MAYA SITE OF COPÁN (HONDURAS)

STATE OF CONSERVATION

A Progress Report

November 2016

GOBIERNO DE LA REPÚBLICA DE HONDURAS

INSTITUTO HONDUREÑO DE ANTROPOLOGÍA E HISTORIA

Honduras
Somos para ti

Identification

Name	Maya Site of Copan (Honduras) - C 129
Location	Near the village of Copan Ruinas Department of Copan, Honduras
Coordinates	E 269524.180507 N 1641547.93025
Inscription	5 September 1980
Administrator	Instituto Hondureño de Antropología e Historia (IHAH)
Address	Barrio Buenos Aires, Villa Roy Tegucigalpa, M.D.C.
Telephones	(504) 2222 1468 / 2222 3470
Fax	(504) 2222 2552
E-mail	patrimonioihah@yahoo.com
Web address	www.ihah.hn

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Preface

This document is a progress report on the State of Conservation of the Maya Site of Copan, Honduras. The IHAH (Instituto Hondureño de Antropología e Historia) seeks to move from a primary management system towards a more open system with the participation of stakeholders. The IHAH has undergone a time-consuming and expensive reorganization since June 2015 and has been unable as yet to complete a full report. A more complete report is to be submitted on February 1, 2017, and an update of some topics related to management will appear in May 2017.

The report has been prepared by a task force led by the Secretary General of the IHAH (Abogado Hector Portillo) with contributions of all the Institutions involved in the archaeological research and the conservation of the site, and in consultation with all the stakeholders possible, especially the local people.

Decisions of the World Heritage Committee, Bonn, 2015

The World Heritage Committee,

1. Having examined Document WHC-15/39.COM/7B,

*2. Recalling Decision **37 COM 7B.99** adopted at its 37th session (Phnom Penh, 2013),*

3. Notes that the runway of the Rio Amarillo airport will be limited to 1200 meters long, as requested by the World Heritage Committee and the recommendations of the 2011 Reactive Monitoring mission, and recognizes the efforts made by the State Party to rescue and relocate archaeological remains located in the surroundings of Rio Amarillo;

4. Welcomes the Cultural Heritage Impact Assessment (HIA) that was undertaken by the Copan Association for the airport area and invites relevant institutions to consider its observations, recommendations and conclusions;

5. Also notes the cartographic information provided by the State Party and requests the State Party to finalize the boundary clarification within the framework of the Retrospective Inventory process and to submit a final proposal for a buffer zone according to paragraphs 163-165 of the Operational Guidelines *concerning Minor Boundary Modification;*

6. Appreciates the efforts of the State Party to prepare the Management Plan and Carrying Capacity Study for the World Heritage property and also invites the State Party to undertake its revision with due consideration of the ICOMOS recommendations particularly regarding the action plan and financing strategy, tourism projections and visitor management and the participation of communities;

7. Also requests the State Party to keep it informed of further developments in the design and testing results of the protective structure of the Hieroglyphic Stairway;

*8. Further requests the State Party to submit to the World Heritage Centre, by **1 December 2016**, an updated report, including a 1-page executive summary, on the state of conservation of the property and the implementation of the above, for examination by the World Heritage Committee at its 41st session in 2017.*

SUMMARY

The Instituto Hondureño de Antropología e Historia, administrator of the property, is moving from a primary system of management towards a participatory system involving all the stakeholders.

Rio Amarillo airstrip

All the mitigation measures have been completed and the no-flying zone over the Maya Site of Copan has been confirmed, covering a circle of 1850m radius around the World Heritage property.

Boundaries of the World Heritage property and its buffer zone

The boundary of the World Heritage property is physically marked by a wire fence built in 1975 and enclosing all the Principal Group of ruins (15 ha) corresponding to the description in the nomination files.

The buffer zone covers an area of 452 ha around the World Heritage property, with the river as its southern boundary, and limits at an average of 1000m from the property to the east, north and west. The land use within the buffer zone is agricultural and livestock pasture.

Management / Action plan

The three main issues are: conservation, management and community

Conservation

The preservation of sculpture, the most important concern of conservation, is handled by Harvard University through the Santander Program. This program includes 3Dscanning of monuments, the installation of a laboratory for sculpture, protective shelters for monuments, a conservation plan for the tunnels, collection management and the training of technicians.

A prototype of a new shelter for the Hieroglyphic Stairway has been tested over the last five years with some success. However, there are still some ongoing discussions on the kind of material to be used. Installation of the new protective structure is now planned for 2019.

Management

1. The German Institute of Archaeology has developed a 3D mapping of the entire Copan valley.
2. Diversification of funding is in progress through the involvement of stakeholders
3. Visitor numbers are still very low (annual average 120,000), and well below the calculated carrying capacity of 1600 at any given time. The problem may arise with the school visits; from 2017 the schools will have to make an electronic reservation (with a limit of 500 per day). Different trails are being established according to the needs of different kind of visitors
4. Disaster risk assessment and preparedness planning is currently being coordinated with the local fire brigade and COPECO, a national agency in charge of disaster management
5. Capacity building: there is an urgent need for staff training. A permanent training program for managers will commence in 2017.

Community

The participation of the local community is now seen as an essential constituent of management. The IHAH has improved communication with the local authorities and civil organizations in order to raise awareness leading towards a sustainable development outcome.

Other issues: (1) Deficiencies in implementation and monitoring of management plans, (2) Law enforcement is improved, (3) Research agenda to enhance better management of heritage.

