refugio with trap cameras installed in the locations of Chun.copo and in different places until reaching the Dos Lagunas Norte community. | Accompanying and supporting WWF personnel for the placement of trap cameras installed in the locations of Chun.copo and in different places until reaching the Dos Lagunas Norte community. | Collaboration with the international organization WWF is maintained, and the results obtained through trap cameras placed for a certain period are shared. |
| | Calakmul BR Park Rangers (CONANP) and the Secretary of Environment, Biodiversity, Climate Change, and Energy (SEMABICCE), Campeche Government | Balam-Ku BR proposal, Xtok, None, Los Platanales, and Los Gallitos, Andrés Manuel López Obrador, and Los Galdinos locations | Verification tour of sites with suspected human settlements within the proposed Balam-Ku BR polygon. Presence of park ranger personnel is maintained at vulnerable points. | Presence of park ranger personnel is maintained at vulnerable points. |
| **September** | Calakmul BR Park Rangers (CONANP) and Televisa reporters | Tour within the BR and the Property, to locations such as Caseta km 20, located in the Southern Zone of the RB, providing access to the Calakmul archaeological zone; Central Villahermosa, 13 km from the border with Guatemala and within the Property. | The objective was to document evidence and interview Reserve personnel about the supervision actions carried out by park rangers to protect the Reserve and the Property against illegal activities. | Surveillance and environmental monitoring are maintained on the roads within the zone. |
| | Calakmul BR Park Rangers and Environmental Education Staff | Work with the communities Pioneros del Río, Arroyo Negro, and Justo Sierra | Environmental education activities about the importance of the Selva Maya and the | Involvement of community members to raise awareness about the importance of conserving the |

| | | | | |
|---|---|---|---|---|
| | | Méndez, near the border with Guatemala | BR, and the care they must take to appreciate and enjoy it. | surrounding ecosystem. |
| | Calakmul BR Personnel | Communities Ley de Fomento and Carlos A. Madrazo | Training for community guards in the use of the SMART tool through Cyber Tracker, to obtain data from patrols that can serve as a record of what exists and happens within conservation areas. | Strengthening surveillance in areas considered vulnerable using digital tools to have data supporting inspections and monitoring in the protected area. |
| **October November** | Operational Staff and BR Park Rangers | Communities of Pachuitz, Xmejia, and Chanchen | Supervision tour of PROCODES productive projects. | Involvement of people maintaining the institution's collaboration with communities. |
| | Operational Staff, Calakmul BR Park Rangers, Global Conservation, and Community Guards from the location Once de Mayo | Communities Niños Héroes, Once de Mayo, locations 22 de Abril and Pan Duro, and trails that connect with the BR | Supervision tour in the Property and surrounding communities to prevent and detect illicit activities. No alterations or damage to the natural state of the ecosystem were observed. | In the mentioned points, recovery is ongoing, and no signs of people entering to harm the state of the ecosystem were observed. |
| | Calakmul BR Park Rangers, Global Conservation, and Technical Personnel | La Guadalupe Community | Tour and placement of camera traps on a property to address the report of feline predation. | Immediate attention to prevent actions that may harm the state of the attacking animal. |

Table 4. Surveillance and Illicit Monitoring Tours in the Mixed Property and Calakmul Biosphere Reserve.

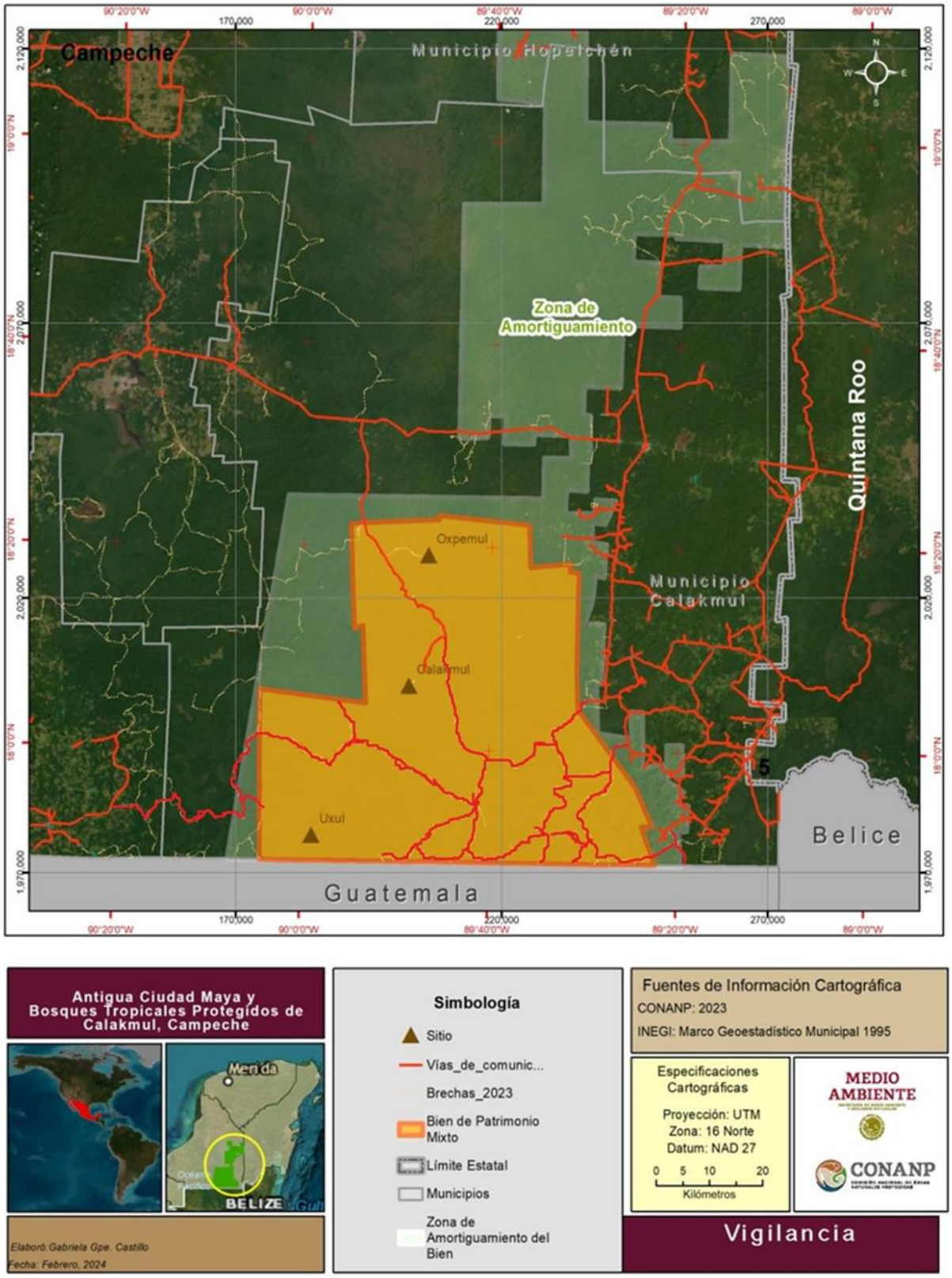



Figure 17. Supervision and surveillance tours on roads and trails in the Mixed Property.

The most relevant data from the supervision and surveillance activities conducted in 2023 are listed, executed by field personnel, yielding various results such as monthly kilometers covered. These serve as a starting point for continuing conservation efforts.

| | |
|---|---|
| Joint Patrols | **2** |
| Patrols (SMART) | **15** |
| Kilometers Covered | **8610** |
| Illicit Activities Recorded | **6** |
| Complaints Filed | **6** |
| Equipped Park Rangers | **32** |
| Received Training Sessions | **4** |
| Number of Trained Individuals | **64** |
| Outreach Materials Distributed | **7** |

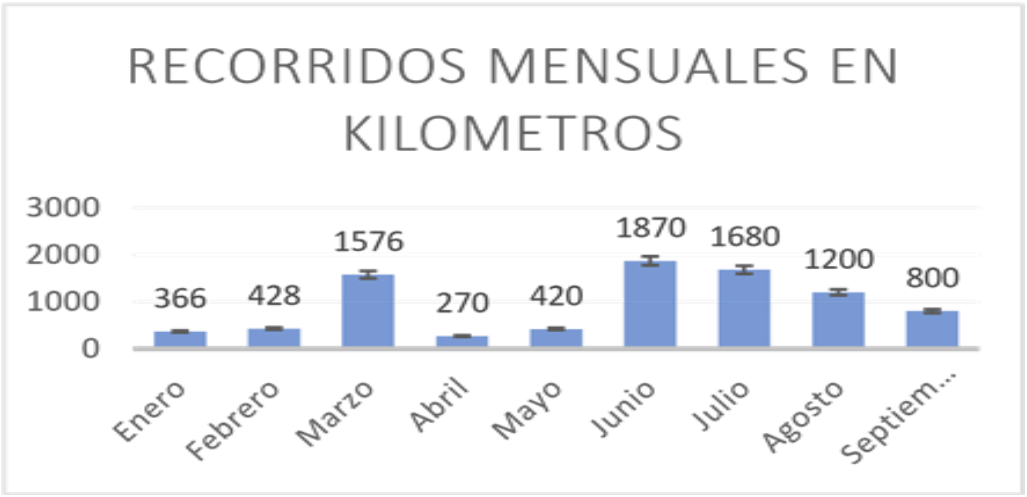



Figure 18. Summary of surveillance actions in the Mixed Property and the Calakmul Biosphere Reserve.

Forest Fires

This report describes the outstanding actions taken to address forest fires by operational area in the year.

In coordinating the various actions for the implementation of the Fire Management Program (FMP) in the state of Campeche in 2023, the Operational Technical Group (OTG) was established, which held two working sessions in

January for annual planning, budgeting, human and material resources, and training provided by different entities. At the suggestion of representatives from Calakmul BR, the burning schedule was adjusted to the dates proposed by farmers in the municipality of Calakmul.

The OTG met in April to address simultaneous forest fires that occurred in Ejido 5 de Febrero, in Laguna Xbonil (800 hectares), and Km 100 (146 hectares) affected, both superficial fires in the municipality of Calakmul. In October, the OTG organized logistical support for the S-211 theoretical and practical course on the use of water and operation of water pumps at the Southeast Regional Fire Management Center (CRMFS) in Castamay, Campeche. Thirty firefighters from the State Incident Management Team (EEMI) participated.

The GTO session in November was held to establish the burning schedule to be implemented in the State of Campeche, as described in the Law for Controlled Burns in the State of Campeche, specifically in CHAPTER II OF REQUIREMENTS AND OBLIGATIONS Article 6, which explicitly states: *In order to prevent and avoid forest fires, owners, possessors, ejidatarios (common land holders), tenants, administrators, and land managers interested in carrying out controlled burns as a method to eliminate dry grass, stubble, or debris from fallow lands, must adopt the following measures beforehand: ...*

> *...VI- Burns must be carried out in the period from March 1 to May 31 of each year and within the hours from 4:00 AM to 11:00 AM, based on the schedule published for this purpose by the Ministry of Rural Development of the State Government, in the Official Gazette of the State, and in two newspapers with the highest circulation in the entity, as well as in other media deemed appropriate. The calendar will mention the appropriate period in various regions of the State*. And to review the polygon of a fire that occurred in the municipality of Champotón and establish coordination for the 2024 season.

The Regional Coordination Technical Group (GTCR) was established in 2021 and is composed of: National Forestry Commission (CONAFOR), Ministry of Environment, Biodiversity, Climate Change, and Energy (SEMABICCE), CONANP, Economic Development Directorate of the Municipal Government of Calakmul, TREN MAYA T7, Ministry of Well-being (Sembrando Vida Program), Civil Protection Directorate of Calakmul, for Forest Fire Response in the Calakmul Region. Its objective is to coordinate actions aimed at fire management established in the Fire Management Plan of the Calakmul-Balam kin - Balam Ku Conservation Complex (NPA under federal jurisdiction) and its area of influence.
In 2023, the GTCR has held multiple sessions to follow up on agreements and activities, including:

- Informational meetings on forest fire prevention in 84 communities in the municipality of Calakmul. Calakmul BR participated by visiting 14 of these communities in coordination with GTCR personnel.
- A working meeting with the Directors of the Calakmul Municipal Government's areas to propose the activation of the Municipal Committee for Protection against Forest Fires. The role of the GTCR in the Municipal

Committee is to provide technical advice in case of any major incidents due to forest fires in the municipal geography.

