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

UPDATED REPORT ON THE STATE OF CONSERVATION OF THE PROPERTY IN ATTENTION TO DECISION 44 COM 7B.78 OF THE WORLD HERITAGE COMMITTEE

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Executive summary of the report.

This presentation includes the actions and results obtained by the National Institute of Anthropology and History (INAH) during 2022, 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 44 COM 7B.78 of the World Heritage Committee.

This report addresses the recommendations set out in Decision 44 COM 7B.78, including actions relating to the delimitation of the Property, and their buffer zone to include additional and relevant cultural sites; procedures for documentation and monitoring of all structures, in particular, the tunnels excavated in Substructure IIC, and the detailed updated information on the Maya Train project and its route in the area near the Mixed Property.
Decision 44 COM 7B.78

Ancient Maya City and Protected Tropical Forests of Calakmul, Campeche (Mexico) (C/N 1061bis)

The World Heritage Committee,

1. Having examined Document WHC/21/44.COM/7B,

2. Recalling Decisions 38 COM 8B.16 and 42 COM 7B.63, adopted at its 38th (Doha, 2014) and 42nd (Manama, 2018) sessions respectively,

3. Commends the State Party for the extensive conservation and management programme that was implemented during the 2018-2019 period and includes actions that are essential to the preservation of the Outstanding Universal Value (OUV) of the property;

4. Welcomes the finalization of a new integrated Management Plan for the property and its buffer zone and reiterates its request to the State Party to provide adequate financial resources for its effective implementation;

5. Takes note of the zoning of the property and its buffer zone proposed in the new Management Plan and requests the State Party to monitor and assess the effectiveness of the established zoning in addressing its previous requests and to submit the results of such assessment to the World Heritage Centre for examination by the Advisory Bodies;

6. Acknowledges the State Party’s assurances that the Committee’s recommendations regarding the delimitation of the property and its buffer zone to include additional and relevant cultural sites are being considered, and also requests the State Party to keep it informed of any further action in this regard;

7. Recommends the State Party to strengthen documentation and monitoring procedures for all structures, and particularly the excavated tunnels for which it is recommended to develop specific conservation plans;

8. Further requests the State Party to consider the recommendations made in the July 2020 ICOMOS technical review and to submit to the World Heritage Centre updated detailed information about the Tren Maya project and its trajectory, and to ensure that all potential impacts of the project on the OUV of this and other properties in the broader region are adequately assessed through appropriate Environmental Impact Assessments (EIAs) and Heritage Impact Assessments (HIAs), as per Paragraph 172 of the Operational Guidelines, and strongly requests to submit them for review by the Advisory Bodies as soon as they are available, before making any decisions that would be difficult to reverse;
9. Finally requests the State Party to submit to the World Heritage Centre, by 1 December 2022, an updated report on the state of conservation of the property and the implementation of the above, including a specific assessment of the effectiveness of the established zoning both within the property and its buffer zone in addressing previous Committee requests, for examination by the World Heritage Committee at its 46th session.
1. Actions relating to the delimitation of the Property and its buffer zone, to include additional and relevant cultural sites.

a. LiDAR coverage area.

In order to have a broad and reliable record of the pre-Hispanic cultural elements preserved within the polygon of the Mixed Property Ancient Maya City and Protected Tropical Forests of Calakmul, the National Institute of Anthropology and History (INAH) agreed with the University of Calgary, Canada, to request the financing of a grant from the Social Sciences and Humanities Research Council of Canada, to acquire LiDAR (light detection and ranging) imagery in 95 km² of the Calakmul Biosphere Calakmul Biosphere Reserve, with center in the monumental complex of the archaeological zone.

The grant was approved at the beginning of 2022 and the overflight carried out in March this year; the airborne survey was carried out by the National Center for Airborne Laser Mapping (NCALM) at the University of Houston and Aerotecnia Digital S.A. de C.V. of Pachuca, Mexico. It is important to say that NCALM is one of the most recognized academic institutions in the world, in the processing of LiDAR images related to cultural heritage research.

The preliminary results of the study revealed the dense and complex urban sprawl that lies beneath the forest canopy of Calakmul, where immense apartment-style residential compounds have been identified, some with as many as 64 individual structures that could have housed extended families of up to 300 people. These large residential units were clustered around numerous temples, shrines, and possible marketplaces in one of the largest cities in America, more than 1,300 years ago, around 700 AD.

The magnitude of landscape modification equalled the scale of the urban population. All available land was covered with water canals, terraces, walls, and dams, no doubt to provide maximum food security for the city dwellers. The above mentioned reinforces the Criterion (i) by which UNESCO approved the inclusion of Calakmul in the World Heritage List, which states that: As a whole, the area is unique in that it preserves largely intact remains of the relatively rapid development of the Maya civilization in a hostile environment of tropical forest.
Strip of 95 km² corresponding to the LiDAR coverage area made in 2022; blue circle marks the centre of the monumental area of the site.

Detail of the monumental complex of the Ancient Maya City of Calakmul.
The importance of this coverage area to protect and delimit the cultural heritage that is preserved within the Property, lies in that it will allow to accurately locate each of the structures in the region, regardless of their size or difficulty in access. It is expected that in 2023 this coverage area may be expanded, with the intention that in the short term a very complete record can be obtained of the entire polygon of the Mixed Property, including some of the 37 archaeological sites known; this will strengthen INAH’s capacity to protect them.

On the other hand, by sharing this information with our peers from the National Commission of Protected Areas (CONANP), the following advantages may be had to strengthen the monitoring and study of the biodiversity of the Mixed Property:

• Capture the three-dimensional structure of the tropical forest, which will be useful to characterize the forest structure and estimate the prevailing developmental states.
• Can help reduce the intensity of sampling, and thus the costs.
• It has the potential to identify areas with broad biodiversity, predict species distributions and model biological communities' responses to anthropic or environmental disturbances.
• Enables high reliability cartographic data generation.
• Makes it possible to calculate variables such as biomass, canopy volume and tree height.
b) Expansion of the protected area and generation of new buffer areas.

The National Commission of Protected Natural Areas (CONANP) has begun efforts to establish a new federal protected natural area with an extent of 774 km.2 (77,400 ha.), located northeast of the Mixed Property, and in which 75 archaeological sites are known; however, this number could be higher, since these archaeological settlements do not represent the total of the pre-Hispanic sites of the area, since the central and southern regions of the polygon are minimally documented.

More recently, CONANP has begun work on another federal protected natural area with an extent of 14,310 km.2 (1,431,000 hectares) to the west and north of the Mixed Property, this will greatly expand the buffer area and will protect at least 137 additional archaeological sites, the number of which may increase depending on future archaeological prospection in the region.

Image of the new protected natural areas in which CONANP works; polygon 1 (black line) contains 75 archaeological sites, while polygon 2 (blue line) protects 137 archaeological sites. The yellow line corresponds to the polygon of the Calakmul Biosphere Reserve.
c. Legal protection.

Although the legal protection of the property is guaranteed by the legal instruments in force in Mexico, in order to strengthen the protection of the cultural and natural heritage in the Mixed Property, through an agreement of the National Institute of Anthropology and History with Mexico’s National Guard, and in coordination with the National Commission of Protected Natural Areas, from 2022 monitoring routes were implemented on the surface of the Mixed Property, in order to inhibit illegal actions, such as looting of cultural property, and illegal logging.

These routes are carried out, both on the access road to the archaeological zone, and on other roads and breaches of the well, including those that adjoin the municipality of Candelaria, to the west of the protected area.

d. Effectiveness of zoning established within the Mixed Property.

As is known, one of the main joint activities carried out between INAH and CONANP was the definition of the zoning of the Property and its buffer zone, including a monitoring program, as well as risk management measures to address threats to the cultural and natural attributes of the Mixed Property.

Zoning is reflected in the Calakmul Mixed Property Management Plan, presented to UNESCO in 2019, where it is stated that the Property is subdivided into three management areas whose denomination follow the prescription established in the LGEEPA and in the Decree that establishes the Calakmul Biosphere Reserve as a natural protected area.

Likewise, the zoning reflects the guidelines of the Operational Guidelines for the Implementation of the World Heritage Convention (UNESCO, 2018) in terms of its definition, established to achieve adequate protection of the Property, its values and whatever else that pertains to the polygon established by the INAH according to the LFMZAAH.

The three zones are:

- Restricted Use Zone: Area 131,441 ha. Located in the East Central portion of the Property.
- Preservation Zone: Area 198,326.5 ha. It occupies the West and North portion of the Property.
- Cultural and Natural Interpretation Zone: 1,629.5 ha, divided into two sections. One occupied by the Calakmul Archaeological Zone, open to public visitation, with 174.8 ha. The other, consistent of trails in the north western portion of the Property, is located along the access road path to the archaeological zone with an extension of 1,454.7 ha.

Total area of the Property: 331,397 ha.
Map of the Mixed Property and its zoning.
In addition, the Voluntary Conservation Areas (ADVC in Spanish) are essential to expand the protected area of the Property, improve the connectivity of ecosystems and preserve their natural resources.

Currently, the proposed zoning has shown to be adequate to allow the monitoring and conservation of natural and cultural assets found in each of the zones, as well as the interpretation and enjoyment of both the archaeological zone, as well as nature observation trails.

Both INAH and CONANP remain attentive to possible pressures arising from the entry into operation of the Maya Train, as well as a foreseeable increase in the number of visitors to the archaeological zone, to this end, INAH Campeche Center and the INAH Site Operations Direction are working on a study of the site's carrying capacity.
2. Procedures for documentation and monitoring of archaeological structures, in particular the excavated tunnels in Substructure IIC.

a. Monitoring of conservation conditions.