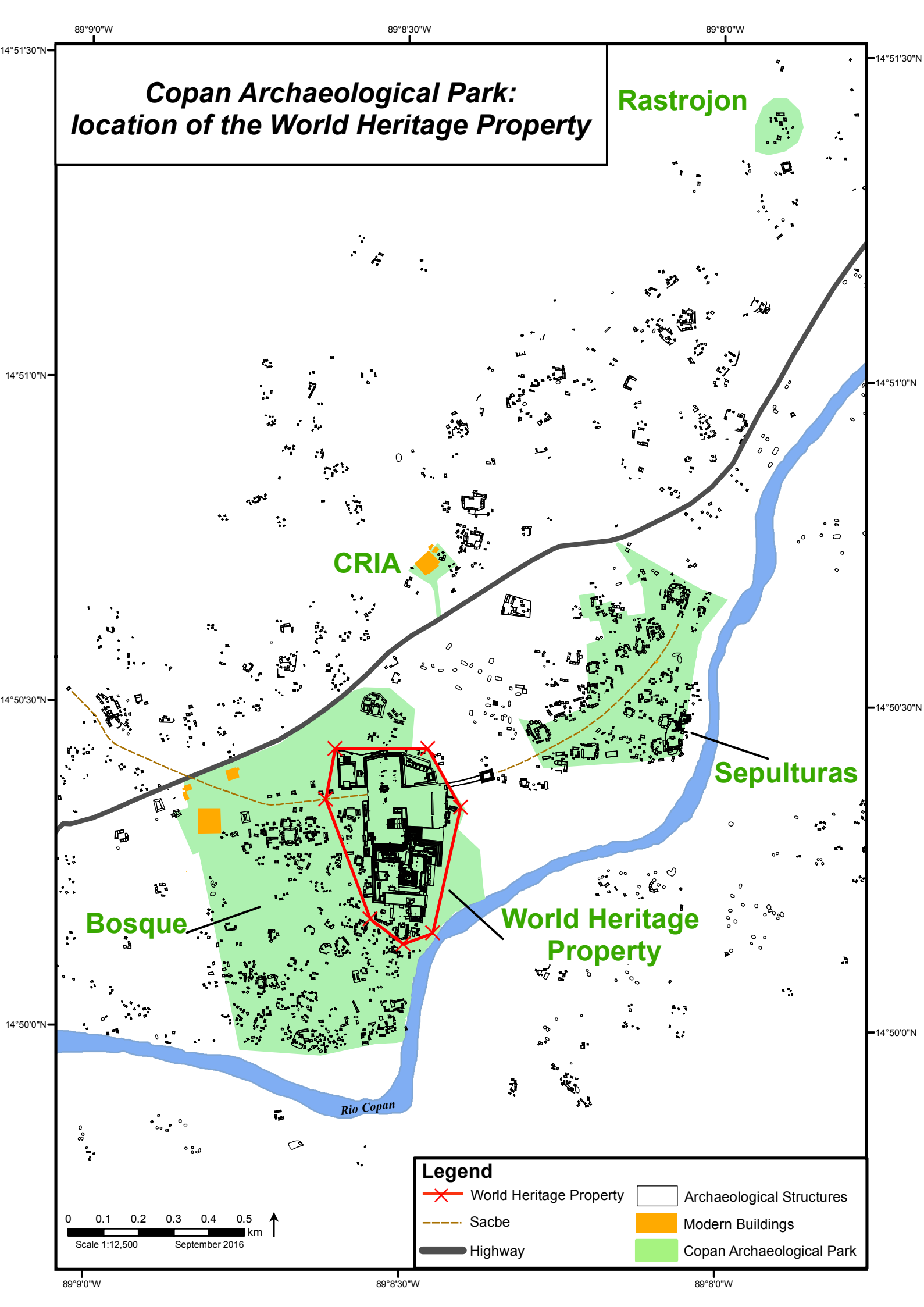
Introduction

The Copan Archaeological Park (see Map 1)

The World Heritage Property (Maya Site of Copan) is located within the Copan Archaeological Park which was originally an area of 45 ha delimited in 1874 in order to protect what is called now the Principal Group (World Heritage property) and its surroundings (El Bosque on the map).
Note: The CRIA (Centro Regional de Investigaciones Arqueológicas) is part of the Archaeological Park. The area called Sepulturas is a private property under the administration of the IHAH.

Figure 1: The archaeological park and its setting

Figure 2: The Great Plaza, with the shelter of the hieroglyphic stairway in the foreground


Copan Archaeological Park:
location of the World Heritage Property
Rastrojon
CRIA
Sepulturas
Bosque
World Heritage Property
Rio Copan
89°9'0"W
89°8'30"W
89°8'0"W
14°51'30"N
14°51'0"N
14°50'30"N
14°50'0"N
0 0.1 0.2 0.3 0.4 0.5 km
Scale 1:12,500
September 2016
Legend
World Heritage Property
Sacbe
Highway
Archaeological Structures
Modern Buildings
Copan Archaeological Park

Legal Framework

The legal protection of the ruins of Copan is guaranteed by the Constitution (1982: article 172), the Law for the Protection of Cultural Heritage (1997), and the Presidential Resolution 185 of 1982 declaring National Monument "all the archaeological vestiges of the geographical zone known as the Copan Valley…… , including the pre-Hispanic city of Copan….."

Institutional Framework

Cultural heritage in Honduras, including the Maya Site of Copán, is under the custody and management of the Instituto Hondureño de Antropología e Historia (IHAH) under the auspices of the Ministry of Education. This is a typical primary system of management, however the IHAH is intending to move towards a system agreeable to all stakeholders.

Management Plan / Carrying capacity

The first management plan was developed in 1984 (Barborak et a. 1984), updated in 2005 (IHAH 2005) and revised in 2013 (IHAH 2013). A study of the Parks's carrying capacity was performed by the Universidad Complutense de Madrid (Hernandez et al. 2013) as part of the last management plan.

Stakeholders

The main actors for administration, research and conservation include: (1) the Instituto Hondureño de Antropología e Historia (IHAH); (2) the Instituto Hondureño de Turismo (IHT); (3) the Instituto de Conservación Forestal (ICF) for the natural environment; (4) the Asociación Copan, an ONG involved with cultural and natural heritage; (5) academic institutions including Harvard University, the National University of Honduras (UNAH),City University of New York, University of Kanazawa (Japan), the Academy of Social Sciences of Beijing, the German Archaeological Institute (DAI).

Local stakeholders include: (1) the Copan Municipality, (2) the Chamber of Commerce, Industry and Tourism of Copan, (3) Indigenous organizations (CONIMCHH and CONADICH), (4) educational institutions, (5) inhabitants of the village of Copan Ruinas.

Issues

The most relevant issues are: (1) the preservation of stone, (2) the efficiency of management (finances, visitors, staff training, disaster risk), and the implementation of the plans, (3) the local community.

Chapter 1

Decision 3: *Notes that the runway of the Rio Amarillo airport will be limited to 1200 meters long, as requested by the World Heritage Committee and the recommendations of the 2011 Reactive Monitoring mission, and recognizes the efforts made by the State Party to rescue and relocate archaeological remains located in the surroundings of Rio Amarillo*

Decision 4: *Welcomes the Cultural Heritage Impact Assessment (HIA) that was undertaken by the Copan Association for the airport area and invites relevant institutions to consider its observations, recommendations and conclusions*

All the compulsory mitigation measures defined in Chapter 6 of the HIA (Asociación Copán 2014) have been completed, except the updating and implementation of the Public Use Plan (PUP) for the site of Rio Amarillo that has been delayed for financial reasons.

1.1. Preventive archaeological operation before the construction

1.1.1. Preventive excavation of archaeological site ARA-Rio Blanco – 1

The entire site was excavated before its destruction. All the excavation notes, photographs and artifacts are stored at the CRIA (Centro Regional de Investigación Arqueológicas) in Copán Ruinas.

Figure 3: ARA-Rio Blanco after excavation

The most interesting feature discovered, a kind of steam room called *Temazcal* in Mesoamerica (from the nahuatl word temazcalli, house of heat), has been reconstructed along with its original components and situated next to the Visitor Center of the site of Río Amarillo.

Figure 4: Reconstruction of the Temazcal near the Visitor Centre of Río Amarillo

1.1.2. Preventive excavation of Compound C of archaeological site Piedras Negras

The compound C is located at 140 m from the northern end of the airstrip. Only the southern half of the site has been excavated. After the Christmas break of December 2014 it was clear that the site would not be affected at all by the construction of the airstrip, so it was decided to close down the operation. Nevertheless all documents and artifacts were stored at the CRIA.

Figure 5: Northern end of the airstrip at 140 meters from Group C of Piedras Negras

1.2. During the construction

An archaeologist of the IHAH was present during the construction, watching for any kind of artifact or feature that could have been impacted by machinery. Only a few artifacts were recovered.

1.3. After the construction

Since the inauguration of the airport on March 10, 2015

1.3.1. Flights over the Maya site of Copan

Aeronáutica has confirmed a flight prohibition zone over a circle of 1850 meters radius around the World Heritage property and an altitude of 6000 feet.

1.3.2. Increase in visitor numbers

The airport has not produced a significant increase in visitor numbers (it sees an average of 12 persons on week-ends). See Chapter 3: Visitor Management.

1.3.3. Effects of vibrations on the sites of Río Amarillo and Piedras Negras.

Planes do not fly over the sites of Río Amarillo and Piedras Negras. As the magnitude of the vibrations on these sites is very low, the effects are negligible.

1.3.4. Alteration of cultural landscape

To date, there has been no alteration of the cultural environment by informal activity. There are so few users of the airstrip that it would not be viable to open a shop.

1.3.5. Public Use Plan of the Archaeological Site of Río Amarillo.

A Public Use Plan was designed in 2011; however it needs to be updated, especially to include an exhibit on the preventive operations of the airport.

1.3.6. Archaeological Project of Piedras Negras

The City University of New York (CUNY) and the Instituto Hondureño de Antropología e Historia are engaged in an ongoing project of investigation in Río Amarillo that will probably last another couple of years. Excavations in the site of Río Amarillo started in 2013, and excavations in the main group of Piedras Negras commenced in July 2015. Further surveys have discovered at least two new sites in that pocket.

Conclusion

Apart from the preventive operation on ARA-Río Blanco-1 that was totally excavated and all the artifacts removed beforehand, the two main sites Río Amarillo and Piedras Negras remain unaffected by the airport development. On the positive side, it has brought about a betterment of life conditions for the local inhabitants through social projects (roads, electricity, drinking water, etc.., a recuperation of the archaeological site of Rio Amarillo and an exhaustive archaeological investigation of the whole pocket of Río Amarillo.