- A meeting to present the proposal for the Forest Fire Response Protocol, with the participation of 12 individuals (Figure 19).

Figure 19: Meeting on the forest fire response.

The GTCR, with the participation of CONANP, took part in the Session of the Municipal Council for Sustainable Rural Development (CMDRS) for the presentation of the Forest Fire Response Protocol in Calakmul. Simultaneously, there was a request for the reactivation of the Municipal Committee against Forest Fires, under the jurisdiction of the Municipal Government.

On July 11, 2023, the National Day of Forest Firefighters was celebrated with the participation of brigades from CONAFOR, SEMABICCE, Civil Protection Calakmul, Economic Development Directorate of the Municipal Government of Calakmul, Balam Kin-Balam Ku, Calakmul Technological University (UTC), Resources Guard from Guatemala, Rangers from Belize, and Calakmul BR.

A working meeting was held to present the results of the 2023 season, review the burning schedule, and plan extension activities for fire prevention in the 2024 season. Participants included CONAFOR, SEMABICCE, Civil Protection, Sembrando Vida, Municipal Government of Calakmul, and Calakmul BR.

For the response to forest fires in the 2023 season, in February, a request was made to the Yucatan Peninsula and Mexican Caribbean Regional Directorate of CONANP to activate three forest firefighting brigades. The request was authorized in March, and the brigades were established as follows:

Three brigades, each composed of 15 members, in the localities of Dos Lagunas Norte, Xcanha, and Dos Lagunas Sur, with a total budget of $700,000.00 MXN. Each brigade underwent training with the Basic Course for Forest Firefighters over three days (25 hours) in the community of Zohlaguna in April.
The activated brigades conducted physical prevention work on combustible material within the Calakmul BR. An essential aspect of forest fire detection involves monitoring hotspots using the CONABIO Early Fire Alert System [http://incendios.conabio.gob.mx/] in the Calakmul-Balam kin-Balam Ku Conservation Complex (Figures 20 and 21).

Figure 20. Heat points in January – May 2023

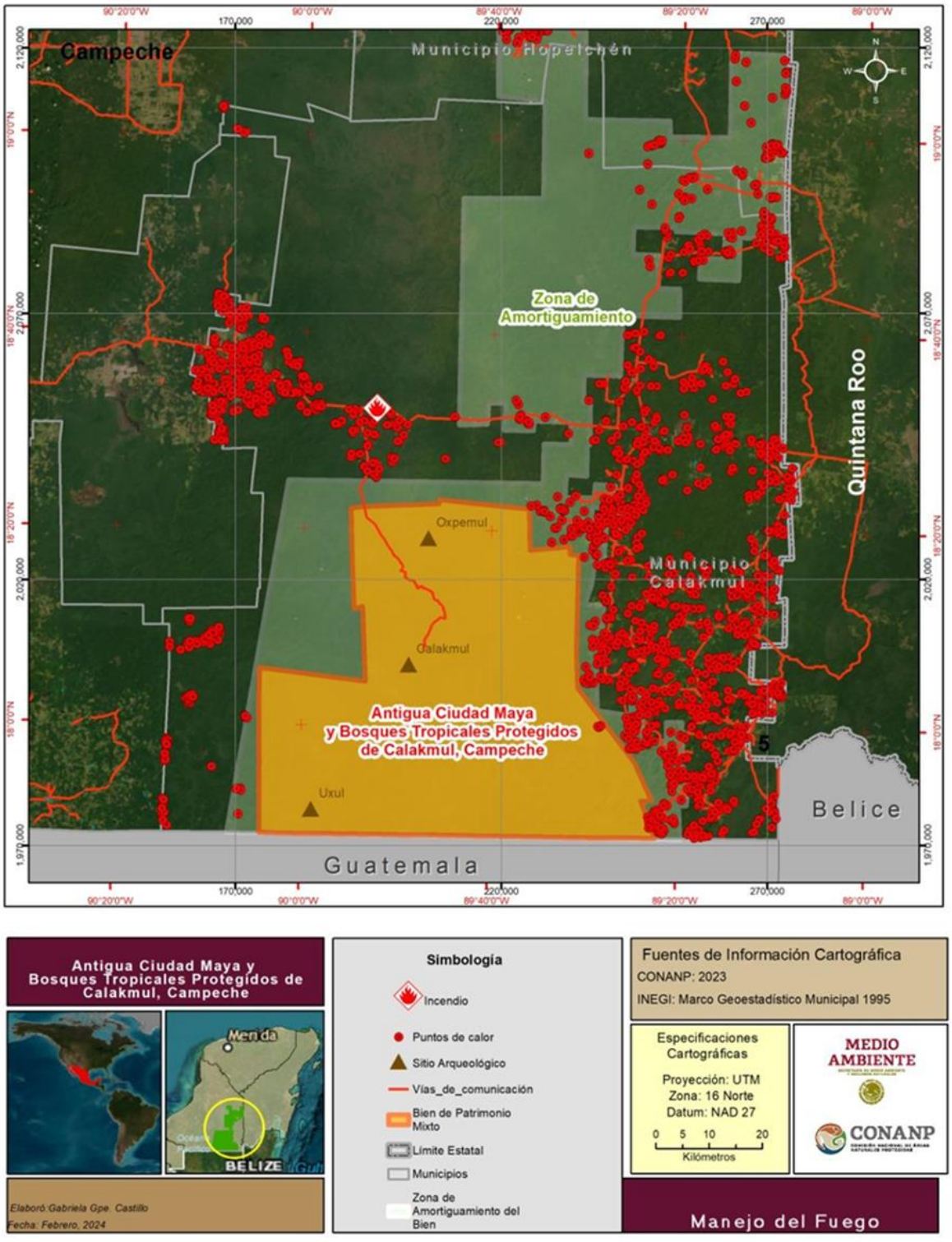



Figure 21. General map of heat points around the Mixed Property in 2023.

This figure provides an overview of heat points detected in the vicinity of the Mixed Property throughout 2023. As illustrated in Table 5, anthropogenic activity related to fire use primarily occurs outside the boundaries of the Property but

within the influence zone of the conservation complex. Only two heat points were recorded within the Property's boundaries, posing no risk of fires.

| Area | March | April | May |
|---|---|---|---|
| **Calakmul BR** | 85 | 147 | 103 |
| **Balam Ku BR** | 168 | 47 | 107 |
| **Balam Kin APFF** | 17 | 364 | 0 |
| **Influence Zone** | 225 | 243 | 450 |
| **Mixed Property** | 0 | 0 | 2 |

Table 5: Heat points in the Calakmul-Balam kin-Balam Ku complex in 2023.

The critical months of drought, spanning from March to May, exhibit the highest number of heat points. Among these, Balam Ku, an NPA located in the southwest of the Calakmul Biosphere Reserve (CBR), records the highest number, particularly in the municipality of Candelaria.

With the information gathered from monitoring, field verification through detection flights is conducted to coordinate response efforts. In April, fires occurred in the forest expansion of the Hopelchén ejido, referred to as km 100, Laguna Xbonil, and Ejido 5 de Febrero, causing considerable damage to lowland tropical forest in the vicinity of the Balam kin NPA. The km 100 forest fire occurred near the Conhuas community in the Hopelchén forest expansion, affecting 146 hectares of subdeciduous lowland tropical forest with species such as *Vitex gaumeri*, *Metopium brownei*, *Bursera simaruba*, *Coccoloba sp*., *Piscidia piscipula*, among others. The undulating topography and stony soil posed challenges in firefighting. It was successfully extinguished in six days, with the participation of 58 firefighters.

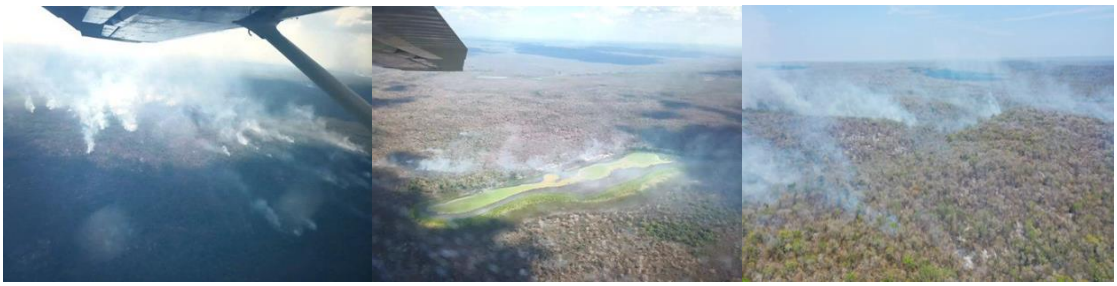


Figure 22: Aerial surveillance of fires outside the Mixed Property.

Figure 23: Community firefighting brigades.

This figure illustrates the community firefighting brigades actively engaged in addressing forest fires. These dedicated teams play a crucial role in combating wildfires and safeguarding the biodiversity-rich areas, including the Calakmul Biosphere Reserve (CBR), Mixed Property, and their surrounding influence zones.

Early Warning System

The Early Warning System functions as a real-time deforestation monitoring tool, utilizing satellite images to indicate daily deforestation activities in the Calakmul region, CBR, Mixed Property, and their Influence Zones. Upon receiving alerts, a thorough verification process is initiated using satellite imagery. If confirmed, on-site verification follows for further monitoring.

In 2023, several deforested areas were identified in the Calakmul region, specifically in the northern part of the CBR, located outside and at a distance from the Mixed Property.

### 2.2.5 Education and Outreach

**Objective:** To serve as an instrument directing efforts to sensitize, raise awareness, educate, and mobilize individual and collective initiatives, aiming at

establishing sustainable development in the Selva Maya. Specific objectives focus on providing methodological guidelines for the design and prioritization of short and medium-term actions with different target audiences. Additionally, tools are offered to evaluate the impact of implemented actions on the territory and the fulfillment of set goals for the program.

The aim is to promote awareness of socio-environmental issues in the area, fostering responsible and environmentally respectful habits and attitudes. This, in turn, encourages behaviors conducive to environmental preservation and rational use. To achieve this, 10 thematic priority axes have been identified (Figure 24), reflecting both the most significant needs and issues to address in the Mixed Property.

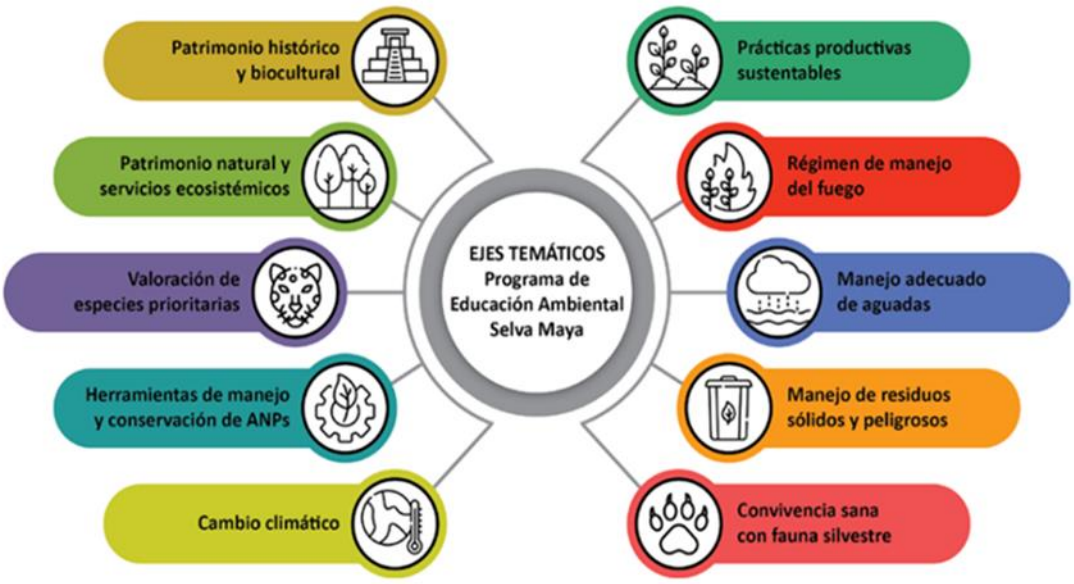



Figure 24. Thematic Axes for environmental education in the Influence Area of the Mixed Property.