Between February and March of this year, a field season was held to allow monitoring of the conservation status of the frieze and tunnels of Substructure IIC, including the surface cleaning of dust accumulations, which allowed a better orthophotographic record of the stucco elements that are preserved in the substructure.

The work done by Dr. Claudia García Solís, who was accompanied by Dr. Javier Reyes Trujeque, director of the Corrosion Center of the Autonomous University of Campeche (Network of National Science Laboratories for Research and Conservation of Heritage - LANCIC), Dr. Beatriz Menéndez from the University of Cergy, France, and Eng. Katia Pérez Ostos, who conducts bio-deterioration studies under the advice of microbiologists Susana de la Rosa and Sergio Gómez, allowed us to confirm that the frieze, masks and other modeled elements are in good condition.

In the report, Dr. García points out that the technique, the type of lime manufactured and the application of lime putty of adequate proportion in great thicknesses, were the circumstances that allowed its conservation through its different stages of its cultural history (García, 2011). Likewise, the intervention carried out during 2002-2004 and the stable conditions of humidity and temperature in which these materials have been maintained, have achieved that after 20 years only minimal effects of point deterioration linked to extrinsic causes are observed. The observed deterioration effects are mostly small fissures and materials accumulated on the surface as surface powders and to a lesser extent, some areas of exfoliation and detachment.

Image from March 2022, showing the main character of the frieze, with small rust spots, restoration works and a minor fissure.
2017 photography, published in the book *Calakmul, corazón de jade*, where it is seen that the spots, restoration works and fissure observed in 2022, already existed then, so no new deterioration appeared.

Dust veils and depositions that were found on the surface of the frieze, and that were removed by the INAH restoration staff.
b. Environmental monitoring of conditions within Sub II C.

In order to get a preliminary idea of the conditions inside the II C Substructure, a datalogger (HOBO) was taken to perform measurements for almost two weeks from March 1, 2022. Measurements inside were made every three hours from 9:00 h. from 3 to 11 March. Also by the CICORR team, external fluctuations were measured, as an exercise to make a comparison of the influence of temperature changes outdoors.

During the monitoring, the temperature inside the substructure remained more or less constant, although the changes between the maximum and minimum temperature were 1.57 degrees (20.94 °C to 22.51 °C), not counting the start of measurements because the datalogger had to be adapted after being saved in its packaging. Differences between the maximum and minimum relative humidity (RH) is 6.12 points (92.19% to 98.31%) relative humidity percentage were more noticeable.

Generally, there is a correspondence in the ratio of a higher temperature and a reduction in temperature, but it does not necessarily coincide that the higher temperatures are those with lower humidity indices, this depended on other circumstances such as the location of the device and the number of people working inside.

As can be seen in the graphs, the first days of March 3-7, were observed greater fluctuations because there were more people inside the substructure and the
The datalogger was placed in the central area of the relief. In this area, air currents occur by coincidence of entry into the interior space of the substructure and that of SubII-C1. As of March 7, the datalogger moved to the west corner of the frieze, a more sheltered area, so temperature and humidity remained more stable.

![Image of frieze with datalogger highlighted](image)

Location of datalogger on the first days of registration.

Compared to outdoor measurements matching those made on March 2, it was noted that the highest temperature record inside the SubII-C1 is below 6°C (22.51°C) of the highest outdoor temperature which is 28.89°C, the increase is given in the same period of time from 2 to 3 pm. With this information, it is noticeable that external temperature changes influence the interior of the E-II and that there is a greater influence of these changes in the central area of the frieze where the device was located at the beginning of the measurements.

Even with the working conditions and the fluctuations observed in 10 days of monitoring, the humidity index has remained above 90%. With these records, it can be predicted that if the frieze has salts in solution they would hardly crystallize and damage the stucco.

Information of this monitoring will be the basis for others to carry out in the coming months, which will allow to establish protocols to be established due to the changes generated by the activities that are carried out inside during the working seasons. Likewise, preventive conservation measures may be proposed to generate gradual changes with its opening, in favour of the preservation of the frieze.
c. Mechanical cleaning of modelled stucco elements.

Cleaning of the earthy accumulations and dust of the surface was carried out after analyzing the state of conservation of the frieze and the masks; special emphasis was placed on verifying that the surfaces were not pulverulent or disintegrated. Once there was the certainty that the colour layers and substrates were stable, they were mechanically cleaned using soft hairbrushes and dusters.
In specific areas, these dust accumulations were stored in separate sealed bags for use as samples and further analysis. A total of 10 samples were collected for soil and dust accumulations from the frieze and east and west masks. These samples shall be used for the preliminary identification of their composition and possible origin.

d. Electrical resistance tests on the frieze.

This method is based on the principle that the lower electrical resistance there is a greater amount of salts in solution; it was successfully used at the Chac Mool Temple in Chichen Itzá to identify the amount of dissolved salts in stone materials with the collaboration of Dr. Reyes and CICORR students in 2019. Information obtained has guided the restoration team to understand the behaviour of the crystallization of salts in the polychrome pillars of this building.

It was considered advisable to carry out such studies in the Calakmul frieze, so during this visit some tests were performed on points of the frieze, differentiating the zones of the restoration works and the original. The tests carried out on the frieze mark a greater resistance in the volumetric reintegration zones unlike the original ones. This difference corroborates that it is a method of analysis to determine the reason for these characteristics will have to be made measurements in several points of the frieze to be able to determine if there is presence of salts in solution and where there are concentrations.
Evaluation of the information collected during this evaluation showed that the elements of the frieze are stable. However, work does not end here, as surface accumulations of dust, or perhaps accumulations of mortars used for the restructuring of the roof, must be identified in order to predict the presence of soluble compounds that could be harmful in the long term. In this case, measurements with a resistometer device are expected shortly, in order to understand their dispersion and behaviour in the original materials and intervention areas.

The cleaning, in addition to helping to achieve a better recording of the elements, significantly reduced the surface accumulations of dust and soil accumulated in recent months, and with this, the possibility of generating an ion exchange with the original materials, taking into account the high percentage of relative humidity that is maintained inside the substructure.

e. Photographic register and analysis of Substructure II C.

During the field season between February and March 2022, a new photographic record was made of the elements that make up the architectural program of Substructure II C, not only in order to have elements to assess its conservation status, but to have a timely record of the iconographic elements that make it up.

The new drawing of the north frieze of Sub II C1, which was in charge of Dr. Daniel Salazar Lama, who currently makes a post-doctoral stay at the University of Paris, with this theme, was made with the photographic information obtained, as well as with a 3D survey carried out by the INAH National Coordination of Historical Monuments (CNMH-INAH), and forms and measures were collated on site.
The colour palette was recorded by measuring the colours with Munsell tables and corroborating the information with the results of previous restoration and conservation work (García Solís, Mendoza Anaya and Quintana Owen, 2016). This same procedure was performed with the architectural masks in the access to the second body of the platform, with the difference that it was based on the preparatory drawings and photogrammetries made by the INAH Emerging Conservation Project in Archaeological Sites of Campeche (CESAC) (Arano Recio, Jiménez Hernández and Albano Camacho, 2017); modifications were made according to on-site observations.

a. Extract from the general plan of Calakmul, showing the Great Plaza and surrounding buildings during Late Preclassic period; b. Isometric drawing of Substructure II C, where the new interpretation of the layout of the buildings of Substructure II C and its architectural program is shown (D. Salazar, 2022).
The new drawing of the north frieze of Sub II C1 of Calakmul (drawing by D. Salazar Lama), including the register of its colour palette.

Drawings of the architectural masks in the access to the second level of the platform: a. East mask; b. West mask (drawings by D. Salazar Lama).
Two of the new photographs of the north frieze of Substructure II C 1, after cleaning by the restoration team (photos by D. Salazar Lama, 2022).
Photographs of the architectural masks of the access to the second level of the platform: a. Upper part of the left earplug of the eastern mask; b. Detail of the right earplug of the western mask; c. General view of the central face of the eastern mask (photos by D. Salazar Lama, 2022).
The new register of the north frieze of Substructure II C allowed Dr. Salazar Lama to confirm that it is part of the group of sculptures integrated into the architecture of the Late Preclassic, which was dedicated to the gods and mythological themes, unlike the Classic sculptural programs, which were mostly intended for royal figures, rulers and ancestors (Carrasco, 2005; Salazar Lama, 2019).

Sculptural program of Substructure II C of Calakmul joint several Maya Preclassic deities and creatures of different cosmological scopes, similar to what occurs in the reliefs of the South Plaza of Group H of Uaxactún, or in the Hunahpu and Ixbalanque buildings of Group E of San Bartolo, among many other cases.

This visualization of the iconographic content of the frieze is a fresh idea, since the central character of the scene was not always interpreted as a deity. Archaeologist Ramón Carrasco (2005, p. 65-66) originally suggested that it was a "mythical figure representing the ch’ulel, the spiritual entity of the Maya who lives at Xib’alb’a, as well as in humans, plants and animals". Beyond this interpretation, which lacks iconographic support, Drs. Salazar and García Barrios propose that it is Chaahk, the Maya god of rain and storms.

Following this analysis, it can be seen that the physionomic features that are observed in the central area of the frieze, are representative of this god (e.g., flaming eyebrow, prominent upper lip, nose over upper lip, hair gathered and knotted and a protruding front tooth), and are more or less constant in Central Lowland art during the Late Preclassic period.

Representation of Chaahk at the center of the north frieze of Substructure II C.
In a preliminary way, it can be said that the works carried out during 2022, have allowed a reinterpretation of the iconography of the sculptural program, finding that the monumental size of the north frieze of Substructure II C1 and the masks in the access to the second platform, allow the oversized figures of the characters dominate the space and can be seen from afar. In addition, the location of both sculptural formats in front of the Calakmul Great Plaza establishes conditions of visibility suitable for the images.