Chapter 2

Decision 5: *Also notes the cartographic information provided by the State Party and requests the State Party to finalize the boundary clarification within the framework of the Retrospective Inventory process and to submit a final proposal for a buffer zone according to paragraphs 163-165 of the* Operational Guidelines *concerning Minor Boundary Modification*

Property	Maya Site of Copan
Identification	C 129
Date of inscription	1980
Area of the inscribed property	15.095 ha
Area of the buffer zone	452.339 ha

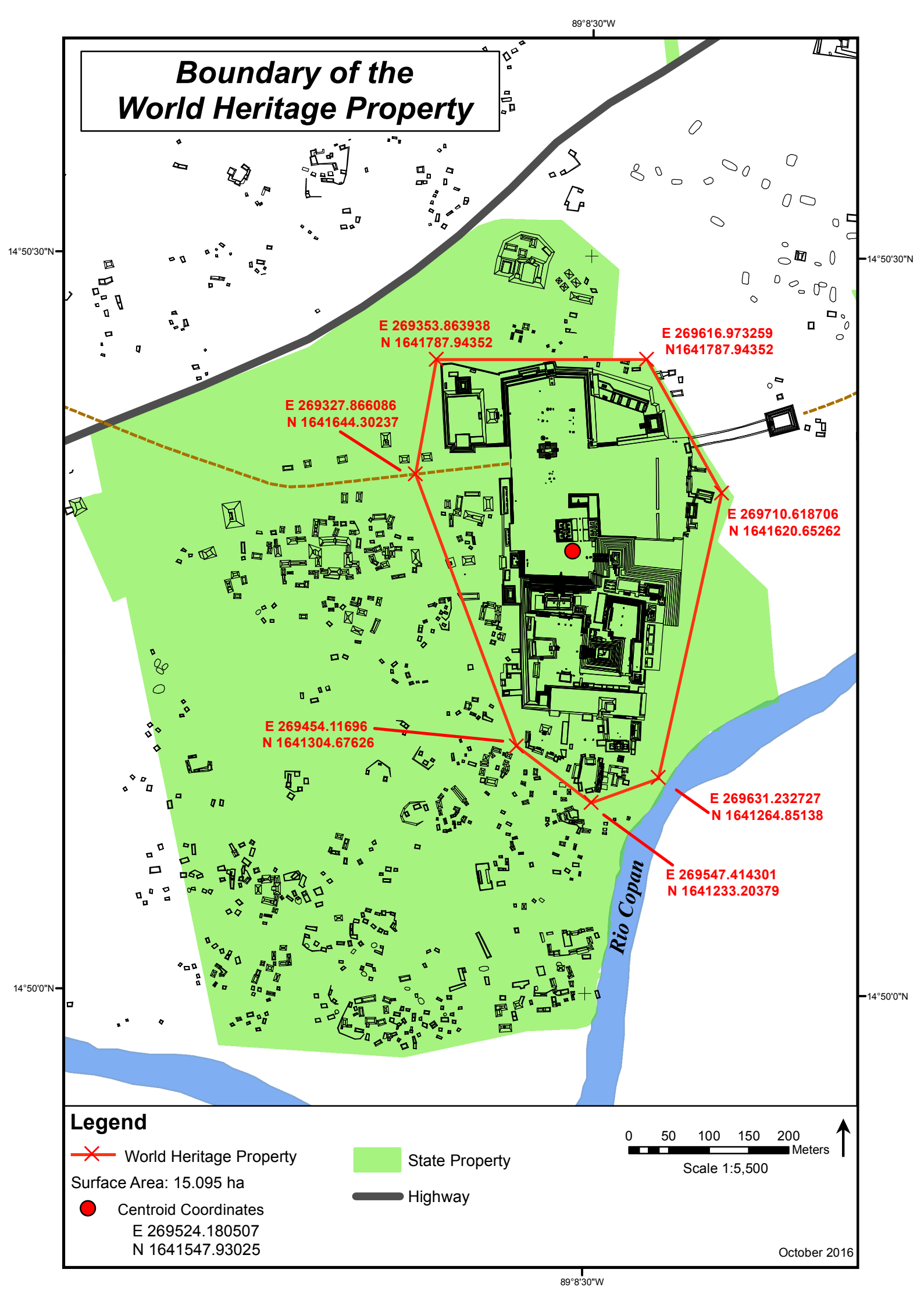
2.1. Boundary of the World Heritage Property (Map 2)

The boundary of the World Heritage Property is demarcated by a wire fence built in 1975 to replace a wall erected in the 1930's by the Carnegie Institution around the Principal Group of ruins.

It was Gustav Stromsvik of the Carnegie Institution who built a dry stone hedge around the principal group of ruins in 1935 to keep animals, especially cattle, away from the sculpted monuments. In 1975 the Honduran government pulled down the wall and replaced it with a wire fence to provide a better protection.

The descriptions in the nominations files of both the State Party (October 1979) and ICOMOS (May 1980) correspond to the monuments inside that physical boundary. This boundary therefore is consistent with the information in the nomination dossier and the evaluation of ICOMOS.

Figure 6: the wire fence from exterior


Boundary of the World Heritage Property
89°8'30"W
14°50'30"N
14°50'0"N
E 269353.863938
N 1641787.94352
E 269616.973259
N1641787.94352
E 269327.866086
N 1641644.30237
E 269710.618706
N 1641620.65262
E 269454.11696
N 1641304.67626
E 269631.232727
N 1641264.85138
E 269547.414301
N 1641233.20379
Rio Copan
Legend
World Heritage Property
Surface Area: 15.095 ha
Centroid Coordinates
E 269524.180507
N 1641547.93025
State Property
Highway
0 50 100 150 200
Meters
Scale 1:5,500
October 2016

2.2. Boundary of the buffer zone (Map 3)

2.2.1. Overview

The buffer zone is limited:
(1) to the south by the Copan River (flowing east-west)
(2) to the north by a line of hilltops: the objective is to preserve the cultural landscape between the world heritage property and those hilltops, including the quarry that provided the stones for the monuments
(3) to the east by the area called Sepulturas where resided the elite of ancient Copan
(4) to the west by a large area of pasture between the archaeological park and the village

2.2.2. Description

The boundary of the buffer zone is marked on the map by the points A, B, C, D, E, F and G.

1. The line A-B, western boundary from A (hilltop of Cerro Chino, figure 7) to B on the river, is the most important as it marks the geographical limit allowed for the expansion of the village. The area between the village and this line is a flood area little suitable for constructions.

2. The Copan River marks a physical boundary to the south (line B-C-D). Land use south of the river is exclusively agricultural and pasture.