Various educational activities were carried out to highlight the environmental services provided by the reserve, the threats, their origin and effects, as shown in Table 6.

| TOPIC | ACTIVITY | COMMUNITIES | NUMBER OF SCHOOLS | TOTAL CHILDREN |
|---|---|---|---|---|
| Proper management of aguadas | Tour of aguadas, local wildlife observation, drawings of animals, and discussion on the importance of aguadas management. | -Dos Lagunas Norte<br>-Nuevo Becal<br>-Nueva Vida<br>-El Refugio | 4 | 88 |

| | | | | |
|---|---|---|---|---|
| Natural Heritage of the Selva Maya | Discussion on the importance of the rainforest and reforestation in primary schools. | -Ley de Fomento Agropecuario<br>-Once de Mayo | 2 | 126 |
| Historical Heritage | Workshop on the most important archaeological sites in Calakmul. | -Xpujil<br>-El porvenir<br>-Valentín G. Farías<br>-Heriberto Jara<br>-Eugenio Echeverría Castellot II | 4 | 174 |
| Healthy Coexistence with Wildlife | Workshop on rainforest (jungle) species, recreational activity "Dress Your Jaguar Warrior, the Guardian of the rainforest," and decoration of wildlife masks. | -Dos Lagunas Sur<br>-Arroyo Negro<br>-Pioneros del Río<br>-Crescencio Rejón | 4 | 154 |
| Tools for Management and Conservation of NPAs | Workshops on Natural Protected Areas. | -Arroyo Negro<br>-Pioneros del Río | 2 | 73 |
| Valuation of Priority Species | Discussion on the importance of the Jaguar and its coexistence in rural communities and the "Jaguar's Spots" activity. | -La moza | 1 | 20 |
| **Total** | | | **17** | **635** |

Table 6. Environmental Education Activities.

Additionally, the geographical distribution of these activities in the communities of the influence area of the Mixed Property is illustrated in Figure 25. Furthermore, diverse activities conducted in the community can be observed in Figure 26.

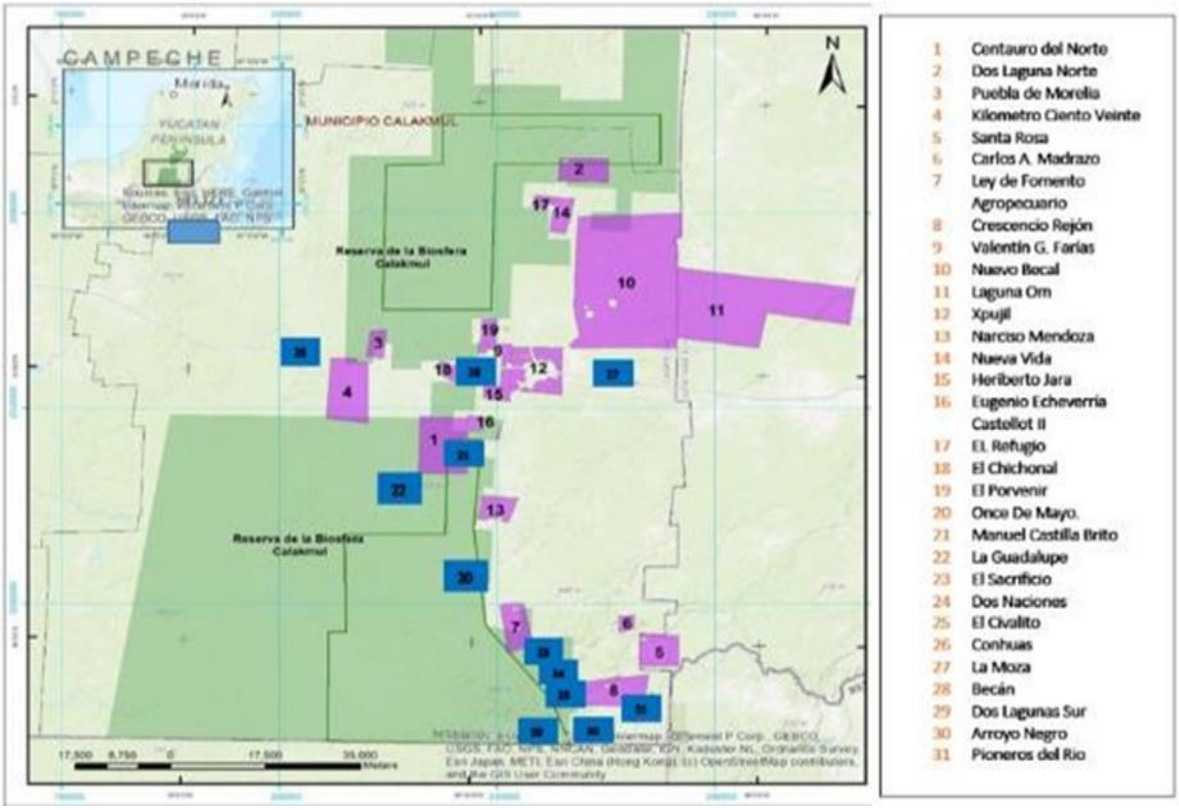


Figure 25. Communities for environmental education attention.


Figure 26. Environmental education activities in primary schools.

Summer Course 2023.

“Jaguar Warriors in Action, Protecting the rainforest".

Objective: Provide children with the opportunity to acquire knowledge and skills in a short period in an informal and entertaining environment, adopting responsible and respectful habits and attitudes towards the environment. The summer course took place from August 7th to 11th, 2023, at the Reserve's office pavilion in Xpujil. The course had 35 attendees, and the following topics and activities were covered:


Figure 27. Summer course 2023.

During the summer course 2023, the children and adolescents successfully learned about the importance of caring for and protecting our jungle and the species that inhabit it. Part of the work conducted aimed to promote the conservation of species, teaching and raising awareness about the individual and collective effort required to safeguard our natural heritage.

At the end of the summer course, each participant received gift kits and a certificate for completing the "Jaguar Warriors in Action, Protecting the rainforest" Summer Course.

Reserve Movies Marathon

Objective: Sensitize children to global and local environmental issues through movies, incorporating traditions, customs, and environmental strategies. The goal is to make them feel part of the conservation and preservation of our natural and cultural resources. The movies marathon week took place from August 14th to 18th at the Reserve's Pavilion in Xpujil, Calakmul.

National Conservation Week

Objective: Raise awareness among the population about the importance of conserving and preserving the nature of our country, with a strong emphasis on Natural Protected Areas.

In 2023, 8 communities and 584 individuals actively participated in conservation efforts within their territories.

Throughout the year, collaboration with local institutions was instrumental in promoting awareness and appreciation for the natural and cultural protection of the Mixed roperty. This involvement extended to events such as:

- National Bee Fair in Calakmul "Cuidemos la Selva".

- Organized by Fondo para la Paz and institutions including Save the Children, Pronatura, Hacienda Mundo Maya, H. Ayuntamiento de Calakmul, University of Calakmul, Sembrando Vida, Calakmul Biosphere Reserve, Red Cross, municipal delegation, and local artisans.

- Artisan exhibitions featuring honey-derived products, swarms, honey product projects, dishes, lectures, crafting bee figures from recycled materials, and drawing contests were part of the event.

Figure 28. National Bee Fair Event.

The conservation of native species from Mesoamerica, such as corn, beans, tomatoes, among others, were also promoted through the 2nd Festival of Traditional and Cultural Food.

The festival involved the participation of Estación Juventud Laklum Castilla, Estación Juventud "Nuscaa", Km 120 Youth, Gender, and Environmental Practices A.C. in collaboration with various government agencies, academic institutions, and civil society organizations. The event highlighted the significance of traditional food in cultural, environmental, social, economic, and health aspects in a municipality as biodiverse and multicultural as Calakmul.

Activities included a gastronomic exhibition, field products showcase, cultural events, workshops, and the sale of regional food and preparations.


Figure 29. Agroecology Forum at Calakmul Technological University.

Strengthening Cooperative Work

The Environmental Safety, Energy, and Environment Agency (ASEA), in collaboration with CECADESU, conducted environmental education actions through primary and preschool teachers and institutions working in the Conhuas community. The goal was to strengthen organization, care, and conservation of the territory. The activities included training in cooperative work and cooperativism, and a community environmental fair.

Figure 30 Strengthening community cooperative work in Conhuas.

2.2.6 Sustainable Tourism

Strategies are in place to implement low-impact tourism. Alongside training, visitor monitoring, and precautionary planning for potential growth in demand for visits to the site, efforts are directed towards enhancing the quality of the experience and protecting the Outstanding Universal Value (VUE).

The strategies Calakmul BR employs to reinforce sustainable tourism include the following:

- Creation of the Public Use Program.
- Monitoring of the influx of tourists in accordance with the current acceptable exchange limit study (ELCA).
- Update of the acceptable change limit study, including indicators related to fauna.
- Strengthening of enterprises related to tourism activity, such as handicrafts, food, lodging services, food and transport.

The following tables summarize the actions implemented in each strategy mentioned above:

| **Creation of the Public Use Program** | |
|---|---|
| Public use diagnosis in Calakmul BR | ● - Tourist trails within the NPA.<br>● - Infrastructure and equipment for public use.<br>● - Regulations in areas designated for public use.<br>● - Tourist service providers.<br>● - Signage within the natural protected area. |
| Construcción del Programa de Uso Público | ● - Incorporation of information from the diagnosis (identification of priority resources, zoning, management strategies).<br>● - Workshops with core group.<br>● Review workshop. |
| Indicadores de Efectividad | ● Define effectiveness indicators based on information obtained in the diagnosis and construction of the public use program. |

Table 7. Actions of the Public Use program

| **Monitoring tourist inflow according to current ELCA** | |
|---|---|
| Monitoring the influx of visitors to the El Ramonal trail | ● Winter (December-January) for 30 days<br>● Easter for 30 days<br>● Summer (July-August) for 30 days |
| Monitoring speed limits on the road to the Calakmul archaeological site | ● Winter (December-January) for 30 days<br>● Easter for 30 days<br>● Summer (July-August) for 30 days. |

Table 8. Tourist Inflow Monitoring.

| **Update of the Study of acceptable change Limit (ELCA)** |
|---|
| -Incorporation of proposals for the conditioning of old roads for use as tourist trails.<br>-Integration of indexes of abundance, richness, and diversity in the criteria for calculating carrying capacity and acceptable change limits, through monitoring fauna in current and proposed trails.<br>-Verification of physical characteristics used in the current ELCA. |

Table 9. Activities for the update of ELCA

| **Strengthening entrepreneurship related to tourism activity** | |
|---|---|
| Sustainable Business Catalog of the Calakmul Biosphere Reserve | ● Updating the database of businesses<br>● Inviting, and strengthening new ventures<br>● Promoting the strategy and businesses at fairs and conferences. |
| Calakmul Collective Seal | ● Recertifications and new certifications<br>● Sales points for certified products<br>● Guidance to enterprises for their certification |
| National Catalog of Sustainable Products from Natural Protected Areas 2024 | • Collaboration with the Strategy Directorate for Institutional Strengthening (DEFI). |

Table 10. Strengthening entrepreneurship related to tourism Activity

Visitor Monitoring

For the past eleven years, visitor monitoring has been conducted for those entering the Calakmul Biosphere Reserve (Calakmul BR). Park rangers conduct this action through a daily record of controlled entries at the surveillance booth located at kilometer 20 on the road to the Calakmul archaeological site, infrastructure located within the World Heritage Site.


Figure 31. Surveillance booth located at kilometer 20.

As a result of the monitoring, an increase in the number of visitors has been observed. Based on the 14,449 visitors recorded in 2012, there has been a significant rise to 51,447 visitors in 2023, representing an approximate increase of 252%. Additionally, there has been an average annual growth of 45% over the eleven years of recorded data.