The works carried out this year, allow us to understand the presence of Chaahk as protagonist of the north frieze, and the Maize God as the central figure of the masks, which could be an indicator of the possible complementarity between both scenes. Several researchers have suggested that the recurring presence of these two gods in the scenes of the maize life cycle in the Codex-style vessels of the Late Classic -many of them from and/or manufactured in Calakmul in the 7th and 8th centuries AD., evidence a mythical "narrative goal" of creation, from which only some isolated images have come to us.

f. Restoration and conservation of structures explored in previous years.

The Government of the Republic authorized 87 million Mexican pesos for research and conservation work at the archaeological site of Calakmul, including four items:

- Research and conservation. Which will be used to conserve the buildings of the site that are open to the public visit; to continue with the investigation of the structural condition of Structure II, in particular of the tunnels associated with the frieze of the Sub-IIC; as well as the continued preservation of the Chi’iknahb Acropolis mural paintings, which require constant monitoring.

- Infrastructure. To improve the areas of ticket office, sanitary services and warehouses, favouring the use of clean technologies, such as lighting with solar cells and rainwater collection systems.

- Museography. Introductory room will be redesigned and will be complemented with updated information on the pre-Hispanic history of the site.

- Signalling and equipment. It will be used to replace the entire signage of the site, using more up-to-date graphic resources and a renewed interpretation; the trails will be redesigned for the visit, making them safer and with environmental information and site history along the way.
3. **Updated detailed information on the Maya Train project and the rail route.**

a. **Location.**

Section 7 of the Maya Train has a trajectory of 272 km, which go from the town of Escarcega, in southern Campeche, to Chetumal city, capital of the Quintana Roo state. Its path is located to the north of the Mixed Property polygon, following a path very similar to that of Federal Highway 186, as can be seen in the image below.
After several meetings at the highest level, it was determined that no modifications will be made to the dimensions of the current access road to the archaeological site of Calakmul. Decisions will be taken about the desirability of private vehicles having access only up to km. 20, where the CONANP facilities are located, and of visitors travelling the remaining 40 km. by light vehicles, whose characteristics and operating scheme have yet to be defined.

National Institute of Anthropology and History (INAH) approved the archaeological prospecting and salvage project in order to make a timely record of each and every archaeological element found in the train track, named Ulu’umil Maaya Wiiniko’ob: A Regional Analysis of the Mesoamerican Southeast, Maya Train Archaeological Salvage Project, Chiapas, Tabasco, Campeche, Yucatán, and Quintana Roo States, directed by Dr. Manuel Eduardo Pérez Rivas, researcher of the INAH Direction of Archaeological Salvage, in which participate, both researchers of the Institute, as a large multidisciplinary team of archaeologists, anthropologists, restorers, geometers, and geographers engaged for the project. To date, archaeological prospecting and salvage work on sections 1, 2, 3 and 4 have almost been completed, and work is under way on sections 5, 6 and 7.
b. Methodology.

As is known, the Maya Train project is the main infrastructure project, socioeconomic development and tourism for the current Mexican government and is conceived in the geographical area of the country where the Maya civilization had great splendour; and where there are archaeological monuments still to be discovered and safeguarded, since they are part of the cultural heritage of Mexico.

Therefore, INAH, as part of its task to protect the archaeological cultural heritage, faces the challenge of providing results at the pace required by the construction project, safeguarding the cultural heritage and at the same time, allowing the work to advance.

To meet this need, under the direction of Dr. Manuel Pérez Rivas, academic responsible for the Maya Train archaeological salvage project, integrated the Geospatial Analysis Laboratory (LAG), constituted by an interdisciplinary group of specialists that implements the most current methodological and technological tools in archaeological prospection.

Methodological and technological tools are divided into different guidelines, but in general terms they have focused on the collection of data, and on the management of LiDAR information, in the implementation of photogrammetry techniques, in excavation and registration of archaeological sites using remotely piloted aircraft systems (RPAS), and in the entry of the large volume of information taken in the field to Geographic Information Systems (GIS), as well as in its subsequent analysis, useful in decision making.

The LAG established the automated methodological design of the geotechnical survey data collection, as well as the data collection of archaeological monuments by surface recognition, which are collected daily, and the basic descriptive statistics of their status are generated simultaneously.

These data allow the production of the following types of reports:

- Thematic maps
- Automated generation of both geotechnical and monuments cards (with automation, hundreds of cards can be exported in one day; currently there is a card for each registered monument.
- Preparation of legal opinions and prospecting.

For the generation of the products already mentioned, the LAG processes and preserves information from the construction company, generating new information and proposals from it; also, as a starting point for surface recognition work, the preliminary analysis of LiDAR data is performed, which consist of a three-dimensional point cloud, which by its characteristics, can be obtained digital elevation models, as well as accentuating possible archaeological features
through the Relief Visualization Toolbox (RVT) application. Analyses of these features make prospecting more efficient.

![Point cloud product of RPAS flight (image courtesy of M. Pérez Rivas).](image)

After surface reconnaissance or prospection stage in Section 7 (Escárcega-Chetumal) has finished, the project will begin the excavation stage. As mentioned above, the excavation site registration methodology was implemented with planning and photogrammetric survey of excavation units using RPAS, this is done in the following stages:

- Registration of the site unchanged.
- Intermediate layer records during the excavation process.
- Registration at completion of excavation.

The excavation registration consists of three stages. The first considers the methodological proposal of excavation log tables, then the standardization of registry parameters and the design and dissemination of excavation log that allows creating complex forms with logical flows and validation of data types.

Second stage consists in the implementation of the excavation register and finally, the third stage covers the standardization of the method of transfer, processing and storage of data generated with photogrammetry and the spatial representation of data in GIS.

As a result of each flight with RPAS, point clouds, digital elevation models and orthomosaics with control points are obtained to correct coordinates and elevation accuracy.
Through the photogrammetry technique, it is possible to define precisely the shape, dimension and position in the space of any object or site through a reconstruction with photographs that share elements with each other due to a previously defined overlap.

This activity can be divided into three main components of the procedure:

- Generation of point clouds in IAS format.
- Generation of digital elevation models in TIIF format.
- Generation of orthomosaics in JPG format.

Another work under the LAG agenda is the digitization of the special context register by layer. The purpose of this activity is to provide support to the archaeologist’s team during the realization of their graphic recordings since the drawings are fundamental for the later stages and require a lot of precision. Together the context profile is performed. The task of generating profiles is to digitize and collect information produced by archaeologists, surveyors and RPAS operators in order to produce architectural plans for legal opinions, minutes and reports to INAH.

Once the excavation work is completed, descriptive statistics, thematic maps are estimated and legal opinions are drawn up that stipulate the continuity of the work, in sections of the train route.

All of the above, in addition to other process automation tools implemented, provide the advantage of effective management of large volumes of information, a large area evaluated with a minor advantage, compared to traditional methodology in archaeology, which largely considers the capture of data, drawings, calculations and other manual methods.

As an extra attribute, with all the processes implemented by the Geospatial Analysis Laboratory, it is possible to minimize the intrinsic human error in these traditionally manual processes.

In conclusion, the work of the LAG consists in proposing methodologies, making processes more efficient through automations, providing advice and constant training to archaeology personnel, manage, prepare and analyse large volumes of information from a large area of assessed land and generate institutional legal products.

c. Works on Section 7.

The Ministry of National Defence (SEDENA), which is responsible for the work on this section, has divided Section 7 into seven segments. So the archaeological salvage project appointed a team of archaeologists to perform archaeological prospecting and geotechnical work on each of them.
As a result of the archaeological work and the GIS analysis of the information, partial academic technical opinions are prepared on the feasibility of the construction project of the train by sections and subsections. In agreement with SEDENA, zoning of each segment is defined with general and specific recommendations for the protection of archaeological heritage; subsequent intervention actions are also indicated. These opinions are the basis for INAH authority to issue the corresponding partial authorizations, taking into account the applicable technical-academic recommendations.

A standard format is used for opinions. Previously, uniform criteria are defined for the actions applicable to each monument by virtue of its characteristics and its location in the work. Four main situations have been identified: A standard format is used for opinions. Previously, uniform criteria are defined for the actions applicable to each monument by virtue of its characteristics and its location in the work. Four main categories have been identified:

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<td>Approval of construction, supervision and surveillance work</td>
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</tr>
<tr>
<td>Archaeological monuments in affected area, due to their characteristics are susceptible to intervention, to later, allow construction work</td>
<td>Provisional precautionary restriction, feasible after the salvage work</td>
<td>Planning and execution of surveying, systematic archaeological excavations, materials analysis, supervision and surveillance. Feasible once intervention and recovery of materials and information</td>
<td>2</td>
</tr>
<tr>
<td>Archaeological monuments in affected area. Due to their characteristics, it is necessary to preserve them in situ.</td>
<td>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.</td>
<td>Planning and execution of surveying, systematic archaeological excavations, materials analysis, supervision and surveillance. Technical measures for the conservation and protection of right-of-way structures [embankments, bridges, overpasses, shelter in green areas, re-burial, among others].</td>
<td>3</td>
</tr>
<tr>
<td>Archaeological monuments in affected areas; there are structures with exceptional values that merit the conservation and enhancement of monuments</td>
<td>Total restriction, requires modification of the constructive project</td>
<td>Excavation, conservation, restoration, material analysis, re-planning and relocation of the construction work in the sector</td>
<td>4</td>
</tr>
</tbody>
</table>

To date, approximately one third of the route has been covered, detecting so far more than 1,730 pre-Hispanic constructions, ranging from simple domestic architecture, to monumental buildings for civil and ceremonial activities, some with standing architecture.

Below are graphically presented some advances made in the two segments closest to the Mixed Property:
Two examples of loading LiDAR data on mobile devices for field verification.

d. Relevant findings made during the prospecting stage.