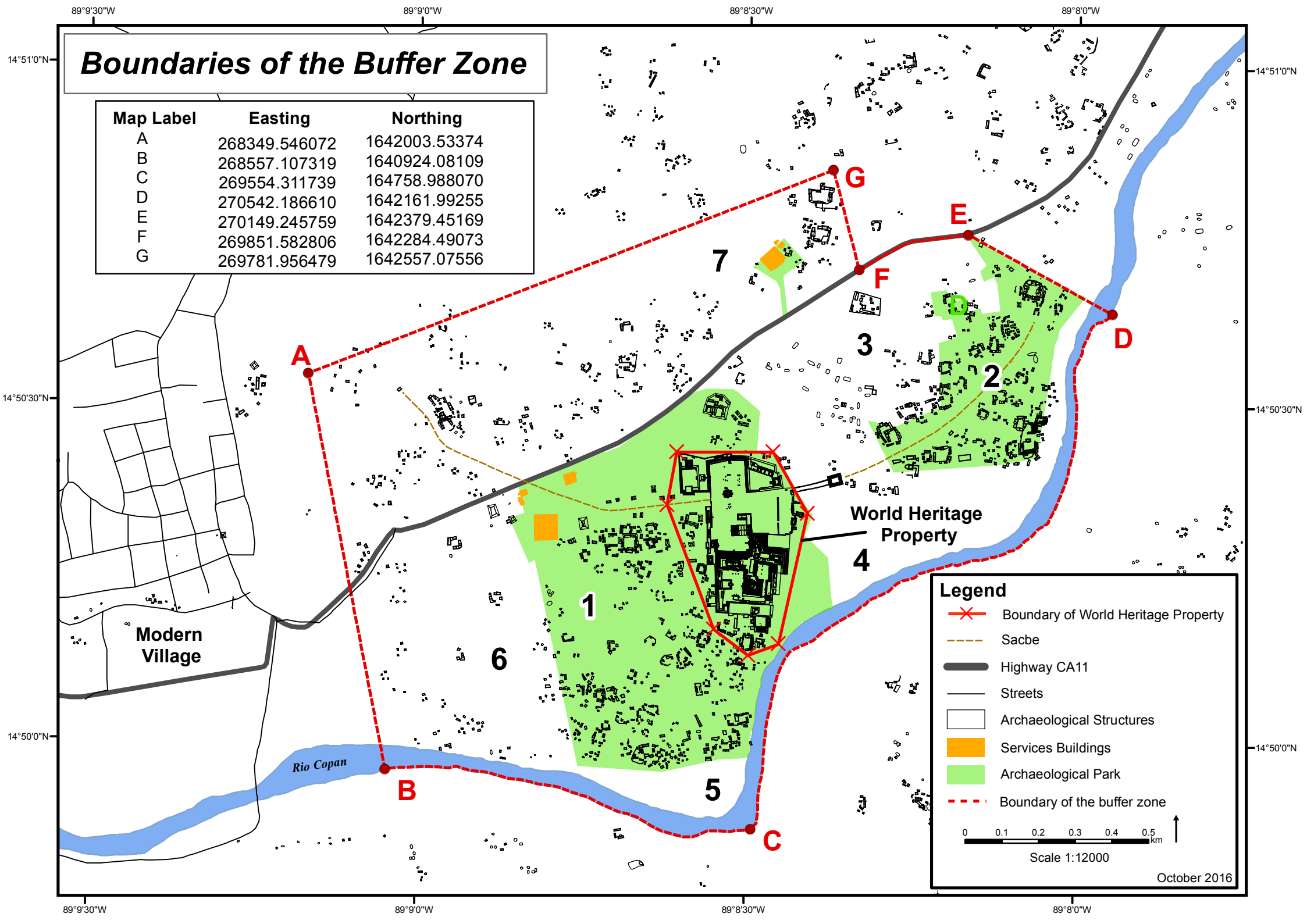
3. The line D-E, eastern boundary, corresponds to the limits of the area called Sepulturas from the river (D) to the road (E)

4. The line E-F follows the road over 350 meters

5. The line F-G is oriented north over 300 meters. The point G corresponds to a hilltop.

6. The line A-G corresponds to a skyline of three hilltops from A (Cerro Chino) to G.

Figure 7: Cerro Chino in the foreground (Point A) and the village in the background


Boundaries of the Buffer Zone
Map Label Easting Northing
A 268349.546072 1642003.53374
B 268557.107319 1640924.08109
C 269554.311739 164758.988070
D 270542.186610 1642161.99255
E 270149.245759 1642379.45169
F 269851.582806 1642284.49073
G 269781.956479 1642557.07556
89°9'30"W
89°9'0"W
89°8'30"W
89°8'0"W
14°51'0"N
14°50'30"N
14°50'0"N
A
B
C
D
E
F
G
1
2
3
4
5
6
7
World Heritage Property
Modern Village
Rio Copan
Legend
Boundary of World Heritage Property
Sacbe
Highway CA11
Streets
Archaeological Structures
Services Buildings
Archaeological Park
Boundary of the buffer zone
0 0.1 0.2 0.3 0.4 0.5 km
Scale 1:12000
October 2016

2.2.3. Distances from the World Heritage Property

Line A-B: 900 meters minimum
Line D-E: 900 meters minimum
Line A-G: 600 meters minimum

2.2.4. Ownership and land use

Areas 1 and 5 are State property, Areas 2, 3, 4, 6 and 7 are private property

Area 1 is state property managed by the IHAH for the exclusive use of visitors. The modern buildings in the northwest part include: visitor center, parking, museum of sculptures, cafeteria souvenir shop and a tourist information center.

Area 2, called Sepulturas, is private property administrated by the IHAH through an agreement with the owner (figure 8)

Areas 3 and 4 are private property, exclusively for agriculture of light impact such as maize. The state is considering the purchase of Area 4 to link the world heritage property with Sepulturas (area 2)

Area 5 is state property used by owner of Area 2 for agricultural purpose as a compensation for the use of Area 2 by the IHAH

Area 6 is private property, a flood-prone area unsuitable for constructions and agriculture, and used exclusively as pasture for livestock (figure 9). This area shields the archaeological park from the expansion of the village.

Area 7, north of the road, is private property used as pasture and to grow maize (figure 10).

Figure 8: The eastern side of the buffer zone with the area of Sepulturas (areas 2, 3 and 4)

Figure 9: The western side of the buffer zone, seen from the northern slopes (area 6)

Figure 10: The quarry on the northern slopes (area 7)

2.2.5. Regulations

1. World Heritage Property

The area is State property administered by the IHAH: the only changes acceptable are positive changes for investigation, for heritage protection and visitor safety.

2. Buffer zone

2.1: Exclusive zone: Areas 1 and 2 on the map

The only changes acceptable are positive changes for investigation, for heritage protection and visitors safety. However, a more flexible approach is acceptable in the northwest part of Area 1 where public facilities are located.

2.2. Zone of restricted activities: Areas 3, 4, 5, 6 and 7 on the map

Only low impact activities (agriculture and pasture) are allowed. Other low impact changes will be allowed if they are to satisfy a social or economic necessity without alternative, in which case an impact assessment will be undertaken and its recommendations implemented.

As all private properties belong to the same family, agreements with the IHAH and their supervision will be easier. The long term objective of the State is purchasing all private properties within the buffer zone, starting with Areas 2 and 4 in the short term, then Area 3.

Chapter 3

Decision 6: *Appreciates the efforts of the State Party to prepare the Management Plan and Carrying Capacity Study for the World Heritage property and also invites the State Party to undertake its revision with due consideration of the ICOMOS recommendations particularly regarding the action plan and financing strategy, tourism projections and visitor management and the participation of communities*

Management Plan / Action plan

The priorities of the action plan consider three important issues:

(1) Conservation

(2) Management

(3) Local community

1. Conservation: the preservation of sculpture is the highest priority.

2. Management:

    2.1. Mapping

    2.2. Financing

    2.3. Tourism: Visitor management / carrying capacity / interpretation

    2.4. Disaster risk preparedness

    2.5. Capacity building / staff training

3. Local community

    3.1. Communication

    3.3. Awareness-raising

    3.3. Education

    3.4. Participation of local people

    3.5. Sustainable development

4. Other issues

Chapter 3 / section 1: conservation

The most important issue is the preservation of sculpture which is an essential attribute of the Outstanding Universal Value of the Maya Site of Copan.

3.1. Preservation of sculptures

The backbone of this action is the Santander Program for Research and Conservation of Maya Sculpture, a comprehensive program for the conservation of Maya sculpture, funded by Banco Santander of Spain. The Santander Program is directed by Barbara and William Fash (Harvard University) who have been working on the sculpture of Copan for more than 35 years.

The associated experts include:

Dr. Nieves Valentin (IPCE: Instituto de Patrimonio Cultural de España)
Dr. Alberto Tagle (Netherland Institute for Cultural heritage, ICCROM)
Lilia Rivero (INAH-Mexico)
Valerie Magar (INAH-Mexico, ICCROM))
Architect Gionata Rizzi (Milan, ICCROM), expert on shelters
Blanca Niño Norton (ICOMOS)
Other experts from the Architecture Conservation Laboratory at University of Pennsylvania (Philadelphia), the National Institute of Anthropology and History (INAH) of Mexico, the National University of Mexico (UNAM).