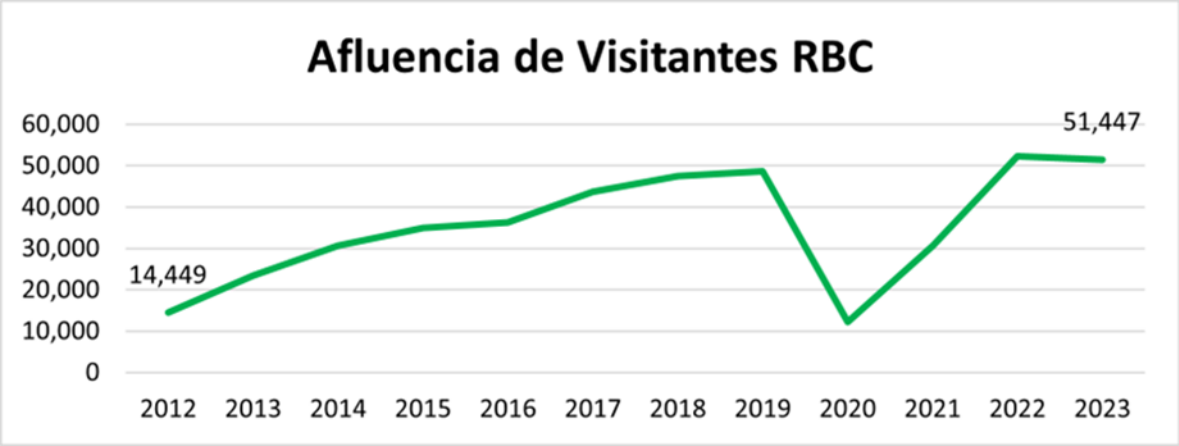



Figure 32: Visitor attendance at Calakmul BR over 11 years

In 2023, the following revenues were recorded:


Figure 33. Inflow of individuals to the Calakmul Biosphere Reserve in 2023.

Thanks to monitoring within the property, it has been identified that foreign visitors are on the rise, with an average annual increase of 27%, while national visitors show a 33% average annual increase.


Figure 34. National and international visitors over 11 years in the Mixed Property and the Calakmul Biosphere Reserve (CBR).

Fee Collection

As a regulation measure for visitor access to the Natural Protected Areas (NPA), fees are charged for entry, following the Federal Law of Fees Art. 198 Frac. I, and Annex 19 of the Miscellaneous Fiscal Resolution for 2023 (D.O.F. November 13, 2023), which states:

> *"For the non-extractive use or enjoyment of natural and scenic elements carried out in the marine, island, and terrestrial Natural Protected Areas subject to the public domain regime of the Federation, derived from recreational, tourist, and sports activities such as autonomous diving, free diving, water skiing, tours in motorized and non-motorized boats, observation of marine fauna in general, sports fishing in any of its modalities, navigation in seas, channels, estuaries, and coastal lagoons, cycling, horseback riding, rappelling, mountaineering, hiking, high mountain activities, camping, overnight stays, birdwatching, and other wild fauna and flora observation, spelunking, rock climbing, guided and unguided tours, river descents, use of kayaks and other rowing or motorized boats, and motorized vehicle tours, fees will be paid... Per person, per day, for each Natural Protected Area considered as having a low carrying capacity due to the high vulnerability and fragility of its ecosystems."*

For approximately 17 years, an ejidal fee has been established to provide access to the property's polygon by using roads that cross through Conhuas ejido lands. For six years, the municipality of Calakmul collected the fee; however, since 2012, the Conhuas ejido has managed this resource.

By agreement between the administration of the Calakmul Biosphere Reserve and representatives of the Conhuas ejido, for the past two years, the ejido has supported fee collection to access the natural protected area at the booth located at km 0. This is also where the ejidal fee is collected, and tourist information is provided to visitors.

In this dynamic, the ejido submits a weekly report to the National Commission of Natural Protected Areas (CONANP) to report income and the sale of CONANP wristbands. As a second checkpoint, at the booth located at km 20, Calakmul Biosphere Reserve personnel verify that all visitors wear wristbands, maintaining

a record. In the event of a visitor without a wristband, park rangers have wristbands available to collect the fee.


Figure 35. Informative banners at the booth at km 0

Trails and Limit of Acceptable Change Study (ELCA)

There are open trails for visitors to enter and observe nature, showcasing natural values such as representative flora and fauna.

It has been observed that the trail at km 27, known as El Ramonal, experiences the highest influx. Therefore, three monitoring sessions are conducted throughout the year during vacation periods: Winter (December-January), Holy Week (March-April), and Summer (July-August). The purpose is to confirm that the carrying capacity determined by the Limit of Acceptable Change Study (ELCA, 2018) and established in the Management Plan of the World Heritage Property, is not exceeded.

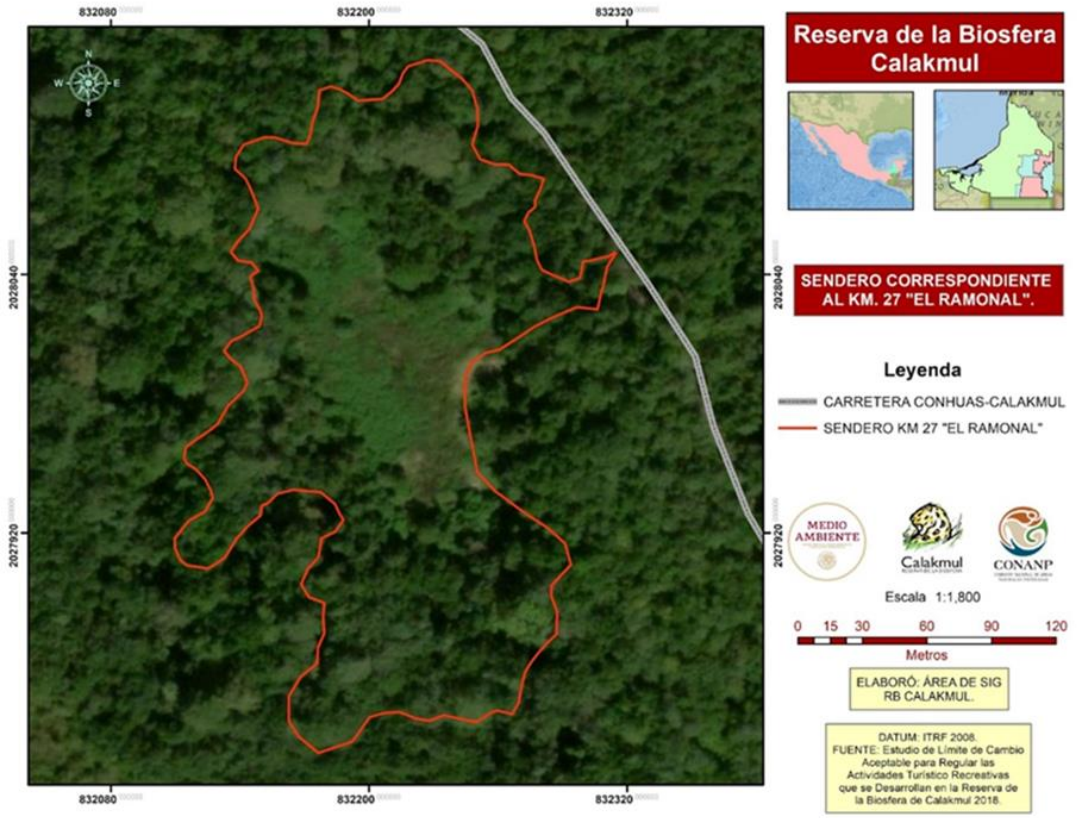



Figure 36. Map of the trail at km 27 El Ramonal.

The Limit of Acceptable Change Study (ELCA) establishes that the maximum intensity of use under desirable site conditions is 301 visits per day for the El Ramonal trail. This translates to 9,030 visits per month, and it is recommended to manage groups of up to 12 people with one guide. Over three years of monitoring on the El Ramonal Trail, this limit has not been reached, as it has had an average visitation of 6% of its total capacity, equivalent to 558 visitors.

Figure 37. ELCA Monitoring July-August 2023

Figure 38. ELCA Monitoring December 2023 – January 2024

As a proactive planning measure in anticipation of the expected growth in visitor demand in the coming years, there is a pursuit to expand the number of interpretative trails through the conditioning, recovery, and/or restoration of the old paths used for activities before the decreed of the Calakmul Biosphere Reserve (RBC), mainly by chicle gatherers and/or loggers.

These proposals for the development of tourist trails are designed and established in collaboration with local tourist guides, involving participatory workshops and field visits. Additionally, they will be supported by a Limit of Acceptable Change Study and carrying capacity assessment.

Figure 39. Workshop with Local Tour Guides

Figure 40. Trail Walkthrough

As a result, proposals for ten trails are prepared, and their locations are:

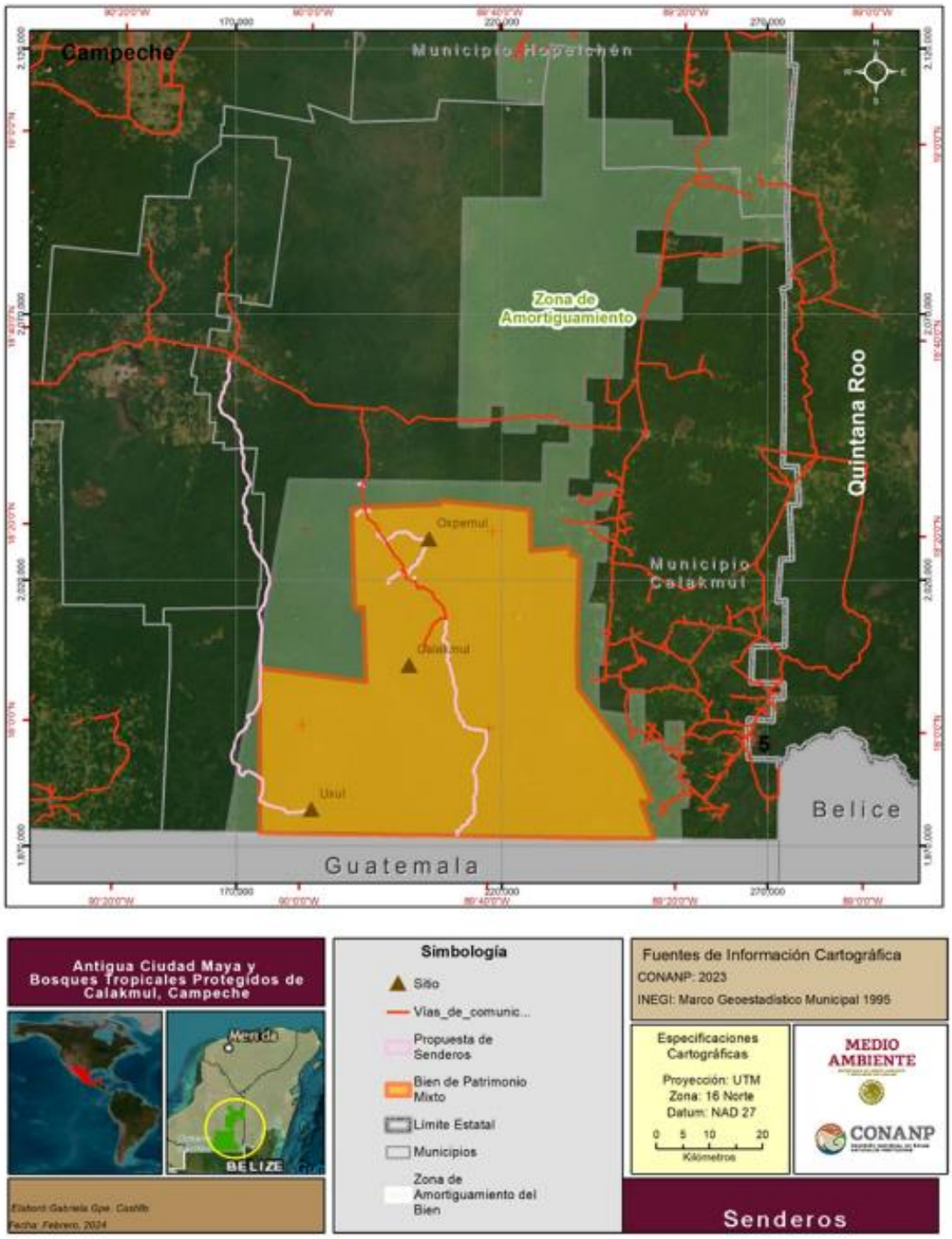



Figure 41. Proposals for trails within the polygon of the Mixed Property and the Calakmul Biosphere Reserve (CBR).

For calculating the carrying capacity on the new trails, in collaboration with the organization PRONATURA Península de Yucatán A.C., a monitoring system was established using fifteen camera traps to incorporate diversity, richness, and abundance indexes. The aim is to continue collecting this data for six months to achieve a more representative sample.