These monuments, classified as Type 4, according to the project's dictation code, will have to be preserved, so the train route will have to be adjusted, in order to ensure their preservation.
e. Heritage Impact Assessments.

Through the INAH World Heritage Direction (D.P.M.), researchers Claudia García and Natalia Hernández performed a detailed analysis of the possible impacts identified in accordance with the categories of analysis specified by the D.P.M. This evaluation was made without considering the specific plans or projects of applicable mitigation, as they are still in a process of planning and acceptance.

The preliminary results of the heritage impact assessment of the Calakmul Mixed Property show that the Maya Train project in its construction phase will not cause direct damage to its integrity. The train route and associated infrastructure will be built outside the protection areas established for the Property of the core of the nature reserve in which it is immersed.

García and Hernández point out that the benefits that the train route offers are of an economic order and quality of life for the populations that live in the communities near the heritage site and train stations. Its due articulation with some of the sustainable programs of the conservation of the reserve will make the benefit direct and in balance with their ways of life and natural contexts.

In due course, the World Heritage Direction, through its Focal Point at UNESCO, Francisco Vidargas, will report on the final results of this legal opinion.
UPDATE OF THE STATE OF CONSERVATION REPORT
OF THE WORLD HERITAGE PROPERTY
ANCIENT MAYA CITY AND PROTECTED TROPICAL FORESTS OF
CALAKMUL, CAMPECHE
2021–2022

Attention to decision 44 COM 7B.198 adopted by the Extended 44th session of
the World Heritage Committee (Fuzhou, China/Online Meeting, 2021)
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Ancient Maya City and Protected Tropical Forests of Calakmul, Campeche (Mexico) (C/N 1061bis)

1. Executive Summary of the report

In view of the possible threat posed by the construction of the Proyecto de Infraestructura Ferroviaria Tren Maya to the Mixed Property Ancient Maya City and Protected Tropical Forests of Calakmul, Campeche, the World Heritage Committee requested the State Party to report on the State of Conservation of the Property (SOC), in accordance with Decision 44 COM 7B.78 adopted by the World Heritage Committee at the 44th Extended Session in Fuzhou, China in 2021, recommendations aimed at the adoption of the necessary measures to avoid the deterioration of the Property and its Outstanding Universal Value and the enhancement or recovery of its values.

The SOC report aims to provide the elements for the World Heritage Committee to evaluate the state of conservation of the property and its attributes, considering its proximity to the Tren Maya and the projected works (trajectory, stations, support works, etc.) and, if necessary, determine the need to adopt specific measures to address current or potential threats or risks to the property. This is one of the mechanisms used by the World Heritage Committee to monitor the state of conservation of the Property.

This report responds to Decision 44 COM 7B.78 with the answers to each of the questions or paragraphs, in accordance with the provisions of the Committee with respect to natural aspects.

Since it is a mixed property, the conservation of the property and its attributes are coordinated between the National Institute of Anthropology and History (INAH) and the National Commission of Natural Protected Areas (CONANP), however, the recommendations that strictly correspond to the cultural assets are the responsibility of the INAH, while the natural components and assets or attributes are the responsibility of the CONANP. Therefore, this complements the report sent on November 28, 2022, by INAH through official letter number 401.3S.4-2022/DPM-175/11.

Regarding the financial resources for the implementation of the Management Plan of the property, the federal budget increased by approximately two million pesos from 2021 to 2022, which represents an increase of 10.45%, and with respect to 2020 to 2022 it was of 22.48%, resources that were destined to community support projects in the buffer zone of the mixed property.

Conservation and management actions are included for the property and its buffer zone.
The boundaries of the property and its buffer zone are maintained as described in the nomination dossier. Some of the actions that SEMARNAT and CONANP are implementing to increase the protected area in the lands bordering the Calakmul Biosphere Reserve NPA are explained, such as the certification of Areas Voluntarily Designated for Conservation (ADVC in Spanish); these have increased the conservation area by 19 percent in relation to the total area of the BR, thereby increasing the connectivity of the property and its buffer zone).

Some of the changes that could cause the construction of the Proyecto de Infraestructura Ferroviaria Tren Maya, Tramo 7 Chetumal-Escárcega, in its crossing through the buffer zone of the property are mentioned.
2. **Response to the Decision of the World Heritage Committee**

44 COM 7B.78

Ancient Maya City and Protected Tropical Forests of Calakmul, Campeche (Mexico) (C/N 1061bis)

The World Heritage Committee,

1. Having examined Document WHC/21/44.COM/7B,
2. Recalling Decisions 38 COM 8B.16 and 42 COM 7B.63, adopted at its 38th (Doha, 2014) and 42nd (Manama, 2018) sessions respectively,
3. Commends the State Party for the extensive conservation and management programme that was implemented during the 2018-2019 period and includes actions that are essential to the preservation of the Outstanding Universal Value (OUV) of the property;
4. Welcomes the finalization of a new integrated Management Plan for the property and its buffer zone and reiterates its request to the State Party to provide adequate financial resources for its effective implementation;
5. Takes note of the zoning of the property and its buffer zone proposed in the new Management Plan and requests the State Party to monitor and assess the effectiveness of the established zoning in addressing its previous requests and to submit the results of such assessment to the World Heritage Centre for examination by the Advisory Bodies;
6. Acknowledges the State Party’s assurances that the Committee’s recommendations regarding the delimitation of the property and its buffer zone to include additional and relevant cultural sites are being considered, and also requests the State Party to keep it informed of any further action in this regard;
7. Recommends the State Party to strengthen documentation and monitoring procedures for all structures, and particularly the excavated tunnels for which it is recommended to develop specific conservation plans;
8. Further requests the State Party to consider the recommendations made in the July 2020 ICOMOS technical review and to submit to the World Heritage Centre updated detailed information about the Tren Maya project and its trajectory, and to ensure that all potential impacts of the project on the OUV of this and other properties in the broader region are adequately assessed through appropriate Environmental Impact Assessments (EIAs) and Heritage Impact Assessments (HIAs), as per Paragraph 172 of the Operational Guidelines, and strongly requests to submit them for review by the Advisory Bodies as
soon as they are available, before making any decisions that would be difficult to reverse;

9. Finally requests the State Party to submit to the World Heritage Centre, by 1 December 2022, an updated report on the state of conservation of the property and the implementation of the above, including a specific assessment of the effectiveness of the established zoning both within the property and its buffer zone in addressing previous Committee requests, for examination by the World Heritage Committee at its 46th session.

**Attention to recommendations**

4. **Welcomes the finalization of a new integrated Management Plan for the property and its buffer zone and reiterates its request to the State Party to provide adequate financial resources for its effective implementation;**

**Financial Resources**

In the federal budget there was a substantial increase between 2018 and 2022 of about seven million pesos that went to community support projects, where the areas voluntarily destined for conservation (ADVC) and the communities that are in the buffer zone of the Mixed Property were strengthened. Support was provided through the PROCODES (Conservation for Sustainable Development Program) subsidy program, which was given for the development of productive projects, training and feasibility studies; in six strategic areas: beekeeping production, Calakmul collective seal, sustainable forest management, soil conservation, water management and conservation, agri-food gardens and ecotourism; Also in PROREST (Program for the Protection and Restoration of Ecosystems and Priority Species), which supported the formation and implementation of community brigades against forest fires, community surveillance brigades, and community biological monitoring brigades.

It should be noted that the federal budget increased by approximately two million pesos from 2021 to 2022, representing an increase of 10.45% and with respect to 2020 to 2022 it was of 22.48%, which were allocated to community support projects in the buffer zone of the mixed property.

Resources from the Fondo para Áreas Naturales Protegidas (FANP) were allocated for environmental contingencies (burns and forest fires), as well as for the operation of the area, in accordance with its annual operating program (POA in Spanish).
Table 1. Financial resources in MXN, from different sources.

<table>
<thead>
<tr>
<th>Source of financing</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEDERAL</td>
<td>12,354,234.00</td>
<td>14,829,120.00</td>
<td>14,829,120.00</td>
<td>17,125,499.00</td>
<td>19,123,230.00</td>
</tr>
<tr>
<td>FONDO PARA AREAS NATURALES PROTEGIDAS</td>
<td>995,277.00</td>
<td>1,014,303.00</td>
<td>1,076,205.00</td>
<td>1,142,095.00</td>
<td>1,142,095.00</td>
</tr>
<tr>
<td>KFW/GIZ INTERNATIONAL COOPERATION</td>
<td>3,641,662.07</td>
<td>5,494,189.61</td>
<td>2,071,291.10</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>AMIGOS DE CALAKMUL/GLOBAL CONSERVATION</td>
<td>1,200,000.00</td>
<td>1,200,000.00</td>
<td>1,200,000.00</td>
<td>1,350,000.00</td>
<td></td>
</tr>
<tr>
<td>WWF</td>
<td>600,000.00</td>
<td>900,000.00</td>
<td>1,000,000.00**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FONATUR</td>
<td>800,000.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>16,991,173.07</strong></td>
<td><strong>21,523,309.61</strong></td>
<td><strong>18,700,411.10</strong></td>
<td><strong>20,367,594.00</strong></td>
<td><strong>22,415,325.00</strong></td>
</tr>
</tbody>
</table>

*Support was in-kind, outreach and environmental education material (T-shirts, souvenirs)

**Support was in-kind, firefighting and monitoring equipment, camp rehabilitation, communication (radio mobile), infrastructure improvement.

With the project “Protección y Manejo de la Selva Maya” of the German Society for International Cooperation (GIZ) and the German Development Bank (KFW), implemented from 2016 to 2020, financed the improvement of the office and acquisition of vehicles, the operation of the area, as well as the support to the communities of the Areas Voluntarily Designated for Conservation (ADVC) with productive projects and formation of community monitoring brigades.