The main components of the program are: 3D scanning, conservation and training.

3.1.1. 3D scanning of monuments in danger of erosion or loss.

From the start, the attention of the program focused on extremely high resolution 3D scanning of monuments and artefacts with high significance threatened by erosion or disintegration. Priority was given to the Hieroglyphic Stairway which is now totally scanned and for which both a virtual model and a solid model (at 1:10 scale) have been produced. Most of the modelled plaster sculptures that decorate Early Classic buried architecture uncovered in the Acropolis tunnels have also been scanned.
Besides the high quality documentation provided by the 3D scans, the technique will allow perfect replications of the monuments and artefacts when necessary, at whatever scale is required.

Figure 11: Scan of the panel of Temple Margarita

3.1.2. Conservation:

3.1.2.1. Sculpture Conservation Laboratory in the Copan Sculpture Museum.

A large room within the Sculpture Museum has been reconditioned into a modern laboratory for the preservation of stone and plaster sculpture. The facility hosted its first Conference and Workshop from August 22-26, 2016, and is now operational. This facility will be also available for laboratory analysis of plaster and stone sculpture samples from monuments of other sites in Honduras and in Guatemala.

3.1.2.2. Protective shelters of sculpture, particularly over the stelae. The flagship of this component is a new protective structure for the Hieroglyphic Stairway, based upon the recommendations of the Getty Conservation Institute report (see Chapter 4)

3.1.2.3. Conservation plan for tunnels

The conservation of the archaeological tunnels dug into the Acropolis by projects carried out in the 1930s, 1970s, and early 21st century has been a crucial issue for many years. In addition to architectural façades and features (including associated floors), there are numerous modelled stucco decorations that need careful monitoring. The plan has initiated high resolution 3D scanning of the sculptures, now being followed up by topographic survey with a robotic Total Station to produce 3D models of the entire tunnel system. The models will indicate which sections are original construction, sculpture, consolidation, and backfilled tunnels. In addition to the mapping and modelling of the tunnels, environmental monitoring is being carried out which follows up on earlier monitoring and assessments made by Dr. Nieves Valentín of IPCE.

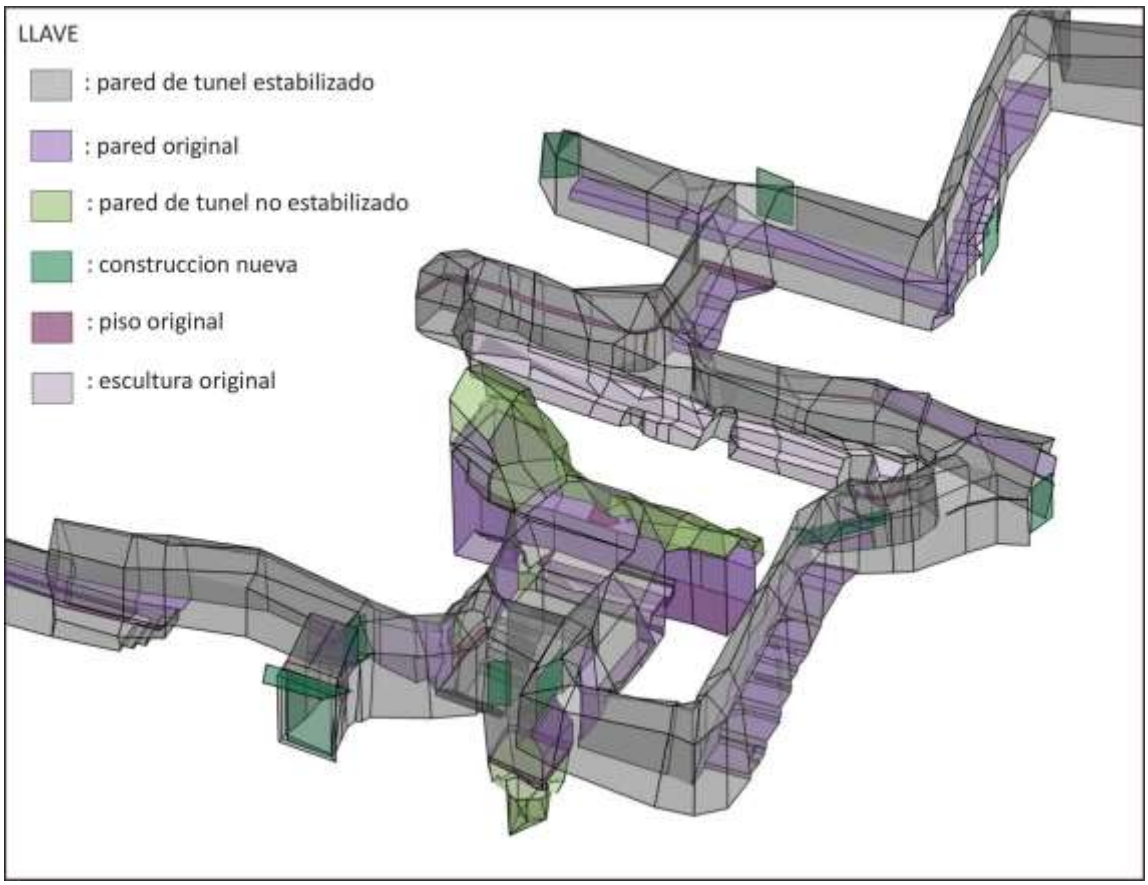


Figure 12: Map of a tunnel in the Acropolis (Laura Lacombe, Harvard University)

3.1.2.4. Collection management

The management of the collections is an integral part of the program of conservation. All archives on sculptures - catalogues, registers, drawings and photographic negatives – are being scanned and digitalized to create a databank that can be replicated and stored in different places for safety.

3.1.3. Training

Training of local technicians in sculpture conservation and collection management is an essential component of the program in order to assure its sustainability. This component, called COEDMAC (Conservación, Educación y Desarrollo de Museos Arqueológicos de Copan) includes interchanges of trainees with Guatemala and Mexico.

3.1.4. Other actions

3.1.4.1. An important contribution of the Santander Program is the creation of a network of exchanges between conservation staff in Copan and various relevant institutions in Guatemala and Mexico.

3.1.4.2. Another valuable activity concerns the education program and dissemination of results through community projects. An example is the exhibition called “Copan (1912-2012): One Hundred Years of Community” showing through photographs the interaction between the local people and the ruins over a century.
The Rastrojon Educational Program, coordinated by a teacher and member of the indigenous Chorti community under the auspices of the Santander Program, will organize visits and some practices for the local schools with the aim to raise awareness about the importance of cultural heritage.

Follow-up actions

Equipment and material for the Sculpture Conservation Laboratory	January – June 2017
Inauguration of the laboratory	July/August 2017
Shelter for the Hieroglyphic Stairway	See chapter 4

Chapter 3 / section 2: management / part 1: Mapping

3.2. Management

3.2.1. 3D Mapping and GIS: the MayaArch3D Project

A 3D map associated with a Geographic Information System is now an essential tool for the management of a complex archaeological site such as Copan and the area around it. Such work is being done at Copan through the MayaArch3D Project (www.MayaArch3D.org) funded by the U.S. and German governments.
The MayaArch3D Project has built a virtual research environment for the documentation and analysis of complex archaeological sites. Specifically, it is a web-based, 3D-GIS that can integrate 3D models of cities, landscapes, and objects with associated, geo-referenced archaeological data. This international, interdisciplinary project brings together archaeologists, art historians, and cultural resource managers with experts in geosciences, remote sensing, photogrammetry, 3D modeling, and virtual reality from various institutions in Germany, the US, Italy, and Honduras.