Figure 42. Placement of camera traps for the ELCA update.

Sustainable Businesses

As part of the strategies to promote sustainable tourism, the sustainable use of resources in the communities surrounding the Calakmul Biosphere Reserve (Calakmul BR) is encouraged.

The goal is to encourage the development and professionalization of local enterprises, fostering their businesses and/or brands under sustainability frameworks. Since 2021, efforts have been underway to conduct business diagnostics, gathering information on the operations, weaknesses, strengths, and procedures of these enterprises. In a subsequent stage, business plans for 16 enterprises will be developed:

- Artesanías Jade
- Cabañas Calakmul
- Chile Gelipe
- El Hormiguero
- La Peña de Horeb
- Meliyik
- Miel Selva Tropical (La Floración de la Naturaleza Maya)
- Mujeres de Ramon de Nuevo Becal
- Raíz del Futuro
- Restaurante “La Selva”
- Transporte Turístico Ciudad Maya
- Tuumben Kab
- Valentín Natural
- Velas Aromáticas
- Vivero “El Paraíso”
- Xanic
- Neek Ich Che

Figure 43. Interview with members of the Miel Selva Tropical enterprise

The strengthening of enterprises continues, and currently, efforts are being directed towards promoting their products in new sales points and obtaining the Sello Colectivo Calakmul (Collective Seal Calakmul) certification.

Sello Colectivo Calakmul

This local certification provides assurance to buyers that the products they acquire meet sustainability criteria, evaluating aspects of governance, local economy, and environmental responsibility.

There is an ongoing effort to renew the validity of enterprises that already held the certification, and an invitation has been extended for new enterprises to undergo the certification process. A total of 17 enterprises are currently being worked with, two of which already possess the certification, while the rest are new applicants.

The following table presents the enterprises interested in certification:

Figure 44. Sello Colectivo Calakmul meeting with Local enterprises

Marketing Strategies and Sales Points.

The sales process is crucial for the consolidation of enterprises. In this regard, efforts have been made to increase the visibility and availability of Calakmul's local products.

Currently, marketing agreements have been finalized for five enterprises to send their products to the CONANP central offices in Mexico City and to the natural protected areas products store of CONANP in the Islas Marías Biosphere Reserve. The enterprises involved are Chiles Gelipe, Miel Selva Tropical, Miel Reselva, Chicles Chicza y Velas Aromáticas Butz'an yik Cantela.

Additionally, negotiations are ongoing for the following sales points:

| **Sales Points** | |
|---|---|
| Well-being Gas Station Conhuas | Agreement finalized; designated space at the gas station for Sello Colectivo Calakmul products. |
| UNAM Store | In the process of establishing a connection between UNAM store administrators and enterprises meeting the requirements for marketing. |
| Visitor Attention Center (CATVI) Calakmul | In collaboration with Directorate of Strategies for Institutional Strengthening (DEFI-CONANP), a connection is being established to request a space at CATVI Calakmul. |

Table 11. Points of sale for sustainable products

In 2023, participation took place in three national events to present the Sustainable Business strategy, with the aim of promoting regional enterprises:

First Fair of Honey, Coffee, and Cocoa.

It was held in Mexico City, where two enterprises were supported to showcase their products and raise awareness. Specifically, Miel Selva Tropical and Reselva participated. Each presented an explanation of their enterprises and product sales. Additionally, Reselva conducted a tasting session covering topics related to apicultural activities such as flowering types, harvesting periods, coloration, and consistency.

Figure 45. Sale of products at the First Fair

Figure 46. Honey Tasting at the First Fair.

Second Fair of Iztapalapa with Crafts and Food Products

Held in Mexico City, two ventures, El Artesano Sabio and La Peña de Horeb, took part. Both ventures set up a booth showcasing their products and engaged in discussions about their manufacturing processes.

Figure 47. Product sales at the Second Fair

Figure 48. Exhibition of entrepreneurships at the Second Fair

Second Mexican Forum of IUCN: “Roots of territorial sustainability of the peoples of Mexico. Indigenous Peoples, Gender, and Youths”

Lasting for three days, an entrepreneurial meeting and exchange of experiences took place as part of the market modality in the Second Forum. The aim of participating in this modality was to promote the two main strategies for sustainable resource use in the communities within the influence area of the Mixed Property: the “Sustainable Businesses” catalog and the ”Sello Colectivo Calakmul”. Additionally, the goal was to continue building channels for marketing and promoting the ventures that are part of both strategies.

Products from nine ventures were showcased, including La Peña de Horeb, Miel Selva Tropical, Reselva, Chizca, Chiles Gelipe, Meliyik, El Artesano Sabio, Flor de Tajonal, and Butz'an yik Cantela (Aromatic Candles).

Figure 49. Exhibition at the Second Mexican Forum of IUCN

Figure 50. Calakmul booth at the Second Mexican Forum of IUCN

In collaboration with the Directorate of Strategies for Institutional Strengthening of CONANP, support was provided with information from 20 ventures to be included in the National Catalog of Sustainable Products of Natural Protected Areas 2024. This effort contributes to the dissemination of ventures

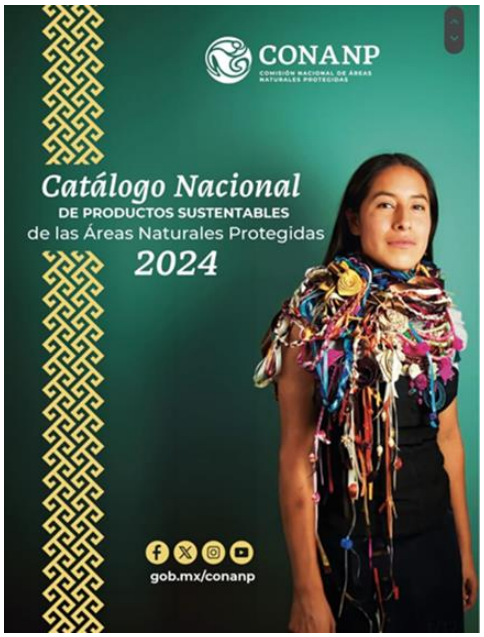


Figure 51. National Catalog of Sustainable Products from Natural Protected Areas 2024

2.2.7 Subsidy Programs

Sustainable Development Program (PROCODES) 2023

The Conservation Program for Sustainable Development (PROCODES) is an instrument of public policy that promotes the conservation of ecosystems and biodiversity. It involves the direct and effective participation of the local population in territory management processes, sustainable use of resources, protection and restoration of ecosystems, and economic valuation of environmental services provided to society. The goal is to generate alternative productive opportunities and contribute to improving the quality of life of inhabitants in Natural Protected Areas and their Influence Zones.

PROCODES aims to encourage people living in Natural Protected Areas and their influence zones to use natural resources and biodiversity sustainably.

It offers four types of support*:

- Projects: Financial support to promote the sustainable use of biodiversity and natural resources through the development of sustainable productive activities and ecosystem restoration actions for productive purposes.
- Training Courses: Financial support for conducting training courses and/or workshops on conservation and sustainable development action lines.
- Technical Studies: Financial support for the development of studies that serve as planning, programming, and evaluation tools related to strategies

and action lines for sustainable development in localities located in Natural Protected Areas and their influence zones.
- Environmental Contingency Brigades: Financial support for the prevention, mitigation, and restoration of risk situations arising from forest fires, earthquakes, human activities, or natural phenomena that endanger ecosystem integrity.

Regarding the benefits of subsidies in the Mixed Property, it is considered that they help mitigate pressure on it by promoting sustainable productive alternatives. This, in turn, reduces certain threats such as invasions due to agricultural and livestock activities, extraction of forest resources, and wildlife, by contributing to the training on the sustainable use and exploitation of natural resources on the outskirts of the Mixed Property. This generates family income, fostering the well-being of the population in the communities bordering it.

Within the Conservation Program for Sustainable Development, a total of 135 projects were supported in 2023, amounting to $16,974,954.00 MXN, benefiting populations in 54 communities through three calls:

- 82 projects in the national call
- 45 in the territorial call
- 8 in the agrobiodiversity call

The financial resources allocated by areas were as follows:

- Apiculture: $8,877,304.00 (52%)
- Agrobiodiversity: $2,857,820.00 (17%)
- Soil conservation and restoration: $1,596,000.00 (9%)
- Forest and agroforestry plantations: $1,173,000.00 (7%)
- Ecotourism projects: $1,000,000.00 (6%)
- Stone-dammed reservoirs: $600,000.00 (4%)
- Others: $870,000.00 (5%)

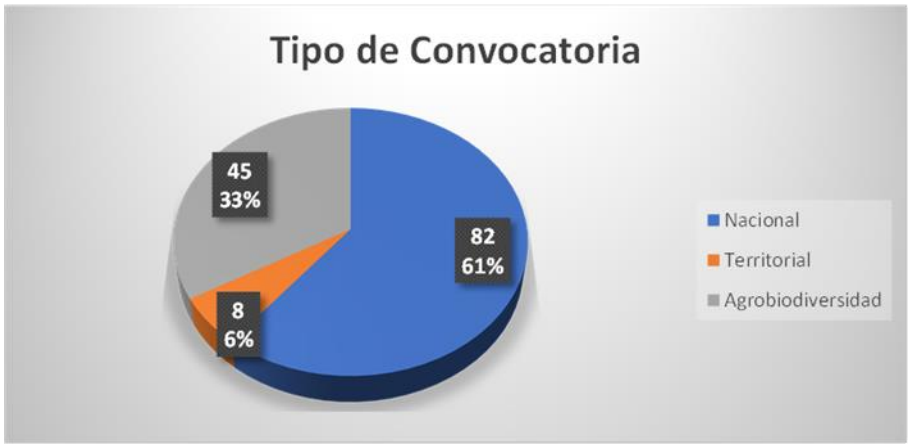


Figure 52. Distribution of projects by call

A) Regarding the first call, known as National, 82 projects were supported with an amount of $12,383,154.00. The support concepts were:

- 45 productive projects
- 36 ecosystem restoration projects with productive purposes
- 1 management

Broken down into the following areas of support:

- 40 establishment of apiaries
- 19 conservations of agrobiodiversity
- 8 soil restoration
- 4 forest plantations
- 3 ecotourism projects
- 2 enrichments of secondary plant communities (so called *acahuales*)
- 2 dressed stone weirs.
- 1 certification of guides
- 1 tool for tourism management
- 1 works for water management and capture
- 1 soil recovery for productive use

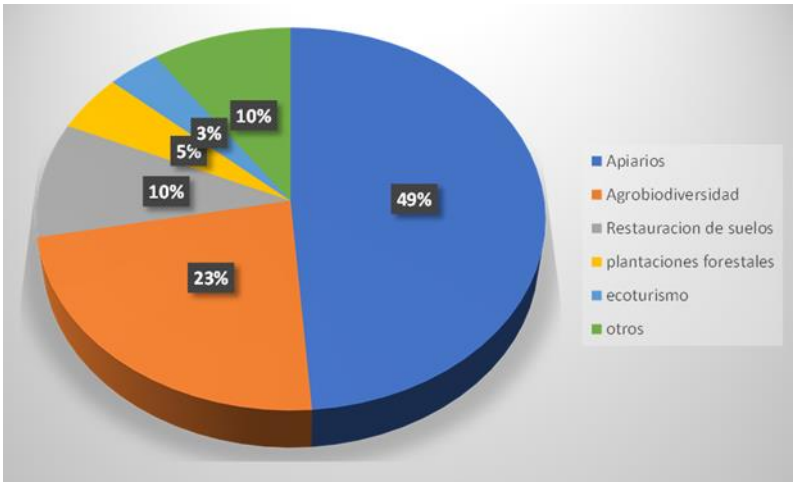


Figure 53. Category of PROCODES projects

B) Regarding the second call, known as Territorial, 45 projects were supported with an amount of $3,491,800.00, distributed across the following concepts:

- 32 productive projects
- 8 for the application of new technologies
- 5 for restoration with productive purposes

Broken down into the following areas:

- 26 establishment of apiaries

- 8 conservation and sustainable use of soil
- 4 agroforestry plantations
- 3 ecotourism projects
- 3 workshops for transformation
- 1 works for water management and capture