As for the support received from the civil associations Amigos de Calakmul and Global Conservation, 10 community rangers (five men and five women) were hired from 2018 to 2022 for surveillance and protection of the property and its buffer zone.

In addition, with the support of the World Wildlife Fund (WWF), the operation of the area was strengthened through community studies on the management and use of natural resources, in addition to hiring of four additional park rangers.

**Basic and support staff**

There is currently a staff of 31 people hired from different funding sources, but all of them are focused on the protection and conservation of the mixed property and its buffer zone.

Table 2. Staff assigned to Calakmul Biosphere Reserve.

<table>
<thead>
<tr>
<th>Staff assigned to Calakmul BR</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>18</td>
<td>10</td>
<td>28</td>
<td>31</td>
<td>31</td>
</tr>
</tbody>
</table>
5. Takes note of the zoning of the property and its buffer zone proposed in the new Management Plan and requests the State Party to monitor and assess the effectiveness of the established zoning in addressing its previous requests and to submit the results of such assessment to the World Heritage Centre for examination by the Advisory Bodies;

Zoning of the property and its buffer zone.

The Mixed World Heritage Property Ancient Maya City and Protected Tropical Forests of Calakmul, Campeche, inscribed in 2014 on the World Heritage List has a surface of 331,397 ha. Located in the southern portion of the Calakmul Biosphere Reserve.

For the limits of the Mixed Property, Core Zone I was taken, as well as the expropriated and national lands that were added, and the buffer zone, the rest of the surface of the Biosphere Reserve 391,788.1 ha, to reinforce the protection of the property.

In the Management Plan, the property is divided into three management zones whose names correspond to those established in the General Law of Ecological Balance and Environmental Protection and the Decree that created the Calakmul Biosphere Reserve as a natural protected area. Likewise, the zoning reflects the guidelines of the Operational Guidelines for the implementation of the World Heritage Convention, in terms of its definition, established with the purpose of achieving effective protection of the property, its values and the polygon established by INAH in accordance with the Federal Law on Archeological, Artistic and Historic Monuments and Zones (LFMZAAH).

The Buffer Zone is an area surrounding the property which has complementary legal and/or customary restrictions placed on its use and development in order to give an added layer of protection to the property. It takes into account the immediate setting of the property, important views and other areas or attributes that are functionally important as a support to the property and its protection (Operational Guidelines, paragraph 104)

The main function of the buffer zone is to ensure that the activities carried out in the area lead to sustainable development, while creating the necessary conditions to achieve long-term conservation of the natural and cultural attributes, with its own subzoning.

The zoning was established as follows:

Restricted Use Zone: Surface 131,441 ha. Located in the Central East portion of the property.

Preservation Zone: Surface 198,326.5 ha. Occupies the West and North portion of the property.
Cultural and Natural Interpretation Zone: 1,629.5 ha. It is divided into two surfaces, the one occupied by the area open to public visitation of the Calakmul Archaeological Zone with 174.8 ha and the trails in the northwestern part of the property, located along the access road to the archaeological zone with 1,454.1 ha.

Map I. Zoning of the World Heritage Property
Follow-up of the Property Management Plan.

The following structure was proposed to address the actions defined in the Management Plan:

**Table 3. Strategic lines of attention**

<table>
<thead>
<tr>
<th>No.</th>
<th>Strategic line</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Conservation Areas Systems</td>
<td>ADVC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SISPROREST – Firebreaks</td>
</tr>
<tr>
<td>2</td>
<td>Land Tenure</td>
<td>Ecological and Territorial Planning</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Irregular lands</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Geographic Information System (GIS)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Quality response system SIRCA - PM</td>
</tr>
<tr>
<td>3</td>
<td>Ecological Connectivity</td>
<td>Studies</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Research</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Quality response system SIRCA - OT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Operation Wallacea Foundation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WWF</td>
</tr>
<tr>
<td>4</td>
<td>Conservation of Priority Species</td>
<td>Drinking troughs, pans and aguadas</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Biological Monitoring</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SISPROREST – Species at Risk</td>
</tr>
<tr>
<td>5</td>
<td>Monitoring</td>
<td>SMART</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SISPROREST - Surveillance Operations</td>
</tr>
<tr>
<td>6</td>
<td>Tourism and Protected Area</td>
<td>Quality response system SIRCA - PA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tourism</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SICDE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Collection of Fees</td>
</tr>
<tr>
<td>7</td>
<td>Identity, communication and dissemination</td>
<td>Signage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Media</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Events</td>
</tr>
<tr>
<td>8</td>
<td>Education and Culture for Conservation</td>
<td>Environmental Education Program</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Events</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Econiños</td>
</tr>
<tr>
<td>9</td>
<td>Forest Fire Protection</td>
<td>Integral Fire Management Program</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fire Brigades</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PROCODESCA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Quality response system SIRCA - IF</td>
</tr>
<tr>
<td>10</td>
<td>Conservation for Development</td>
<td>SISP - PROCODES</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Maiz Criollo</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Sustainable Social Business Calakmul Collective Seal</td>
</tr>
<tr>
<td>11</td>
<td>International Cooperation.</td>
<td>MaB-UNESCO Program</td>
</tr>
<tr>
<td></td>
<td></td>
<td>World Heritage Convention</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Selva Maya</td>
</tr>
</tbody>
</table>
|   | Interinstitutional Coordination | Steering Group – Campeche  
|   |  | Attention Table to Menonitas  
|   |  | Attention Table to Land Tenure  
|   |  | Security Table  
|   |  | Committee on Ecological Land Management Program (POET)  
|   |  | Quality response system SIRCA – CA  
|   |  | Environmental Sector  
|   |  | GTO – Campeche  
|   |  | Tren Maya  
| 13 | Administrative Development | Capacity building  
|   |  | Receipt and submission of documents.  
|   |  | Human resources  
|   |  | Per diem and tickets  
|   |  | Procurement  
|   |  | SICOP  
|   |  | • Per diems and tickets  
|   |  | SGPOA  
|   |  | I-effectiveness  
|   |  | INDIMAPA  
|   |  | Facilities maintenance program  
|   |  | Vehicle fleet.  
|   |  | Fuel logs  
|   |  | Inventories  

With this organization, the implementation of the Management Plan of the property is being carried out, addressing the goals set for 2025, the year in which the evaluation of management effectiveness of the Calakmul BR will be carried out.

*Protection and Management Actions*

The management of the entire Mixed Property and its buffer zone is the responsibility of the Federal Government, through the National Commission of Natural Protected Areas (CONANP), for the natural attributes, in coordination with the National Institute of Anthropology and History (INAH), responsible for the archaeological sites and zones, without detriment to their respective legal and administrative responsibilities and with the participation of other federal agencies. There are legal instruments for the management of the site where cultural and natural elements coincide in the same place.

The 90% of the surface area of the property is Federal property and all the archaeological sites located therein are protected by the Federal Law of Archaeological, Artistic, and Historic Monuments and Zones and the General Law of Ecological Balance and Environmental Protection, since it is a natural protected area with the category of Biosphere Reserve. The legal instruments necessary for the protection and management of the property, where there is concurrence, are in force.

The actions to increase ecosystem connectivity, by type of vegetation, carried out in accordance with the Management Plan for the property are as follows:
Objective: Maintain the functional connectivity of the different types of tropical forests, to favor the dispersion processes of fauna species sensitive to disturbance.

Actions: To maintain the functional connectivity of the different types of vegetation, in the zone of influence and within the buffer zone of the property, a type of community natural protected area (NPA) has been established, known as Area Voluntarily Designated for Conservation (ADVC). These NPAs are voluntarily designated by landowners, who may be an individual, legal entity, private individual, or a social organization.

Areas Voluntarily Designated for Conservation are those that may present any of the characteristics and biological elements indicated in articles 48 to 55 of the General Law of Ecological Balance and Environmental Protection (LGEEPA); provide environmental services or that by their location favor the fulfillment of the objectives foreseen in article 45 of this LGEEPA. For such an effect, the Secretariat will issue a certificate, under the terms of the provisions of Section V Establishment, Administration and Management of Areas Voluntarily Designated for Conservation, of Chapter I of the Natural Protected Areas. Said lands shall be considered as productive areas dedicated to a function of public interest. The establishment, administration, and management of Areas Voluntarily Designated for Conservation will be subject to the provisions of Section V of Chapter I.

With the establishment of ADVC, ejidos organize their territory and productive activities. These areas have increased the conservation area by 144,656.79 ha, or 20% of the total area of Calakmul Biosphere Reserve, 723,128 ha. As of January 2023, there are 19 ejidos that have set aside their lands for natural heritage protection, recognized as ADVC, as shown in the following map:
Objective: By 2025 there is a zoned and prioritized forest fire risk index; establishing risk reduction mechanisms.

Actions: Work has been done on fuel models and firefighting strategies established in the Integrated Fire Management Program, for which 170 people have been trained and equipped as community firefighters, forming 17 brigades to fight fires, with the support of international cooperation and CONANP own resources.

In addition, fire risk zoning has been established for the Property and its buffer zone, in addition to the land in the zone of influence of the Calakmul Biosphere Reserve.

As a result, 369,945.308 ha have a high-risk index; 367,132.642 ha have a medium risk index; and 1’087,654.710 ha, have a low risk index, for a total monitored area of 1’824,723.660 ha.
During 2022, CONAFOR, though the Forest Health Management, conducted ground monitoring for the early detection of forest pests in 252.73 hectares in the Calakmul Biosphere Reserve, Campeche. This activity was carried out by the Promotoría de Desarrollo Forestal of Campeche, reporting no pest presence in this monitoring.

**Objective**: By 2025 conserve the surface of forests, carrying out actions of regulation, restoration and rehabilitation of areas affected by human activities and climate change, to favor the connectivity and continuity of the landscape.