Project History

This project began as a small pilot project in 2009 on the Maya site of Copan, funded by two National Endowment for the Humanities grants, Digital Humanities Start-Up grants to the University of New Mexico (UNM). The work was carried out in close collaboration with ETH Zürich, FBK Trento, UC Merced and the German Archaeological Institute. It developed and beta-tested a pipeline and prototype 3D WebGIS called *QueryArch3D.* The project researches innovative approaches to integrate GIS, 3D digital models, and virtual reality (VR) environments online for teaching and research on ancient architecture and landscapes. It has grown into an international, interdisciplinary project that brings together art historians, archaeologists, and cultural resource managers with experts in remote sensing, photogrammetry, 3D modeling, and virtual reality.

Remote sensing of the Copan architecture and sculpture was undertaken by the 3D Optical Metrology Department (3DOM) of FBK Trento and ETH Zürich and GISciences at the University of Heidelberg. The aerial LiDAR data for the Copan valley was collected by WSI of Oregon, USA and further processed by FBK and GISciences, Heidelberg.

The MayaArch3D follow-up project is carried out by two project partners, the German Archaeological Institute (DAI) and the GIScience Research Group at the University of Heidelberg. The Project is funded by the German Federal Ministry of Education and Research (BMBF).

Project partners

German Archaeological Institute (DAI) –
University of Heidelberg: GIScience Research Group
Fondazione Bruno Kessler (FBK), Trento, Italy
University of Nebraska, Lincoln
Honduran Institute of Anthropology and History

Project summary

The goal of the MayaArch3D project is to develop a new research tool that offers the possibility to combine 3D-Models and the functions of Geographical Information Systems (GIS) for the documentation and analysis of archaeological sites on one internet platform. Two and three-dimensional data and models of different size and resolution will be integrated in a Geodatainfrastructure (GDI) with web-based, interactive features for analysis and visualization. Until now the online analysis of maps of settlements, their access and visibility, topography, architectural and landscape alignments, and spatio-temporal distribution of features was only conducted in 2D or 2.5D-views, now it will be possible in a 3D environment. In this way, information and objects that are housed in disparate collections around the world can be documented, geo-referenced, virtually combined and analyzed on one platform according to international data sharing and data security standards.

Implications for the management of Copan

The IHAH will have a state of the art tool for the management, protection and conservation of the site. The whole Copan pocket abounds with archaeological vestiges that are constantly threatened by development. Furthermore, the project will allow impact avoidance of the cultural landscape that can be seen from the Acropolis to the east.

Follow-up action:

Completion of the Geographic Information System

Chapter 3 / section 2: management / part 2: Financing strategy

3.2.2. Financing strategy

The allocation of financial resources for the preservation of the Outstanding Universal Values of Copan is a crucial concern of the IHAH. Support from projects like the Santander Program, the MayaArch3D, as well as from Japanese, Spanish and US cooperation agencies alleviate the financial burden. Projects have also been financed by international organizations such as the World Bank, the Inter-American Bank of Development, and the Central American Bank of Economic Integration (BCIE, that have allowed the building of infrastructure and improvements in administration. These supports will continue for several years in one form or another; nevertheless, the IHAH obviously needs to assure independent sustainable financial resources to secure the basic administration, protection and conservation of the site and its dependencies such as the research center (Centro Regional de Investigación Arqueológica) and the museums.

The main income for the IHAH is derived from government funding and the sale of tickets to visit the site. About half of the entry fees is reinvested in Copan, the other half being used to support other sites that receive few visitors. The IHAH seeks to increase the number of visitors to Copan as well as to other sites. If the other sites become self sufficient, a higher portion of the income would remain in Copan. A department of “Promotion and Sustainable Cultural Tourism” has been created to that effect, working in close relation with the Honduran Institute of Tourism and with the “Marca País” office that promotes the image of Honduras internationally. A corollary of this proposal is to make the site more attractive. It is a medium to long term objective to involve other stakeholders at the regional level, as it is the whole region that has to become more attractive. This work is being done progressively through strategic alliances with relevant people and institutions like the municipalities, chamber of commerce, development agencies and other bodies of civil society.

Although funding is inadequate, it should be improved through diversification. Another source of income being explored is the concession contract to operate some services: cafeteria, souvenir shop, tour operator, transports. The IHAH envisages buying (through an agency of the government) the land left by the river on the eastern side of the archaeological park. It would be a perfect place to create a popular park with cultural and natural attractions, like the reproduction of an ancient Maya village and garden, making the site more attractive and generating income through services.

Chapter 3 / section 2: management / part 3: Tourism

3.2.3. Tourism

The IHAH is aware that a balance must be found between the conservation of the property and its use.

3.2.3.1. Carrying capacity

An analysis conducted by the *Universidad Complutense de Madrid* (Hernandez et al. 2013) calculated the maximum carrying capacity at 1742 visitors at any given time. The current number of visitors does not come close to that maximum except when educational institutions visit the site on the last Thursday of each month. Since August 2016 the number of visitors from educational institutions has been limited to 500 per day, but this is a temporary palliative. The IHAH is seeking an agreement with the *Secretaria de Educación* to organize the visits of schools and colleges by way of electronic reservation with a limit of 300 students per day, allowing their distribution over the week. Such arrangement will provide an opportunity to educate young people on Cultural Heritage and especially on World Heritage (see section 3: Community, paragraph 3.3.3.)

3.2.3.2. Visitor management

Visitor management is a means essential for a sustainable tourism program. The annual visitor numbers have been stable over the last four years, ranging between 110,000 and 120,000. As the IHAH seeks an increase in visitor numbers, preparing the control of their flow becomes an urgent necessity. The first step is to analyze the statistics of visitors over the last three years. A book of visitors was started at the end of 2013 which registered the number of people entering the archaeological park, the exact time of their entry, their origin (country or city for nationals), their type of travel (individual, family, association, education institution, travel agency) and the number of nights they spent in the village. These statistics will allow the creation of a pattern of the flow of visitors and their quality over a year. From this model a strategy will be developed to harness the flow of visitors, and thus avoid surpassing the site's carrying capacity. The model will also serve as a baseline to monitor the increase of tourists.

The IHAH is drawing a policy based on the sustainable tourism program that can be found on the website of UNESCO. The policy will promote broad-based stakeholder engagement in the planning, development and management of tourism in the region, especially through cooperation with the tourist industry.

3.2.3.3. Interpretation

The IHAH is also revising the interpretation program of the site based on the "ICOMOS Charter for the Interpretation and Presentation of Cultural Heritage Sites" and that will involve all stakeholders in the region.

The interpretation and presentation of Copan will facilitate the understanding of the significance of the site, its Outstanding Universal Values, and will insist on the preservation of these values. Different trails are being established according to the needs of different types of visitors, with a specific attention to young people.

Chapter 3 / section 2: management / part 4: Disaster risk preparedness

3.2.4. Disaster risk preparedness

A Disaster Risk Management plan is being drawn by the IHAH in conjunction with the Fire Brigade of the village of Copan Ruinas and COPECO (Comité Permanente de Contingencias) that operate at a national level.

The three risks identified are: (1) fire, (2) flood, (3) earthquake

1. Fire

Fire is the highest risk, especially during the dry season (February to May). Most fires are man-made, and largely due to negligence. Fire prevention starts with awareness-raising among the public, the park staff and the land owners within the buffer zone. The creation of a fire brigade in the village of Copan Ruinas in 2015 now permits a swift response in case of emergency.

2. Flood

The proximity of the river creates a risk of flood. Protective walls on the river banks have been erected and reinforced after the flood of 1998. The stability of these walls is regularly monitored.

3. Earthquake

While not that common at Copan, earthquakes do occur and could potentially cause significant damage. Training of staff is thus of crucial importance for an immediate response and inspection of such damage to the site.

Awareness-raising, training and swift reaction are the keys to mitigating disaster impact. A workshop with the fire brigade and COPECO is in preparation. Its priority is to raise awareness and understanding among stakeholders of disaster risk management, then to build capacity to respond efficiently to disaster. The DRM will include a prevention plan and a reaction plan, both focusing on the preservation of the outstanding values of the World Heritage property. The DRM plan is expected to be ready by February 2017, before the dry season.