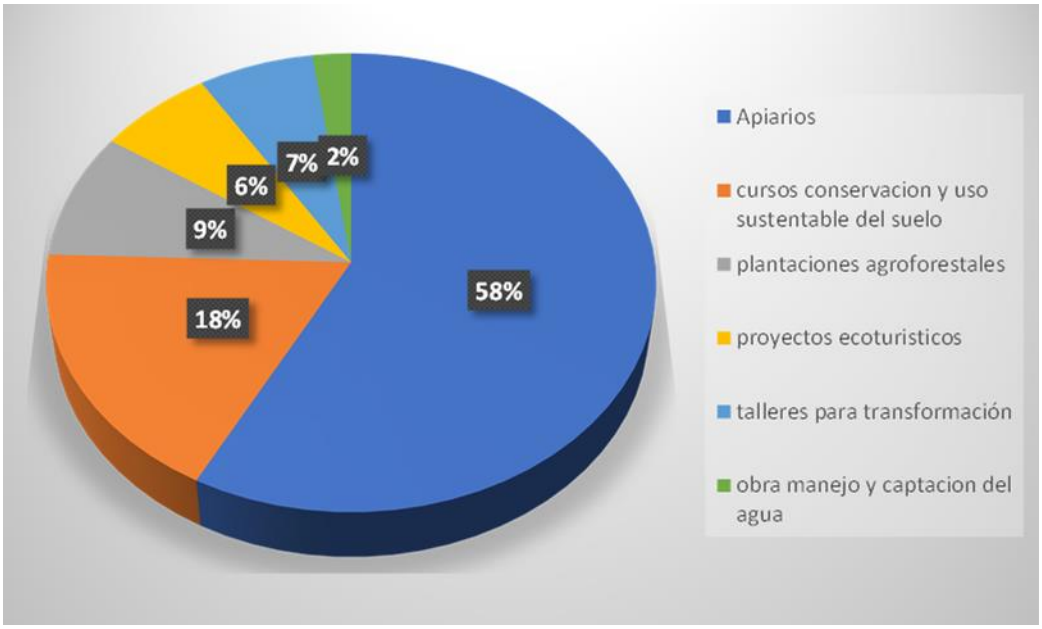



Figure 54. Percentage of Financed Projects

C) Regarding the Agrobiodiversity call, eight projects were supported with an amount of $1,100,000.00 MXN.

A total of 1,735 people benefited, including 881 (51%) women and 854 (49%) men, belonging to 54 communities. Of these, only Conhuás has a direct impact on the Mixed Property, and 11 communities have an indirect impact: Concepción, Km 120, Emiliano Zapata, Centauro del Norte, Ricardo Payró, Narciso Mendoza, La Guadalupe, Once de Mayo, El Sacrificio, Ley de Fomento, and Dos Lagunas Sur. Of the beneficiaries, 768 women and 736 men are indigenous, and 391 (22.5%) are young individuals (228 women and 163 men). Of the 135 supported projects, 122 were allocated to organized groups belonging to indigenous peoples, including 90 Choles, 25 Mayas, six Tzeltales, one Tsotsil, one Chontal from Tabasco, and 12 that do not identify as indigenous peoples.

| **PROCODES 2023** | | | | | | |
|---|---|---|---|---|---|---|
| SUBSIDY | Authorized Amount | Authorized Projects | Communities benefited | Men benefited | Women benefited | Technical staff |
| PROCODES NATIONAL | $12'383,154.00 | 82 | 39 | 532 | 558 | 4 |

| | | | | | | |
|---|---|---|---|---|---|---|
| PROCODES TERRITORIAL | 3’491,800.00 | 45 | 34 | 211 | 219 | 4 |
| PROCODES AGROBIODIVERS-ITY | $1,100,000.00 | 8 | 5 | 111 | 104 | 4 |
| TOTAL | $16’974,954.00 | 135 | 54 | 854 | 881 | 4 |

Table 12. Total projects and beneficiaries with PROCODES

The Program for the Protection and Restoration of Priority Ecosystems and Species (PROREST), like PROCODES, is an instrument of public policy. It promotes the protection and restoration of ecosystems in the Natural Protected Areas (NPA), as well as biodiversity conservation through the participation and involvement of both inhabitants of communities settled in the Natural Protected Areas and their zones of influence, as well as the academic sector. This is achieved through technical studies and actions for the management of the territory of these areas and their priority species with the direct and effective participation of the local population.

PROREST has two components: Technical Studies for the Management of Natural Protected Areas (ETM) and Community Conservation in Natural Natural Areas (CC).

The objective of the Technical Studies for the Management of Natural Protected Areas (ETM) component is to promote the realization of technical studies for the effective management of the Natural Protected Areas under the jurisdiction of the Federation based on the Terms of Reference formulated for this purpose. The objective of the Community Conservation in Natural Protected Areas (CC) component is to promote the direct and effective participation of the local population in actions for the prevention, protection, and restoration of ecosystems and biodiversity in Natural Protected Areas and their Zones of Influence. Simultaneously, this generates economic opportunities for their inhabitants.

The PROREST-CC component has been implemented in communities surrounding the Mixed Property, through the following support concepts:

Ecological Restoration

Refers to the execution of community activities focused on the reestablishment or recovery of ecosystems that, for several reasons, were damaged, and it is necessary to restore their ecological functions and environmental services. The activities conducted include:

- Restoration of Terrestrial Habitat
- Restoration of Aquatic Habitat

- Solid Waste Management
- Comprehensive Fire Management for Ecosystem Conservation
- Terrestrial Ecosystem Sanitation
- Aquatic Ecosystem Sanitation
- Reforestation

Community Surveillance and Monitoring.

Involves the formation of Community Surveillance and Monitoring Committees to conduct monitoring and surveillance tasks, both terrestrial and marine, including:

- Systematic observation through permanent routes and points/transects to identify the state of water bodies, reefs, wetlands, mangroves, rivers, lakes, lagoons, forest soils, flora, and wildlife in Natural Protected Areas.
- Prevention of environmental damage and protection of natural resources, such as the timely detection of forest pests, diseases in wildlife and flora, coral systems, as well as terrestrial and marine invasive exotic species.
- Identification of environmental offenses, such as discharging pollutants into the soil, subsoil, and any type of channel, basin, or aquifer, developing polluting activities, interruption, filling, drainage, or diversion of hydraulic flows, hunting activities or exploitation and extraction of species of wildlife and flora, and in general, any activity that contravenes the provisions of the General Law of Ecological Balance and Environmental Protection (LGEEPA), the declaration of the NPA, the Management Program, and other applicable legal provisions.
- Environmental education activities with community groups, demonstrating the results and efforts of in situ environmental monitoring and surveillance.

For this concept, it is mandatory for individuals who make up the community surveillance and monitoring committees to take out a collective personal accident policy.

Species Conservation.

The resources allocated to this concept are intended for projects that allow the implementation of conservation actions for priority and endangered species. These species can be both plants and animals distributed in the NPA and must not contradict the guidelines established in the Decrees, Management Programs, corresponding legal framework, or international commitments through any relevant international designation, or in adherence to the Action Program for the Conservation of Species.

From 2021 to 2023, the following projects have been implemented in the localities surrounding the Mixed property:

| Support Concept | Community | Indigenous Group | Amount Expended |
|---|---|---|---|
| **Habitat Restoration** | Arroyo Negro | Cho'ol | $446,000.00 |
| | Justo Sierra Mendez | Cho'ol | $216,000.00 |
| | José María Morelos y Pavón | Cho'ol | $216,000.00 |
| | Dos Naciones | Cho'ol | $422,000.00 |
| | El Sacrificio | Tsental | $208,000.00 |
| | Ley de Fomento Agropecuario | Cho'ol | $508,000.00 |
| | Once de Mayo | Cho'ol | $449,600.00 |
| | Niños Héroes | Cho'ol | $180,000.00 |
| | Cristóbal Colón | Tsental | $336,000.00 |
| | Narcizo Mendoza | Cho'ol | $556,000.00 |
| | La Guadalupe | Cho'ol | $214,000.00 |
| | Centauros del Norte | Cho'ol | $728,000.00 |
| | Emiliano Zapata | Cho'ol | $428,000.00 |
| | Kilómetro Ciento Veinte | Cho'ol | $656,250.00 |
| | Nuevo Conhuas | Cho'ol | $150,000.00 |
| | Postunich | Cho'ol | $242,000.00 |
| | El Carrizal | Cho'ol | $872,000.00 |
| **TOTAL** | | | **$6,827,850.00** |

| | | | |
|---|---|---|---|
| **Community Surveillance and Monitoring** | Ley de Fomento Agropecuario | Cho'ol | $398,250.00 |
| | Once de Mayo | Cho'ol | $323,000.00 |
| | Narcizo Mendoza | Cho'ol | $100,000.00 |
| | Centauros del Norte | Cho'ol | $400,000.00 |
| | Kilómetro Ciento Veinte | Cho'ol | $400,00.00 |
| **TOTAL** | | | **$1,621,250.00** |
| **Species Conservation** | Centauros del Norte | Cho'ol | $120,000.00 |
| | Emiliano Zapata | Cho'ol | $90,000.00 |
| | Kilómetro Ciento Veinte | Cho'ol | $240,000.00 |
| | Nuevo Conhuas | Cho'ol | $240,000.00 |
| **TOTAL** | | | **$690,000.00** |
| **TOTAL PROREST** | | | **$9,139,100.00** |

Table 13: PROREST for the monitoring and restoration of the Calakmul BR


Figure 55. From left to right: 1) Photograph of an ocelot specimen (*Leopardus pardalis*). 2) Community Surveillance and Monitoring Committee of the Ejido Once de Mayo.

Figure 56: Fire Management Works for Ecosystem Conservation, Cristóbal Colón Community.

National Forestry Commission Subsidy Programs

The subsidy programs implemented by the National Forestry Commission (CONAFOR) that have had a positive impact on the conservation and protection of the property are the "Support for Sustainable Forestry Development" Program and the Environmental Compensation Program for Land Use Change in Forest Lands.

The "Support for Sustainable Forestry Development" Program subsidizes, communities, small landowners and inhabitants of forest areas to implement actions that contribute to the protection, conservation, restoration and incorporation of areas into community forest management. It also considers the strengthening of local value chains, so as to generate employment alternatives and additional income in rural areas.

The grants are given in accordance with the criteria and requirements established in the Operating Rules and in the calls that will be published to receive requests for support from the communities. Applications will be judged and graded to determine those that are viable to be supported because they meet the technical and legal requirements and obtain the best grades.

While the *Environmental Compensation Program for Change of Land Use in Forest Lands*, aims to carry out the works or activities required for the restoration of forest soils, reforestation, protection and maintenance in order to rehabilitate deteriorated forest ecosystems and control or avoid degradation processes.

This program includes two main components:

**Forest Restoration**: Focuses on carrying out works or activities for the restoration of forest soils, reforestation, protection and maintenance with the aim of rehabilitating deteriorated forest ecosystems. This is preferably done within the watershed where the land-use change took place or in priority areas for reforestation.

**Forest Protection**: Its objective is to reduce the risks that may affect forest ecosystems in order to control or avoid their degradation processes. This includes the integration, equipping and operation of brigades to carry out activities to prevent, detect, combat and extinguish forest fires in the priority areas defined by CONAFOR.

These components seek to compensate for the negative effects caused on forest ecosystems by changes in land use on forest land, through its restoration and protection, as well as to contribute to the prevention, adaptation and mitigation of climate change in forest ecosystems.

Support for Sustainable Forestry Development

The National Forestry Commission (CONAFOR) contributes to the promotion of environmental and social benefits through support or economic incentives to communities and indigenous or afro-mexican communities, women and people who live and/or own forest lands, in order to implement protection, conservation, restoration and sustainable management actions in turn, contribute to climate change adaptation and mitigation.

In this regard, CONAFOR has granted financial resources for the protection of the World Heritage Property through the following support concepts of the *"Support for Sustainable Forestry Development" Program*:

1. *Concept PF1 Phytosanitary Treatments* aims to combat and control forest pests in order to reduce them to ecologically acceptable levels in the country's forest ecosystems. For this purpose, CONAFOR, in accordance with its budgetary availability, grants financial resources for the implementation of the phytosanitary treatments or measures established in the sanitation notification for which support is requested.