**Actions**: Derived from a simple intersection analysis of the area of the Calakmul Biosphere Reserve and the support allocated for the Payment for
Environmental Services in the period 2018 to 2022, National Forestry Commission (CONAFOR), promoted the conservation of an area of 49,502.74 hectares of evergreen forest through the Payment for Environmental Services. The allocation of 97.1 million pesos benefited 50 forest landowners, who committed to carry out ecosystem protection and conservation activities, which contribute to the preservation of the biodiversity present in the Calakmul Biosphere Reserve. Detailed information can be found in the Table 4.

Table 4. Summary of support allocated for Payment for Environmental Services.

<table>
<thead>
<tr>
<th>Federative Entity</th>
<th>Municipality</th>
<th>Total beneficiaries</th>
<th>Total surface (ha)</th>
<th>Total amount allocated (MNX)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campeche</td>
<td>Calakmul</td>
<td>41</td>
<td>38,821.02</td>
<td>$75,444,949</td>
</tr>
<tr>
<td></td>
<td>Champotón</td>
<td>1</td>
<td>2,000.00</td>
<td>$3,760,000</td>
</tr>
<tr>
<td></td>
<td>Hopelchén</td>
<td>7</td>
<td>6,891.21</td>
<td>$12,925,272</td>
</tr>
<tr>
<td>Quintana Roo</td>
<td>Othón P. Blanco</td>
<td>1</td>
<td>1,790.51</td>
<td>$5,038,741</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>50</strong></td>
<td><strong>49,502.74</strong></td>
<td><strong>$97,168,962</strong></td>
</tr>
</tbody>
</table>

Aguadas

**Objective:** The ecological integrity of the Aguadas system is maintained by 2025.

**Actions:** From 2018 to 2022 monitoring was conducted where data from 30 aguadas were analyzed, including physical characteristics, presence of wild or introduced fauna, physical threats that damage the aguadas, typification of the vegetation surrounding the aguadas, which was identified down to species and a list was made containing: scientific name, common name, IUCN Red List categories, CITES appendices, NOM-059-SEMARNAT-2010 risk categories and their uses.

The supporting, provisioning, regulating and cultural ecosystem services that the aguadas provide have been documented. This section was covered through interviews with the ejidal commissioner or key stakeholders in each community. Monitoring was carried out based on the Australasian recovery evaluation wheel methodology, which allows to illustrate the degree to which the project is achieving its objectives over time with respect to the ecosystem Monitoring of the Aguadas from Calakmul.

The results show that threats have been managed or mitigated to a low degree. Physical conditions such as the substrate in the aguada exhibit physical and chemical characteristics very similar to those of the reference ecosystem with evidence that they can support species and processes indefinitely.
Species composition represents a high diversity of characteristic species (> 80%) at the site, high similarity to the referred ecosystem, improved potential for colonization of more species over time. Furthermore, in structural diversity, all strata of the reference ecosystem are present in the aguada, as well as there are spatial patterns: evident and substantial trophic complexity developing, relative to the reference ecosystem.

Finally, the ecosystem function provides considerable evidence that the functions and processes in the aguada are very similar to those of the reference site, and there is evidence that the potential for external exchanges is very similar to the reference integrated management arrangements and in the long term with a broader picture in functioning and operation.

Large mammals

**Objective:** Maintain the functional connectivity of the different types of forest, to favor the dispersion processes of fauna species sensitive to disturbance.

**Objective:** Strengthen through physical and legal actions, the structural connectivity of the different types of forest within and outside the polygon.

**Actions:** The monitoring and protection system has been established, in which community guards from 16 ejidos have been involved, in addition to the natural protected area staff, thus creating a network of more than 180 people. This monitoring system, with which community guards have been trained and equipped with GPS and SMART Phones, has an impact on more than 1.4 million hectares.
**Objective:** To train, raise awareness and regulate subsistence hunting through ejidos regulations, conservation instruments and social agreements or pacts.

**Actions:** A program was designed to address bushmeat consumption in the communities of the buffer zone, to:

1.- know the real situation of hunting and the destination of such hunting,
2.- to establish an alternative strategy for the protection of preferred hunting species,

3.- to know the preferred species for consumption by the communities.

**Figure 2. Table of hunting activities in the ADVC**

<table>
<thead>
<tr>
<th>Location</th>
<th>Hunter</th>
<th>Not Hunter</th>
</tr>
</thead>
<tbody>
<tr>
<td>KM120</td>
<td>69%</td>
<td>31%</td>
</tr>
<tr>
<td>PDM</td>
<td>89%</td>
<td>11%</td>
</tr>
<tr>
<td>CDN</td>
<td>67%</td>
<td>33%</td>
</tr>
<tr>
<td>DLN</td>
<td>58%</td>
<td>42%</td>
</tr>
<tr>
<td>MCR</td>
<td>67%</td>
<td>33%</td>
</tr>
<tr>
<td>SRO</td>
<td>58%</td>
<td>42%</td>
</tr>
<tr>
<td>CAM</td>
<td>33%</td>
<td>67%</td>
</tr>
<tr>
<td>VGF</td>
<td>73%</td>
<td>27%</td>
</tr>
<tr>
<td>LFA</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>NBL</td>
<td>60%</td>
<td>40%</td>
</tr>
<tr>
<td>Total</td>
<td>62%</td>
<td>38%</td>
</tr>
</tbody>
</table>

The main reason or motive for hunting, indicated by those interviewed who do practice subsistence hunting, was: to bring food to the family with 48% of the mentions; in second place was the protection of their crops from the damage caused by certain animals with 26%; while the pleasure of hunting (fun) and the taste for bush meat came in third place with 11% of the responses for both options (Figure 3).
Species used and types of use

A total of 31 species of wild terrestrial vertebrates were recorded as having some type of use in the 10 ADVC studied, which were 16 mammals, eight birds and seven reptiles. The ADVC that reported the highest number of species studied were Nuevo Becal and Centauro del Norte with 26 species; while those of Puebla de Morelia and Ley de Fomento Agropecuario recorded the lowest numbers, eight and 11 respectively (Table 5).

Of these, 23 species (74.2%) are used for food; two (6.5%) are used for medicinal purposes; four (13%) are used as pets; and 15 (48%) are hunted to avoid damage to crops, domestic animal or people (Table 5).

Also, the species that are harvested in all of the ADVC studied are: temazate deer (including two species), while-tailed deer, armadillo, collared peccary and ocellated turkey; while the tepezcuintle, badger, hocofaisán and cojolita are harvested in nine of the 10 ADVC in the study area.

In response to this hunting and bushmeat consumption situation, community rules were created, and Wildlife Conservation Management Units (UMAs) were promoted in three ejidos for the reproduction, extraction, and release of the most hunted species in the area.

Objective: Establish sanitary mechanisms with legal, physical, and technical instruments to reduce the risk of zoonosis in key, indicative or sensitive species.
**Actions:** In conjunction with international cooperation, particularly that of the German Government’s GIZ, the ONE HEALTH project was implemented to create sanitary mechanisms and legal instruments to reduce the risk of zoonosis in the region.

A workshop was held with livestock producers from different communities in the municipality of Calakmul, to train them in preventive medicine for their livestock and to raise their awareness of the importance of zoonotic diseases, such as rabies in public health, how to prevent them and how they affect their livestock production units. There was also created a working relationship with the State Committee for the Promotion and Protection of Livestock in the State of Campeche (COFOPECAM), which provided support with an informative talk on rabies in domestic animals aimed at livestock producers in the Calakmul region.

Finally, an informative poster was prepared on how to prevent diseases in livestock and how to report cases of predation of domestic animals by big cats to the Livestock Insurance Fund with support from GIZ-Mexico, was distributed to communities where there is a strong presence of livestock in the municipality of Calakmul.

**Figure 4.** Interagency coordination, concurrence, and governance.

Tourism

The property and its buffer zone are managed in coordination by CONANP and INAH, within the framework of their respective legal and administrative responsibilities.

There is an access control booth where data on tourists entering the site is collected to make an annual analysis of behavior, observe trends, and evaluate the impact of tourism.

There has been an arithmetic growth in the number of tourists, due to the increase in tourism infrastructure. While it’s true that the number of tourists does not have a direct impact on the heritage, what is worrisome is that for every two tourists, a motorized vehicle enters, directly impacting
the site’s fauna. This has led INAH and CONANP to work in coordination on a tourism management strategy regarding vehicle access.

**Figure 5.** Tourist inflow. Final report on tourism inflow 2021.

Figure 6. Type of tourist by country of origin.

*Climate Change.*

In 2020, with the support of international cooperation, the Program for Adaptation to Climate Change (PACC) of the Complejo Selva Maya, which includes the Calakmul Biosphere Reserve and the Bala’an K’aax Flora and Fauna Protection Area, was updated.

The PACC have two main objectives: one is to strengthen conservation actions in the NPAs, based on adaptation actions that increase the
resilience of ecosystems and species in the face of climate change, and the other is to guarantee the permanence of livelihoods that sustain human development in the NPAs. This program was developed considering strategies and international commitments on climate change.

Through coordinated work and by means of a participatory process among the different strategic stakeholders of the Selva Maya, five socio-environmental conservation targets were established: 1) Beekeeping, meliponiculture and associated floral resources, 2) Aguadas and associated fauna, 3) Representative forest species and local vegetation management, 4) Agrobiodiversity and 5) Pollinators, whose vulnerabilities were evaluated with complementary theoretical frameworks.

On the one hand, the Rapid Vulnerability Tool adapted for terrestrial protected areas (CEC, 2017) was considered, and on the other hand, exposure, sensitivity and adaptive capacity were considered, with trends and projections of climate change scenarios in the near term (2021-2039).