Chapter 3 / section 2: management / part 5: Capacity building / staff training

3.2.5. Capacity building / staff training

The management of the Copan Archaeological Park needs human resources with various levels of qualification: professional archaeologists, qualified technicians in fields such as site management, conservation, restoration, museum exhibition, collections and archives management, topography and mapping, maintenance of natural environment, and also workers properly trained to bring support to the archaeologists and the qualified technicians. All the staff of the IHAH in Copan is from the two villages of Copan Ruinas and Santa Rita, close to the Copan Archaeological Park

All archaeological projects are an opportunity to train local people for the benefits of the site and the community. The research contract includes a clause that requires employing local people and providing the proper training. At the level of archaeologist, Jorge Ramos from Santa Rita received a Ph.D. at University of California in 2008. He has been co-director with William Fash of the Rastrojon Project (Santander Program), and is now co-director with Li Xinwei of a project of the Institute of Archaeology of the Chinese Academy of Social Sciences (IACASS) of Beijing. A young man from Copan Ruinas is at CUNY (City University of New-York) enrolled in a Master in Anthropology. A young woman from Santa Rita is following a "Licenciatura" cursus in Archaeology at the Universidad del Valle in Guatemala. These three individuals received grants and other financial support from the Asociación Copán, CUNY and Harvard University.

The Santander Program is training highly qualified technicians in the preservation of sculptures, artifact restoration and the management of collections and archives. They are all from the village of Copan Ruinas. One of them, a young woman who managed to gain an M.B.A. while learning stone preservation, will be the director of the Sculpture Conservation Laboratory.

The MayaArch 3D project is training students of the Honduran National University (IARPACUNA program) in Geographic Information Systems and Virtual Reality with a view to enhancing the management of cultural and natural resources.

The employees with simple tasks of maintenance are regularly trained to understand the importance of their daily routine in the preservation of the Outstanding Universal Value of the site.

While the human resource in conservation is becoming adequate to the task, there is a deficiency in qualified professional cultural heritage managers. Capacity building for managers is thus a high priority of the IHAH. A training program, commencing in January 2017 on ad hoc basis and developing into a permanent program by mid 2017, will be opened to all site managers in Honduras. Its syllabus will include planning, implementation and monitoring as the basic topics but also include others such as community outreach and youth education.

Chapter 3 / section 3: Community

3.3. Community

The participation of local community is now seen as an essential constituent of site management. For years there was a void between the IHAH and the neighboring community; but this situation has changed over the last two years. The IHAH has improved communication with the local authorities and civil organizations in order to raise awareness leading to a sustainable development of the site.

3.3.1. Communication

Formal relations have been established with the municipality of the village of Copan Ruinas. The agreement includes consultations before any development and joint ventures to develop tourism are pursued. A similar agreement has been established with the Chamber of Commerce and Tourism of Copan, and a covenant has been arranged with the indigenous organizations (CONIMCHH and CONADIMCH) for a genuine collaboration.

Follow-up action: creation of a mechanism of coordination and consultation that will include all stakeholders.

3.3.2. Awareness-raising

Thanks to these promising new relations, progress towards a permanent awareness-raising program is being developed. Both government authorities and local people are becoming legitimate stakeholders in the management of the archaeological park. However, there is still room for improvement through community outreach in order to achieve greater awareness, in particular in the understanding of the Outstanding Universal Value.

With the support of the Japanese embassy the IHAH and the municipality have remodeled an old school into a modern community museum which is a showcase for the benefits that the community may receive from its cultural and natural heritage. It displays interventions that have saved heritage from destruction as well as the history of interaction between the ruins and the community, showing how a proper management of the cultural heritage may lead to prosperity for all.

An example of successful awareness-raising is the “Macaw in liberty” program that released about 50 macaws in the archaeological park and its surroundings. The macaw was a sacred bird for the ancient Mayas. This program included an educational segment to avoid the killing of the birds by the population and to warn the authorities when a bird is seen in danger. Subsequently, these birds are now seen flying all over the valley without harm by locals.

Follow-up action: program of awareness-raising through the local TV channels and local radios

3.3.3. Education

Awareness-raising must start with young people. To this effect a children's museum, "Casa Kinich", has been set up and is run by the Asociacion Copan in an old military compound refurbished by the same Asociación in agreement with the municipality through financing by the World Bank. A guide for teachers has been written and will be published through the Santander Program. The entrance is free for all children.

A joint venture of the IHAH, the Santander Program and the Welchez Foundation is organizing a program of educational visits of the site of Rastrojón excavated and restored by the Santander Program. This program is led by a young indigenous Chorti man who is a local school teacher and has worked for years with the projects run by Harvard University.

The IHAH intends to set up an agreement with the Secretaria de Educación to make the visits to the archaeological park by schools and colleges more efficient in terms of education. These visits are indeed a magnificent opportunity to raise awareness about the importance of cultural and natural heritage in the minds of young people, and especially to explain the notion of Outstanding Universal Values of the Maya Site of Copan. The UNESCO kit for children will serve as the basis for this educational project. Also the input of IARPACUNA (a program of UNAH) will be essential to this program.

Follow-up action: agreement with the Ministry of Education

3.3.4. Participation of local people

Participation of local people in the management of the site is (1) direct by employment in the administration and the research projects, (2) indirect through the municipality, the Chamber of Commerce and the indigenous organization.

3.3.4.1. Direct employment

All people working at the archaeological park and with the research projects are from the villages of Copan Ruinas and Santa Rita and especially from the rural zones. The following table shows the employment figures:

Institution	Technicians / administation	employees
Archaeological Park	18 (4 women)	20 (8 women)
Santander Program	7 (3 women)	1
Asociacion Copan/IARPACUNA	4	3
Japanese project	10	14
Chinese project	5	15
University of New York	2	3
Total	46	56

Beside the regular income provided to the families, all these workers are aware of the importance of cultural heritage and they transmit that awareness to those around them.

Tour guides

About 20 guides, all from the village of Copan Ruinas, have been trained by the IHAH. A permanent training program is underway to enhance their collaboration in the visitor management process.

3.3.4.2. Indirect employment

The Municipality and the Chamber of Commerce work in agreement with the IHAH to promote tourism in Copan.

The indigenous organizations

Facilities for the sales of indigenous handicraft are being provided by the IHAH, and events will be organized to promote the immaterial heritage of Maya culture. As an example, indigenous women have prepared a medicinal plants lexicon with the help of a professional biologist.

3.3.5. Sustainable development

The expected result of the collaboration between the IHAH and the community is sustainable development. The combination of communication, awareness, education and participation will lead towards a sustainable development whereby the community can reach a decent level of prosperity without harm to the Outstanding Universal Value of the World Heritage Property.

The environmental, economic and social dimensions are regarded as the three “pillars” of sustainable development. The alliance between the IHAH and the Municipality will preserve the significance of the site and its surroundings. The agreement with the Chamber of Commerce will promote an economic development without harming the cultural and natural values of the World Heritage property and the buffer zone. The covenant with the indigenous organizations will promote social equity and the preservation of the rural area.

Chapter 3 / section 4: other issues

3.4. Other issues

3.4.1. Monitoring program

The deficiency in trained managers has lead to a deficiency in the implementation of management plans and obviously in the monitoring of implementation. In fact, beside the conservation program which is properly monitored with adequate indicators, the general management is not using indicators to measure the efficiency of its activity. This is another area for which there is much room for improvement.

A permanent monitoring program will be developed, starting with a baseline and defining simple indicators that the managers will be able to handle. After proper training these indicators will be refined and put into practice.

Follow-up action: An annual agenda will be established to control the progress of implementation and monitoring.

3.4.2. Law enforcement

Enforcement of the law for the protection of cultural heritage has considerably improved over the last two years, thanks to more efficient cooperation with the local authorities and more awareness of the civil society.

The IHAH is defining a set of rules to be followed before any change in the cultural landscape is made. These rules, based on the UNESCO-ICOMOS document of 2011 ICOMOS 2011), drawn in agreement with the judicial authorities, will be enshrined as the legal process for the Heritage impact assessment preceding a potential development.