2. *Concept PF.2 Forest Sanitation Brigades* are intended to monitor, detect, diagnose, combat and control forest pests in priority areas defined by CONAFOR, for which economic resources are granted for the integration, equipment and operation of the Forest Sanitation Brigades
3. *Concept PF1 Rural Fire Management Brigades* Economic resources are granted for the integration, equipment and operation of the brigades made up of a group of 10 people whose purpose is to carry out activities of prevention, detection, combat and control of forest fires in the priority areas defined by CONAFOR.
4. *Concept PF.4 Forest Protection Brigades in Forest Fires*, which aims to carry out activities to prevent, combat and control pests and forest fires and reduce the deterioration of the different forest ecosystems at the national level, through phytosanitary treatments, forest sanitation brigades and rural fire management brigades.

In addition, CONAFOR has supported works and activities required for the restoration of forest soils, reforestation, protection and maintenance through the *Environmental Compensation Programme for Land Use Change in Forest Lands,* which aims to rehabilitate deteriorated forest ecosystems and control or prevent degradation processes.

In 2023, CONAFOR granted economic support to three communities located within the polygon of the Property, through the Environmental *Compensation Program for Change of Land Use in Forest Lands*, for a total amount of $12,870,265.00 (Table 15).

| State | Municipality | Applicant's Name | Area (ha) | Amount (MXN) |
|---|---|---|---|---|
| Campeche | Calakmul | Xbonil Common land | 200.00 | 5'000,300.00 |
| Campeche | Calakmul | Conhuas Common land | 105.00 | 3'378,165.00 |
| Campeche | Escárcega | Silvituc Common land | 200.00 | 4'491,800.00 |
| **Total** | | | **505.00** | 12,870,265.00 |

Table 14. Area supported by CONAFOR in 2023 through the Environmental Compensation Program for Land Use Change in Forest Lands.

Other concepts of support that CONAFOR has exercised in the Calakmul Biosphere Reserve are:

In terms of forest health, through the concepts **PF1 Phytosanitary Treatments** and the concept **PF.2 Forest Sanitation Brigades**, CONAFOR has invested $2,627,100.00 pesos, in the period from 2020 to 2023. The common lands and support concepts are shown in Table 16.

| Fiscal Year (Year) | State | Municipality | Beneficiary | Support Concept | Number of brigades | Months of Operation | Allocated Amount ($) |
|---|---|---|---|---|---|---|---|
| **2020** | Quintana Roo | Othón P. Blanco | Laguna Guerrero common land | PF.2 Sanitation brigades | 1 | 8 | 490,000 |
| **2021** | Quintana Roo | Othón P. Blanco | La Península common land | PF.2 Sanitation brigades | 1 | 7 | 440,000 |
| **2022** | Quintana Roo | Othón P. Blanco | La Península common land | PF.2 Sanitation brigades | 1 | 7 | 391,000 |
| **2023** | Quintana Roo | Othón P. Blanco | Municipality of Othon P Blanco. | Forest sanitation brigades | 1 | 10 | 653,050 |
| **2023** | Campeche | Calakmul | Municipality of ALAKMUL | Forest sanitation brigades | 1 | 10 | 653,050 |
| | | | | | | | **2,627,100** |

Table 15. Support granted from 2020 to 2023 for the protection of the property through the concepts **PF1 Phytosanitary Treatments** and the **concept PF.2 Forest Sanitation Brigades**

In terms **of fire management**, during the period from 2017 to 2023 there have been a total of 14 forest fires in the Calakmul NPA that reached 6,578.35 ha of burned forest area. In this regard, CONAFOR provided financial support for a cumulative total of $20,277,951.00 pesos, through the support concepts **PF1 Rural Fire Management Brigades,** and the **PF.4 Forest Protection Brigades in Forest Fires**. Among the preventive activities carried out by these brigades is the rehabilitation of 1.6 km of firebreak breaches.

| Beneficiary | Support Concept | Number of brigades | Months of Operation | TOTAL AMOUNT ALLOCATED (MXN) |
|---|---|---|---|---|
| Othón P. Blanco | Rural Forest Fire Brigades | 1 | 3 | $ 217,620.00 |
| Othón P. Blanco | Rural Forest Fire Brigades | 1 | 3 | $ 217,620.00 |
| Othón P. Blanco | Rural Forest Fire Brigades | 1 | 3 | $ 217,620.00 |
| Othón P. Blanco | Rural Forest Fire Brigades | 1 | 3 | $ 217,620.00 |

| | | | | |
|---|---|---|---|---|
| Ministry of Environment, Biodiversity and Climate Change of the Executive Branch of the State of Campeche | Rural Forest Fire Brigades | 1 | 4 | $ 302,144.00 |
| Minsitry of the Environment, Biodiversity and Climate Change of the State of Campeche | Rural Forest Fire Brigades | 1 | 4 | $ 390,858.00 |
| Minsitry of the Environment, Biodiversity and Climate Change of the State of Campeche | Rural Forest Fire Brigades | 1 | 4 | $ 390,858.00 |
| Government of the State of Quintana Roo | Rural Forest Fire Brigades | 1 | 4 | $ 284,144.00 |
| Government of the State of Quintana Roo | Rural Forest Fire Brigades | 1 | 4 | $ 284,144.00 |
| Government of the State of Quintana Roo | Rural Forest Fire Brigades | 1 | 4 | $ 284,144.00 |
| Government of the State of Quintana Roo | Rural Forest Fire Brigades | 1 | 4 | $ 284,144.00 |
| Ministry of the Environment of the State of Campeche | Rural Forest Fire Brigades | 1 | 3 | $ 395,200.00 |
| Ministry of the Environment of the State of Campeche | Rural Forest Fire Brigades | 1 | 3 | $ 395,200.00 |
| Ministry of Ecology and Environment of the State of Quintana Roo | Rural Forest Fire Brigades | 1 | 4 | $ 510,400.00 |
| Holpechen | Rural Forest Fire Brigades | 1 | 4 | $ 764,895.00 |

| | | | | |
|---|---|---|---|---|
| Calakmul | Rural Forest Fire Brigades | 1 | 4 | $ 764,895.00 |
| Candelaria | Rural Forest Fire Brigades | 1 | 4 | $ 764,895.00 |
| Othón P. Blanco | Rural Forest Fire Brigades | 1 | 4 | $ 764,895.00 |
| Ministry of the Environment, Biodiversity, Climate Change and Energy of the State of Campeche | Rural Forest Fire Brigades | 1 | 4 | $ 474,800.00 |
| Ministry of the Environment, Biodiversity, Climate Change and Energy of the State of Campeche | Rural Forest Fire Brigades | 1 | 4 | $ 474,800.00 |
| Government of the State of Quintana Roo | Rural Forest Fire Brigades | 1 | 4 | $ 474,800.00 |
| Municipality of Candelaria | B Rural Forest Fire Brigades | 1 | 6 | $ 736,295.00 |
| Municipality of Hopelchén | Rural Forest Fire Brigades | 1 | 6 | $ 736,295.00 |
| Municipality of Calakmul | Rural Forest Fire Brigades | 1 | 6 | $ 736,295.00 |
| Municipality of Othón P. Blanco | Rural Forest Fire Brigades | 1 | 6 | $ 736,295.00 |
| Ministry of Environment, Biodiversity, Climate Change and Energy of the State of Campeche | Rural Forest Fire Brigades | 1 | 4 | $ 632,000.00 |

| | | | | |
|---|---|---|---|---|
| Ministry of Environment, Biodiversity, Climate Change and Energy of the State of Campeche | Rural Forest Fire Brigades | 1 | 4 | $ 632,000.00 |
| Ministry of Ecology and Environment | Rural Forest Fire Brigades | 1 | 4 | $ 632,000.00 |
| Ministry of Ecology and Environment | Rural Forest Fire Brigades | 1 | 4 | $ 632,000.00 |
| Municipality of Othón P. Blanco | Rural Forest Fire Brigades | 1 | 7 | $ 1,076,735.00 |
| Hopelchén | Rural Forest Fire Brigades | 1 | 8 | $ 1,213,085.00 |
| Calakmul | Rural Forest Fire Brigades | 1 | 8 | $ 1,213,085.00 |
| Candelaria | Rural Forest Fire Brigades | 1 | 8 | $ 1,213,085.00 |
| Othón P. Blanco | Rural Forest Fire Brigades | 1 | 8 | $ 1,213,085.00 |
| | | | **TOTAL** | **$ 20,277,951.00** |

Table 16. Support granted for the protection of the property through the concepts PF1 Rural Fire Management Brigades and PF.4 Forest Protection Brigades in Forest Fires.

## 3. Information about the Tren Maya Railway Project (PFTM)

### *3.1 Evaluation of the Environmental Impact Statement Mayan Train Infrastructure Project, Section 7 and its Resolution*

Consult the information provided in the Update of the State Conservation Report of the World Heritage Site Ancient Mayan City and Protected Tropical Forests of Calakmul, Campeche, 2021-2022, in the section "Impact of the Mayan Train Project, Section 7 Chetumal-Escárcega on Natural Protected Areas" where reference is made to the Environmental Impact Statement Regional modality and its resolution, delivered to the World Heritage Center in 2023.

3.1.1 Recommendations for the protection of wild species.

The General Directorate of Wildlife (DGVS) of the Ministry of Environment and Natural Resources (SEMARNAT), considering the presence of wildlife species in any risk category in accordance with official standard NOM-059-SEMARNAT-2010 "Environmental protection-Native species of Mexican wild flora and fauna-Risk categories and specifications for their inclusion, exclusion or change-List of species at risk", present in the Calakmul Biosphere Reserve and are important for the proper functioning of the ecosystem.

DGVS has paid special attention to the recommendations it has issued through the various technical opinions to the Environmental Impact Assessments, on precautionary measures that contribute to minimizing or avoiding the damage that could be caused by the different development works in the region.

It has also issued technical suggestions to establish mitigation measures to avoid any damage to species or populations that are committed to the activities that are intended to be carried out, for example, to establish intensive campaigns for the rescue and relocation of species of wild flora and fauna, with special emphasis on species at risk, those that are migratory and those that have a limited distribution (endemic).

Other suggestions that the DGVS has expressed in the technical opinions are those related to the compensation of the damages or effects that the works or projects could cause over time, that is, this measure seeks to repair the negative effects that the works could cause in their development or operation stages. An example of these measures is the implementation of wildlife crossings (WLC), which function as bridges that allow the free transit of species and genetic exchange between populations, in addition to contributing to minimizing mortality due to possible collisions with motor vehicles or trains.

Among the species of importance are also the populations of monkeys (*Alouatta villosa* and *Ateles geoffroyi*), which are in the endangered category, for which improvements in biological monitoring have been suggested based on the locations of the WLC, based on recent scientific studies on the distribution patterns of the populations. Specific recommendations have also been made for the protection and conservation of populations and species of arboreal mammals such as *Potos flavus* (Night Monkey) and also on species of flying mammals (bats), recommending specific actions for the prevention of disasters in different habitats of these specimens such as The Volcano of the Bats. With these actions and others that have been suggested, the development works are intended to be compatible with the conservation of biodiversity in the Calakmul region, always with respect for current mexican environmental regulations.

### *3.2 Progress of Section 7 and associated infrastructure.*

The National Fund for Tourism Development (FONATUR) provided information regarding the progress made in the construction of infrastructure associated with section 7 of the Mayan Train.

The Calakmul station is 30% complete in terms of research, conservation and infrastructure development, as well as 20% in the development of a signage system for 3,447 meters of interpretive silk hedges with 264 identification cards for native species.

The construction of the site museum is 7% complete. The museum is expected to be ready by 2024 and will house a collection of more than 3,000 archaeological pieces.

The CATVI (Visitor Service Center) is 8% complete, which will offer services and information to tourists visiting the region; It is part of the program for the improvement of the archaeological sites of the Mayan Train Project.

FONATUR is developing for 2024 a comprehensive tourism planning instrument that defines strategies and actions for the orderly and sustainable growth of tourism in the municipality of Calakmul, this study is aligned with the other planning instruments, such as the Municipal Urban Development Program and the Ecological Land Management Program.

This instrument will focus on promoting the responsible use of the cultural and natural heritage of the municipality, as well as its conservation and proper use, to promote economic and social development, taking into account projections and forecasts for the short, medium and long term of the study area.

In this sense, a conceptual project of community lodging units called "Mayan Ecovillages" is carried out, in some localities located outside the World Heritage Property, but within the range of influence of the biocultural attractions of the

same, which will allow the inclusion of local communities in the management, governance and obtaining of benefits associated with tourism activity.