Based on the analyses carried out, it was determined that vulnerability is differential in relation to each conservation target (OCSA), for example, the OCSA of Apiculture, meliponiculture and associated flowers resources present within the PACC Selva Maya Action Polygon (PAP-PSM), a greater vulnerability in the central zone of the polygon, specifically in the municipalities of Hopelchén, Campeche and the eastern portion of the municipality of Bacalar. In general, the results obtained from the vulnerability analyses provide relevant information on the individual and combined effects of the climatic hazards and stressors identified for each of the conservation target (OCSA).

The adaptation measures proposed in the PACC seek to reduce the vulnerability of ecosystems through the implementation of Ecosystem-based Adaptation (EbA) and Community-based Adaptation (CbA) and risk reduction measures, accompanied by an investment projection, to facilitate their management and allocation of resources for their implementation. Likewise, adaptation measures are linked to current public policy instruments and the Sustainable Development Goals (SDGs), thus contributing to Mexico's commitments.

**Subsidy Programs**

CONANP is in charge of the legal and institutional structure for the protection of the natural resources of the property. The property and its buffer zone correspond to the NPA Calakmul Biosphere Reserve (Calakmul BR), which is administered by the same agency. CONANP has subsidy projects to work with the communities to ensure that development activities are sustainable and don’t pose a threat.

Since the declaration of the mixed property in 2014, the participation of citizens in the sustainable management of the ecosystems present in the property has been promoted, which is reflected in a budget increase in terms of co-responsibility and environmental governance.
There are 1670 direct beneficiaries in 17 ejidos, as shown, in the following table:

**Table 5.** Resources allocated through the 2018-2022 Subsidy Projects.

<table>
<thead>
<tr>
<th>YEAR</th>
<th>PROREST</th>
<th>PROCODES</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>$594,990.00</td>
<td>$2,580,000.00</td>
</tr>
<tr>
<td>2019</td>
<td>$1,150,000.00</td>
<td>$2,362,000.00</td>
</tr>
<tr>
<td>2020</td>
<td>$1,333,080.00</td>
<td>$2,943,500.00</td>
</tr>
<tr>
<td>2021</td>
<td>$2,292,306.00</td>
<td>$3,332,162.00</td>
</tr>
<tr>
<td>2022</td>
<td>$5,474,787.00</td>
<td>$7,044,181.00</td>
</tr>
<tr>
<td></td>
<td>$10,845,163.00</td>
<td>$18,261,843.00</td>
</tr>
</tbody>
</table>

To ensure the success of the investment, the adaptive monitoring system was built with the following guidelines:

- Increase the success rate of investments in the management and protection of ecosystems present in the property, from limited resources, which is important given the urgency of addressing the impacts derived from climate change and in adherence to the objectives of the Property Action Plan.

- Strengthen transparency and accountability mechanisms for financial and human resources, in addition to improving aspects of effectiveness and efficiency.

- Generate learning from the property conservation processes (good practices and lessons learned).

- Provide evidence on changes in practices, processes and structures that affect the protection and conservation of the property.

- Verify if the actions are on track and, if necessary, correct their course of action.

- Contribute to Mexico’s progress in the management and protection of the heritage site in the international and national contexts.

**Governance and social participation mechanisms.**

**Advisory Council and Sub-Councils.**

The Advisory Council (CA) is a consultation, support, and consensus-building body made up of public, social, academic, and private sectors, as well as civil society organizations, whose objective is to advise, issue recommendations, and accompany the NPA Management in decision-making, in accordance with current environmental policy and in strict compliance with the Decree and the NPA Management Program. It is
based on Article 157 of the General Law of Ecological Balance and Environmental Protection.

Calakmul Biosphere Reserve has had an Advisory Council since 1998, made up of 21 council members. Six productive committees are represented: beekeeping, agriculture, forestry, livestock, tourism, and indigenous peoples; five representatives from the micro-regions; two academic institutions (ECOSUR and Universidad de Campeche); two CSO (PRONATURA A.C. and Consejo Civil Mexicano); and six institutions from the three levels of government. There is a Scientific Sub-Council made up of eight members from academia and the World Heritage Sub-Council, established in 2016, with 15 academic members and specialists in the natural and cultural areas, civil society organizations, government institutions, and a representative of ejidos and communities.

In 2020, the Advisory Council was updated, with the purpose of strengthening skills, through training and organizational support, to facilitate the optimal operation of the Council and ensure the effective participation of the society, in accordance with the objectives established in the decree and management program of the Calakmul BR, having advisors with effective participation in decision making.

This modification incorporated gender equity criteria, gender inclusion of the communities in the session, follow-up and monitoring of the agreements reached and, finally, the internal regulations were modified.

6. **Acknowledges** the State Party’s assurances that the Committee’s recommendations regarding the delimitation of the property and its buffer zone to include additional and relevant cultural sites are being considered, and **also requests** the State Party to keep it informed of any further action in this regard;

Refer to document: CULTURA-INAH, November 2022. UPDATE REPORT ON THE STATE OF CONSERVATION OF THE PROPERTY IN ATTENTION TO DECISION 44 COM 7B.78 OF THE WORLD HERITAGE COMMITTEE. 35 pages.

7. **Recommends** the State Party to strengthen documentation and monitoring procedures for all structures, and particularly the excavated tunnels for which it is recommended to develop specific conservation plans;

Refer to document: CULTURA-INAH, November 2022. UPDATE REPORT ON THE STATE OF CONSERVATION OF THE PROPERTY IN ATTENTION TO DECISION 44 COM 7B.78 OF THE WORLD HERITAGE COMMITTEE. 35 páginas.
8. Further requests the State Party to consider the recommendations made in the July 2020 ICOMOS technical review and to submit to the World Heritage Center updated detailed information about the Tren Maya project and its trajectory, and to ensure that all potential impacts of the project on the OUV of this and other properties in the broader region are adequately assessed through appropriate Environmental Impact Assessments (EIAs) and Heritage Impact Assessments (HIAs), as per Paragraph 172 of the Operational Guidelines, and strongly requests to submit them for review by the Advisory Bodies as soon as they are available, before making any decisions that would be difficult to reverse;

Incidence of the Proyecto Tren Maya, Tramo 7 Chetumal-Escarcega on Natural Protected Areas.

Within the Environmental Impact Assessment Procedure, and in compliance with the provisions of the General Law of Ecological Balance and Environmental Protection and its Environmental Impact Assessment-Regulation, FONATUR Tren Maya, S.A de C.V., as a promoter of the project, submitted for evaluation before SEMARNAT, the Environmental Impact Statement in its Regional Modality (MIA-R) of the project named “Tren Maya Tramo 7”, with location in the southern portion of the Yucatan Peninsula, in the Municipalities of Calakmul and Escarcega in the State of Campeche, and Municipality of Othón P. Blanco in the State of Quintana Roo.

The complete document of the Environmental Impact Statement in its Regional Modality (MIA-R) of the project named “Tren Maya Tramo 7” and the respective resolution, can be reviewed with log number 04CA2022V0020, at:


The document MIA-R, describes the project Tramo 7, with the following characteristics:

Characteristics of the project.

The Tren Maya Tramo 7 project (TM T7) consists of a railway infrastructure work located in the southern portion of the Península de Yucatán, within the states of Quintana Roo and Campeche, has a length of 255.36 km, starts at coordinates X: 3,922,619.04 and Y: 792,862.90 and ends at coordinates X: 3,684,638.73 and Y: 777,854.20.

It consists of a double track railway line, the purpose of the project is to make it suitable for mixed traffic (passengers and freight) with project speeds of 160 km/h maximum for passenger trains and 100 km/h minimum for freight trains.
It also includes:

- Diesel Locomotive
- Passenger Rolling Stock: Diesel train
- 4 low demand stations: Nicolás Bravo, Xpujil, Conhuas and Centenario
- Maintenance base: Xpujil
- Medium speed train (maximum 160 km/h for passengers and 100 km/h for freight).
- Vehicular crossings (PSV)
- Wildlife crossings.
- Drainage works.

**Table 6.** Surface areas occupied by the works of the Tren Maya Project Tramo 7.

<table>
<thead>
<tr>
<th>work</th>
<th>Total area of the project in ha.</th>
<th>Area of the construction site that coincides with the right-of-way (contained within the right-of-way) in ha.</th>
<th>Net area affected in ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>1,465.47</td>
<td>296.64</td>
<td>1,163.65</td>
</tr>
</tbody>
</table>

The project contains elements and/or permanent works, which total an area of 1,465.47 ha; a portion of this area coincides spatially with the right of way (296.64 ha), as well as with the works themselves (5.18 ha); it should be noted that, of the aforementioned area, 1,020.35 ha correspond to the right of way, which covers a strip of 20 m on each side of the center of the road. The project also includes specific works such as vehicular crossings with sidewalks for crosswalks (52), drainage works (207) and wildlife crossings (126). Finally, the surface area of the project that is considered an affected area corresponds to 1,163.65 ha.

With respect to the World Heritage Property, the route will pass through 3.7 km in the buffer zone, affecting 12.4 ha, which by type of cover is 1.7 km of low and medium forests, and 20.0 km of acahuales and crops.

It is considered that the main impacts were originated with the expansion of the highway prior to the project, so that the project, in the section that crosses the buffer zone of the property, will imply a change in land use by clearing 12.4 ha of vegetation.
According to the MIA, the area affected by the projects (right of way of the highway and works) has an area of 1,163.65 ha, of which only 730.70 ha are considered as land for land use change, 62.79% of the total project, and 1.7 ha for the mixed property.