3.4.3. Research agenda

The IHAH seeks to establish an agenda to privilege scientific research that will allow a better management of the cultural and natural heritage. Some steps are being taken in that direction through an agreement with the UNAH (Universidad Nacional Autonoma de Honduras). The UNAH has commenced a research program called IARPACUNA (Instituto para la Arqueoastronomia y el Patrimonio Cultural y Natural) to provide a complete inventory of species (fauna and flora)in the whole Copan Valley that will be integrated in a Geographic Information System.

Chapter 4

Decision 7: *Also requests the State Party to keep it informed of further developments in the design and testing results of the protective structure of the Hieroglyphic Stairway*

Figure 13: The Hieroglyphic Stairway without shelter

The protective structure of the Hieroglyphic Stairway

The project of protective structure of the Hieroglyphic Stairway is a component of the Santander Program (see Chapter 3).

A modified and updated 1:5 scale prototype of the design recommended in the Getty Conservation Institute report by the original architect, Gionata Rizzi, was installed in 2011. After 5 years of field testing, the experts have agreed on the design of the structure. However there is still some ongoing discussion about the kind of material best suited for fabricating the “sails” and the tensile strength needed for the cables that will sustain them.

History

Discovered in 1895 by Alfred Percival Maudslay, the Hieroglyphic Stairway was cleared by the Peabody Museum in 1893 and the lower section excavated. The reconstruction by the Carnegie Institution, started in 1937, was completed in 1942. Already in 1946, some deterioration was noticed, and when Copan was declared a World Heritage site in 1980 with the Hieroglyphic Stairway as the most significant feature of its Outstanding Universal Value, such deterioration became the most important issue of conservation.

In 1983, a meeting of experts on stone deterioration recommended sheltering tests among other proposals. A large canvas tarpaulin sustained by three main cables was then installed over the Stairway before the 1985 rainy season. As part of its maintenance the cover was replaced regularly every three years, each time with some improvements based on accumulated experience.

Figure 14: The tarpaulin over the Hieroglyphic Stairway

In 1999 the Getty Conservation Institute undertook a three year project to analyze conditions of the Stairway and to determine the actions to be taken for its conservation. The study recognized that the protective shelter had provided for stability of the stairway blocks, keeping the stone surfaces dry, reducing the daily environment variations, and drastically limiting microbiological growth. However, it was noted that heat was trapped at the top of the monument by the current design, and that aesthetically it would be preferable to create a shelter where the monument was visible beyond the shelter. Among other proposals, the final report recommended to continue the use of a protective shelter, either a modified version of the current system with some improvements, or a new, permanent shelter. Four design concepts for a new protective shelter

were proposed by architect Gionata Rizzi who has broad experience on shelters for monuments and sites around the world. Experts favored the so-called “Cascading Sails” design for its simplicity and its apparent efficiency.

The Cascading Sails design

From its inception in 2010, the Santander Program decided to apply the recommendations of the Getty report, including the new protective shelter with the Cascading Sails design. In 2011, Gionata Rizzi set up a 1:5 prototype to be tested in the restored residential architectural area known as “Sepulturas” in the Copan Valley. The place was selected to recreate similar conditions as those of the Hieroglyphic Stairway: facing west, close to the river, and surrounded by trees. The prototype used three different materials (acrylic, fiberglass and polyvinyl) of different thickness and colors.

Follow-up actions

action	date
Installation of another tarpaulin	November 2016
More tests of materials in laboratory	2017 - 2018
Decision on the final design and material	End of 2018
Installation of the Cascading Sails protective structure	End of 2019

Figure 15: Prototype of the “Cascading Sails” protective structure for the Hieroglyphic Stairway

Chapter 5

Other topics

The World heritage Center has established a list of 9 topics to be considered:

- R1 – Create a public-private Task Force coordinated by IHAH to redesign the management plan (with objectives, activities, outcomes, indicators, budget, and the stakeholders involved) and an associated financial resources strategy.

→ This is being implemented and should give first results at the end of 2017

- R2 – Include a coordination strategy in the action plan between the Maya Site of Copan with other associated archaeological sites in the area, such as Río Amarillo/La Castellona and/or Piedras Negras located near the aerodrome. It would be necessary to develop a strategy to create commercial points in order to control the informal activity around the aerodrome and the archaeological sites of Rio Amarillo and Copan.

→ The sites of Copan and Rio Amarillo are being managed as one site. Piedras Negras has only a research value and is being explored by the City University of New York. The only informal activity is at the entrance of the Copan Archaeological Park. The government has planned to reconstruct the road between La Entrada and Copan; this will be an opportunity to move the informal activity away from the entrance and provide them with facilities to continue their trade.

- R3 – Promote networking with other Maya sites included in the World Heritage List to share experiences and the best practices in management plans and their implementation.

→ The Santander Program has established a network with other sites in Guatemala and Mexico to share the best practices in conservation. This network can be expanded in the next future to include best practices in management.

- R4 – Establish a methodological framework for carrying capacity studies in protected archaeological sites linked to their management plans.

→ This is being done (see chapter 3/ section 2 / part 3)

- R5 – Promote a real sustainable tourism initiative according to the recommendations of the World Heritage and Sustainable Tourism Programme and in joint action with the Instituto Hondureño de Turismo (IHT).

→ See chapter 3 / section 2 / part 3

- R6 – Establish new trails according to the needs of the tourism sector and be consistent with the arrival of groups with limited time (such as cruise tourists and half-day trips by plane). It also would be important to promote an interpretive trail integrating environment and archaeology.

→ See chapter 3 / section 2 / part 3

* R7 – Consider a pre-sale electronic ticket payment system that allows not only a forecast of visitors but also allows their distribution within a schedule and the proposal of other sites that could contribute to a territorial distribution of visitors.

→ A pre-sale electronic payment system is envisaged with tour operators. Also an electronic reservation for school visit will be put in place in February 2017.

- R8 – Confirm in the management plan the prohibition for airlines and charter flights to fly over the archaeological site.

→ See chapter 1

- R9 - Redesign the management plan (including communication) so that it contributes to improving the quality of life of Copan citizens, generating opportunities and inclusiveness, and promote community involvement and sustainable tourism development. Actions regarding the informal selling of handicrafts, community-based tourism initiatives and an active participation of all stakeholders are urgently needed.

→ See R2 and chapter 3/ section 3/ paragraphs 3.3.4.and 3.3.5.

The trend to a participatory system of management is just starting at Copan. The problematic involved in such a system will find answers in the medium to long term. Given time, all these topics will be properly addressed.

Conclusions

All the specific decisions of the World Heritage Committee (airport, boundaries, hieroglyphic stairway) have been addressed. The revision of the management plan is still in progress.

While the conservation programs are running smoothly, the management plan has many deficiencies. The IHAH is aware that the management system needs a complete overhaul. It will take time and additional funding. Priority is given to:

1. Diversification of funding. While Government allocation and tourist entry fees will continue to be the main source of funding, alliances with local and national business could improve financial resources, as well as more international cooperation.

2. Capacity building. There is an obvious need of knowledge in best practices and skills to set up a management platform. A permanent training course in management will start in January 2017 on the basis of the UNESCO manual "Managing Cultural World Heritage" and other guides also published by UNESCO and ICOMOS.

3. Community outreach. While the first steps towards the local community have been taken, it remains to enforce collaboration with the IHAH. The direct input of the community in management decisions is currently very low. The IHAH is seeking a commitment from local people to establish a platform of consultation and coordination. Such an engagement of the community should improve the efficiency of management and ensure a sustainable development outcome.

5. Implementation and monitoring. These are the great deficiencies of management. Proper funding, capacity building and engagement of the community are the three pillars necessary to build up efficiency in these areas of management.

The year 2016 has seen a reorientation of the approach to management with the first steps taken to communicate with local people. The year 2017 will see a reinforcement of that orientation with a permanent program to build capacities among managers and stakeholders.

A more complete report will be sent at the end of January 2017, and updates on management will be sent at the end of April 2017.

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