Additionally, the design of the "Mayan Ecovillages" is based on the principles of sustainability and respect for the environment, using materials from the region, local labor, and various eco-techniques for their operation, which will also strengthen local production chains.

These "Mayan Ecovillages" are designed taking as inspiration the Mayan culture and architecture, and the productive, agricultural and artisanal vocation of each locality, defined through participatory planning exercises and workshops, where local inhabitants and representatives of towns and common lands have been involved.

As part of the objectives of this study, the benefit of local communities is sought, as protagonists and main actors of tourism development, promoting their leadership and active participation in the protection of biocultural heritage, in the planning, design of tourist experiences and the provision of services.

With regard to the infrastructure that complements the supply of services for Calakmul, the Naional Water Commision (CONAGUA) participates by granting the necessary concessions, as well as the corresponding discharge permits, through the procedures established in its internal regulations; additionally, the institution has information through the measurements that are made in its meteorological and piezometric networks, as well as in the particular studies that have been carried out in the area. In addition to inspection and surveillance activities on nationally owned assets by CONAGUA.

## 4. Other conservation topics Identified by the State Party that may Impact the OUV of the Property

### *4.1 Actions for Connectivity*

4.1.1 Modification of the Calakmul BR decree

The World Heritage Property is located within the Calakmul Biosphere Reserve, which was established by presidential decree on May 23, 1989. The decree indicates a total area of 723,185.12 hectares and includes two Core Zones: Core Zone I (located in the south of the polygon) and Core Zone II (located in the north of the polygon) with areas of 147,915.50 hectares and 100,345.00 hectares, respectively. It also designates a buffer zone with an area of 474,924.62 hectares.

| Zone | Area (hectares) | Percentage |
|---|---|---|
| Core Zone II (north) | 100,345.00 | 13.88 |
| Core Zone I (south) | 147,915.50 | 20.45 |
| Buffer Zone | 474,924.62 | 65.67 |
| **TOTAL** | 723,185.12 | 100 |

Table 17. Current Zoning of the Calakmul BR.

However, from the beginning, the decree of the natural protected area contained a series of errors, such as:

- Presence of human settlements and areas with agricultural and livestock uses within core zones.
- Presence of areas in good conservation condition with physical, biological, and social characteristics suitable for incorporation as core zones.
- Misalignment of the southern boundary of the Calakmul Biosphere Reserve in line with bordering boundary markers.

Article 62 of the General Law of Ecological Balance and Environmental Protection (LGEEPA) and Article 63 of its Regulation on Natural Protected Areas (RANP) indicate that the Secretariat may propose to the Federal Executive the modification of a declaration when the conditions that led to its establishment have changed. This modification may include changes in category, extension, delimitation, permitted uses or activities, or zones and subzones. Once a natural protected area is established, only its extension or, where appropriate, permitted land uses or any of its provisions can be modified by the authority that established it. Therefore, on July 13, 2023, the NOTICE was published in the Official Gazette of the Federation informing the general public that the study carried out by the National Commission of Natural Protected Areas to justify the issuance of the Decree to modify the Declaration of the Calakmul Biosphere Reserve, located in the Municipalities of Champotón and Hopelchen, Campeche, published on May 23 and 26, 1989, is available to the public.

On September 1, 2023, the DECREE was published amending, repealing, and adding various provisions of the Decree declaring the Calakmul Biosphere Reserve, located in the municipalities of Champotón and Hopelchen, Campeche.

Specifically, the general polygon of the CBR increased from 723,185.12 ha to 728,556.50 ha.

Regarding the Property, the changes in surface area are presented below:

| Zones | Decree 1989 (hectares) | Percentage of the Property (%) |
|---|---|---|
| Core Zone of the RB | 131,210 | 39.60 |
| Buffer Zone of the RB | 200,187 | 60.40 |
| Total Area of the Property | 331,397 | 100.00 |

| Zones | Decree 2023 (hectares) | Percentage of the Property (%) |
|---|---|---|
| Core Zone of the RB | 329,654.74 | 99.47 |
| Buffer Zone of the RB | 1,742.25 | 0.53 |
| Total Area of the Property | 331,397.00 | 100.00 |

Table 18. Comparative analysis of the Property with the new zoning (Decree 2023)

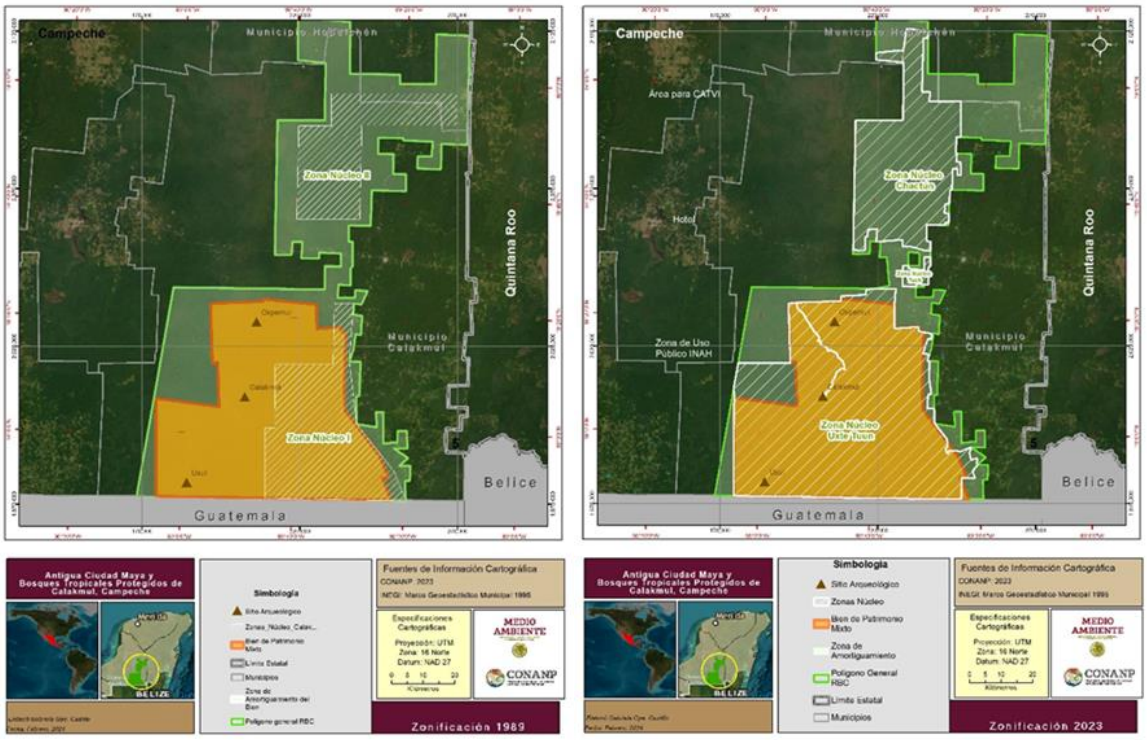



Figure 57. Comparative analysis of Property areas with the new zoning (Decree 2023)

As can be seen with the modification of the Calakmul BR Decree, 99.47% of the Property increases its protection, given that ARTICLE 47 BIS of LGEEPA establishes:

***I. Core zones*** *shall have as their* ***main objective the preservation*** *of ecosystems and their functionality in the medium and long term,* ***where activities for the preservation of ecosystems and their elements, research, scientific collection, environmental education may be authorized, and exploitation that alters ecosystems may be limited or prohibited.***

### 4.1.2 Areas Voluntarily Destined for Conservation (ADVC)

In the municipalities of Calakmul and Hopelchén, where the Property is characterized as social ejidal ownership, efforts have been made to promote the certification of Areas Voluntarily Destined for Conservation (ADVC) with the aim of conserving the OUV of the Property and its connectivity with other spaces.

ADVC is a category of natural protected areas recognized by the General Law of Ecological Balance and Environmental Protection (LGEEPA), established through a certificate that originates from a request by the landowners. This request is accompanied by a technical dossier, which delimits the area, zones it, and indicates the biological importance of the site. Finally, a management strategy is created.

The management strategy is a regulatory instrument and, at the same time, a plan of actions for the certification period of the ADVC. This period can vary between 15 years (the minimum) and 99 years (the maximum). The design of this strategy is led by CONANP as a facilitator and guide, as the construction of this strategy is through community workshops where social participation is promoted and privileged.

Figure 58. Workshop for the design of the management strategy

From 2018 to 2023, 20 ADVCs have been certified in the buffer and influence zones of the property, ensuring its connectivity over an area of 149,656-79-08 hectares.

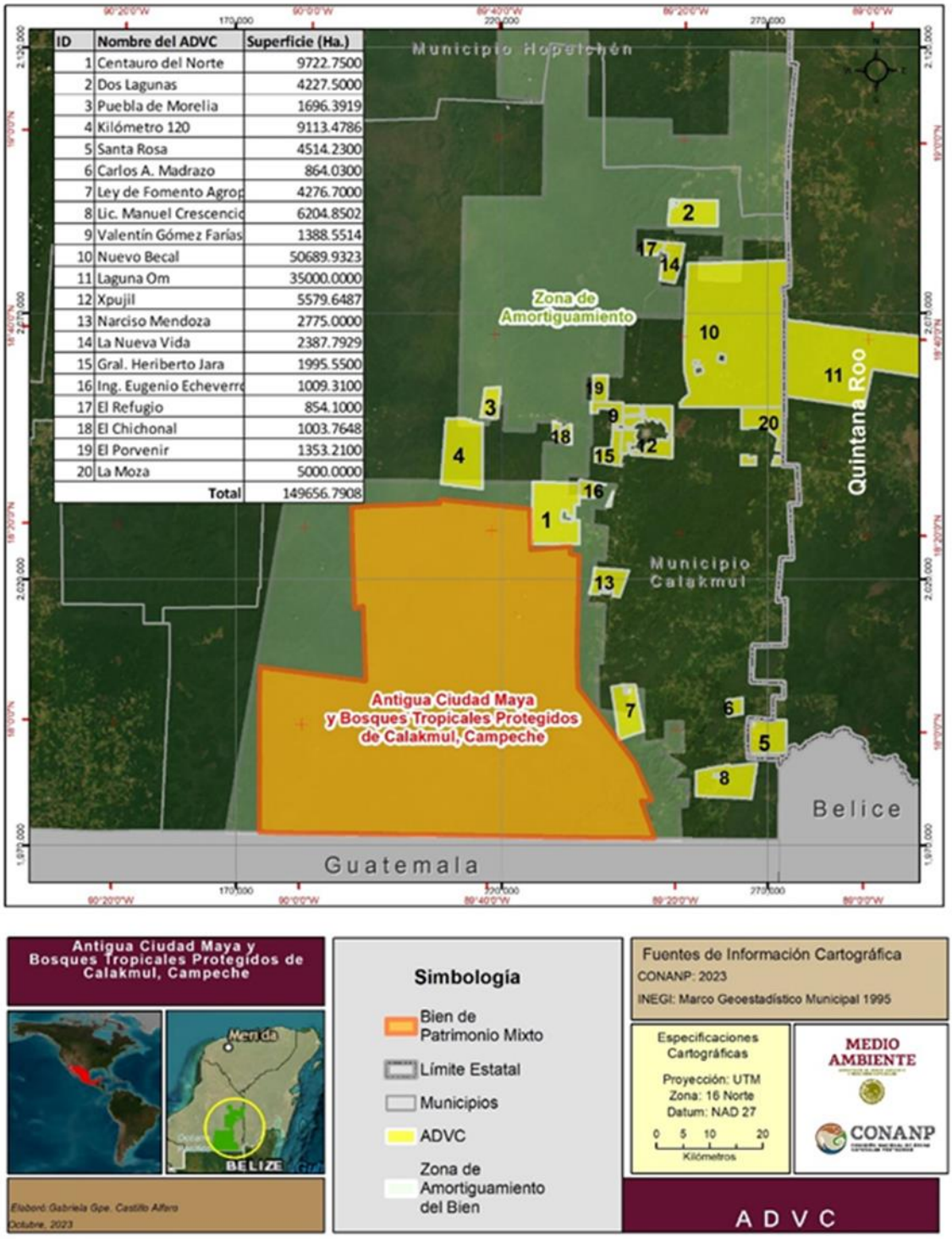



Figure 59: Areas Voluntarily Designated for Conservation.

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