This MIA-R presents in its Chapter III, called “Linkage with Planning Instruments and Applicable Legal Regulations”, the relationship, linkage, application, and relevant measures to comply with the provisions of the World Heritage Convention. Among other aspects, it recognizes:

III.1.2.11 Convention Concerning the Protection of World Cultural and Natural Heritage

The TM T7 has an impact on areas of great importance such as areas declared as World Heritage Sites by the United Nations Educational, Scientific and Cultural Organization (UNESCO), as is the case of the Ancient Mayan City and Protected Tropical Forests of Calakmul, which in addition to its decree as a protected natural area, was declared a World Heritage Site in 2014 and is the first mixed World Heritage property in our country, a category that recognizes the exceptional value of cultural and natural heritage in the same property. The Ancient Maya City and Protected Tropical Forests of Calakmul, Campeche, jointly symbolizes the great natural and cultural wealth that distinguishes our country.

In addition, it is noted:

It is important to emphasize that the TM-T7 does not have a direct impact on the property, but only on its buffer zone. Likewise, the impact section is parallel to Federal Highway 186 Chetumal-Escárcega. Therefore, although it is true that the project has direct impacts only on the buffer zone of the property, we have tried to minimize the impact as much as possible and additionally, we propose mitigation and compensation measures that are considered necessary to prevent indirect impacts on the property and its buffer zone.

The table in Chapter III of the MIA-R is presented below, with respect to the Natural Criteria, the impacts evaluated (Chapter V) and the measures to mitigate, reduce or compensate them (Chapter VI).

<table>
<thead>
<tr>
<th>CRITERIA RELATED</th>
<th>IMPACT</th>
<th>MEASURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Criterion (ix). Be outstanding examples that represent important ongoing ecological and biological processes in the</td>
<td>Alteration of landscape quality due to the intervention of external components.</td>
<td>As mentioned above, the project will impact a section of the buffer area of the property, so by not having a direct</td>
</tr>
</tbody>
</table>
evolution and development of terrestrial, freshwater, coastal and marine ecosystems and plant and animal communities; impact, the buffer area will help mitigate impacts to the landscape. Also, the affected area is located parallel to the federal highway. In addition, other measures are proposed, such as: Integrated Waste Management Program. Implementation of green areas at the stations. Compliance with NOM-081-SEMARNAT-1994. Soil Conservation and Reforestation Program.

<table>
<thead>
<tr>
<th>CRITERIA RELATED</th>
<th>IMPACT</th>
<th>MEASURES</th>
</tr>
</thead>
</table>
| Criterion (x). contain the most natural habitats important and significant for in situ conservation of biological diversity, including those that contain endangered species of universal value exceptional from the point of view of science or conservation. | Changes in the distribution of the population due to migratory flows. | In order to maintain the culture, as well as traditional forms of production and appropriation of natural resources, avoiding the migration of settlers and the introduction of production systems foreign to the Mayan culture, the following measures are proposed: Creation of alternatives to maintain or increase the quality of life, according to their uses and customs, through the promotion and concessions of UMAs, ADVCs and subsidy projects such as PROREST, Sembrando Vida, among others, in coordination with SEMARNAT, CONANP, CONAFOR and Secretaría del Bienestar. Promoting the company's own structures for product marketing and processing. Generation of local jobs. To promote social facilities. Organization and potentiation of rural tourism, which shows
<table>
<thead>
<tr>
<th>Habitat fragmentation due to land use change.</th>
<th>The following measures are proposed:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Execute flora rescue and relocation program.</td>
</tr>
<tr>
<td></td>
<td>Establishment of wildlife crossing points.</td>
</tr>
<tr>
<td></td>
<td>Implementation of drainage works.</td>
</tr>
<tr>
<td></td>
<td>Soil conservation and reforestation program.</td>
</tr>
<tr>
<td></td>
<td>Promote and agree on the establishment of UMAs and ADVCs.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Effects on specimens of flora species in any risk category of the NOM-059-SEMARNAT-2010 by the use of machinery.</th>
<th>The following measures are proposed:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Clearing should be carried out in a programmed manner using methods that do not damage the soil or surrounding vegetation.</td>
</tr>
<tr>
<td></td>
<td>Cultural and Natural Resources Protection Program.</td>
</tr>
<tr>
<td></td>
<td>Environmental Education program</td>
</tr>
<tr>
<td></td>
<td>Flora rescue and relocation program.</td>
</tr>
<tr>
<td></td>
<td>Soil Conservation and Reforestation Program.</td>
</tr>
<tr>
<td></td>
<td>Promote the establishment of nurseries or UMAs with rescued plants.</td>
</tr>
<tr>
<td></td>
<td>Disseminate knowledge of the rescued species, as well as their use and the importance of their conservation.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Effects on terrestrial wildlife species or populations due to the use of machinery and operation of the train.</th>
<th>The following measures are proposed:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Wildlife removal, rescue and relocation program.</td>
</tr>
<tr>
<td></td>
<td>Environmental education program</td>
</tr>
<tr>
<td></td>
<td>Program for the protection of cultural and natural resources</td>
</tr>
<tr>
<td></td>
<td>Prior to the start of construction works, the Fauna</td>
</tr>
</tbody>
</table>
Passage Program must be submitted for approval, which must indicate the location, type of passage for target species, parameters to measure its effectiveness through monitoring and adaptive management to correct what is necessary to improve its effectiveness.

Establishment of drainage works.

With respect to the World Heritage Property, the MIA points out:

**Conclusion**

With the proposed prevention, mitigation, and compensation measures, beyond identifying that the World Heritage Property may be affected, it is expected that the recognition of its importance and value at the local, national and international level will be increased and with it, the commitment of the entire population to contribute to its conservation.

Therefore, it is essential to involve local communities through different programs and projects that additionally represent a real benefit for them and contribute to maintaining and developing a balance between the conservation of natural and cultural heritage.

As a conclusion of the Environmental Impact Assessment Process, the Resolution authorizing the Project was issued and establishes, as the first condition:

1.-Comply with each and every one of the control, prevention and mitigation measures proposed in the documents submitted for the development of the project, which this DGIRA considers to be feasible to be implemented, and consistent with the type of impact that is intended to prevent, mitigate and/or compensate; likewise, it must abide by the provisions of the LGEEPA, the RLGEEPAMEIA, the NOM’s and other legal ordinances applicable to the development of the project without prejudice to the provisions established by another Administrative Unit (federal, state and/or municipal) competent to the case, and must abide by and comply with the measures proposed by the promoter, including the observations and recommendations indicated by the different agencies that issued technical opinions; as well as, the provisions of the TERMS and CONDITIONS established in this resolution,
which are necessary for the conservation of the environmental balance of its surroundings.

Based on the cartographic information of the project's route with respect to the NPA polygon, it was determined that the project affects the buffer zone of the Calakmul Biosphere Reserve and the World Heritage Site, as well as two Areas Voluntarily Designated for Conservation (ADVC) Ejido Kilómetro 120 and N.C.P.E Valentín Gómez Farías, and the State Natural Protected Area, Zona Sujeta a Conservación Ecológica Balam-Kú.

Map 4. Section of the “Tren Maya Tramo 7” project that affects the Calakmul BR buffer zone and the World Heritage property.

9. Finally requests the State Party to submit to the World Heritage Centre, by 1 December 2022, an updated report on the state of conservation of the property and the implementation of the above, including a specific assessment of the effectiveness of the established zoning both within the property and its buffer zone in addressing previous Committee requests, for examination by the World Heritage Committee at its 46th session.
3. Other current conservation issues identified by the State(s) Party(ies) which may have an impact on the property’s Outstanding Universal Value

Protection measures implemented by CONANP before the construction of the Tren Maya

In the buffer zone of the property, is where the Tren Maya will be established, whose major impact could be the fragmentation of the habitat, which is a barrier to maintain the continuity of the natural attributes of the property; the Tramo 7 occupies 300 km of which 3 km enter the buffer zone of the property and 100 km in the zone of influence of the NPA. One strategy of the National Commission of Natural Protected Areas is to establish measures along the train track that contribute to the continuity and reestablishment of connectivity through the creation of Areas Voluntarily Designated for Conservation with action plans for each community, such as:

1.- The creation of the new Calakmul 2 Natural Protected Area.

The federal government, through the corresponding agencies, acquired land from Ejido Plan de San Luis, with an area of 14,000 ha, of which 9,000 ha are in the buffer zone of the mixed property and Calakmul BR, and the remaining 5,000 ha will constitute the new federal protected area that will increase connectivity between the northern buffer zone and the southern buffer zone of the mixed property.

Map 5. Location of the land acquired for the new Calakmul 2 Natural Protected Area.
2. The expansion and federalization of the Balam Kin (115,658.25 ha) and Balam Kú (447,706.77 ha) State Natural Protected Areas.

**Map 6.** Location of the state NPA.

3. Biological corridor of the jaguar "Báalam-Beh".

To conserve the habitat of the jaguar (*Panthera onca*), connecting the Calakmul Biosphere Reserve with the Laguna de Términos Flora and Fauna Protection Area.

It is estimated that approximately 55,000 hectares will be recognized and protected, most of which are socially owned and are expected to be certified as Areas Voluntarily Designated for Conservation.
4. The creation of Areas Voluntarily Designated for Conservation Areas (ADVC) along Tramo 7 in the following communities:

**Table 7.** ADVC established along Tramo 7.

<table>
<thead>
<tr>
<th>iD</th>
<th>Name</th>
<th>Protected surface ha</th>
<th>Km along Tramo 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Laguna om</td>
<td>35,000</td>
<td>20.87</td>
</tr>
<tr>
<td>2</td>
<td>Tomas Aznar</td>
<td>5,000</td>
<td>7.9</td>
</tr>
<tr>
<td>3</td>
<td>Xpujil</td>
<td>5,500</td>
<td>8.0</td>
</tr>
<tr>
<td>4</td>
<td>Valentín Gómez Farias</td>
<td>1,451</td>
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