IUCN Conservation Outlook Assessment 2014 **(archived)**
Finalised on 31 August 2014

Please note: this is an archived Conservation Outlook Assessment for Ancient Maya City and Protected Tropical Forests of Calakmul, Campeche. To access the most up-to-date Conservation Outlook Assessment for this site, please visit https://www.worldheritageoutlook.iucn.org.

Ancient Maya City and Protected Tropical Forests of Calakmul, Campeche

SITE INFORMATION

Country:
Mexico
Inscribed in: 2014
Criteria:
(i) (ii) (iii) (iv) (ix) (x)

Site description:

The site is located in the central/southern portion of the Yucatán Peninsula, in southern Mexico and includes the remains of the important Maya city Calakmul, set deep in the tropical forest of the Tierras Bajas. The city played a key role in the history of this region for more than twelve centuries and is characterized by well-preserved structures providing a vivid picture of life in an ancient Maya capital. The property also falls within the Mesoamerica biodiversity hotspot, the third largest in the world, encompassing all subtropical and tropical ecosystems from central Mexico to the Panama Canal.
© UNESCO

SUMMARY

2014 Conservation Outlook

Significant concern

The property is located within the wider Maya Forest and constitutes an integral and important component in the transboundary network of protected areas within that region. Forest loss and degradation in the Maya Forest are well-documented and will take a toll on the values of Calakmul unless mitigated and managed. Increased communication, coordination and cooperation between governmental and non-governmental actors, governmental levels and sectors and across international boundaries is needed. Public policies at the regional, national and state level require more meaningful consideration of the exceptional natural and cultural heritage of the Selva Maya. Even though the inscribed property enjoys formally adequate legal protection and structured management there are well-documented and serious concerns about the configuration and zonation of the protected area since the establishment of the biosphere reserve. Many observers have consistently stressed the shortcomings of the boundaries and zonation from both a socio-economic and a nature conservation perspective. While the history and consequences of past human use are remarkable basis for a human-environment forest system, much of the contemporary resource use is unsustainable. Some illegal resource uses may require reassessment while clearly damaging illegal resource use requires stricter enforcement of existing laws. Despite many challenges, the increased visibility and political interest that comes with World Heritage status of the now significantly enlarged area provides an opportunity to re-visit the management and conservation of Calakmul, including in light of the many other protected areas nearby.

Current state and trend of VALUES

High Concern
Trend: Deteriorating

The fast and ongoing land use changes and the loss and degradation of the wider Maya Forest undoubtedly have further direct and indirect impacts on the

property. While still impressive, the renowned wildlife populations of Calakmul face increasing pressure from poaching, trade and, in the case of large cats, also predator control. The coincidence of conflicts and the limited ability to enforce existing laws calls for more participatory ways of understanding and negotiating local resource use.

Overall THREATS

High Threat

Calakmul benefits from its relatively central position within the larger Maya Forest and the de facto buffering functions through various large protected areas, including in Guatemala to the South. Ongoing forest loss and degradation in the wider region continue to pose a risk to long term conservation and landscape connectivity. This includes longstanding infrastructure plans at the regional level and more recent plans to invest in tourism development. Tourism development comes with opportunities, but also raises important management questions, including as regards access roads and water and waste management. Within the property and its buffer zone, there are ongoing strong concerns about uncontrolled use, aggravated by questionable boundaries and zonation and a lack of boundary demarcation. Natural disturbance factors such as fire and hurricanes are expected to result in stronger impacts as a function of anticipated climate change.

Overall PROTECTION and MANAGEMENT

Some Concern

The area has long benefited from its remoteness and limited infrastructure in addition to a high degree of natural protection from the by vast surrounding forest areas. The formal protection was a key step in countering the governmental policies promoting regional development based on unsustainable exploitation of natural resources and poorly adapted land use. The drastic policy shift prevented the cultural and natural heritage from exploitation while also leading to poorly communicated and negotiated exclusion of local communities from traditionally used resources. Uncontrolled resource use and conflicts are common. Landscape level planning requires better coordination and cooperation across sectors and administrative boundaries. Management planning is well-structured but requires consolidated implementation and adequate resources. One particular concern is the insufficient coordination between agencies in

charge of cultural and natural heritage, respectively. It is hoped that the inscription as a mixed site will encourage enhanced coordination.

FULL ASSESSMENT

Description of values

Values

World Heritage values

- **Major and highly valuable remnant of a vast human-environment forest system**
  Criterion:(ix)

  At slightly more than 300,000 hectares with an even larger buffer zone the property is a large and well-protected example of the coupled human-environment system sometimes referred to as the Selva Maya or Maya Forest (IUCN, 2014, Lawrence et al., 2004). Located in Southern Mexico along the border with Guatemala, the property and its buffer zone are embedded in a vast and extraordinary seasonal tropical forest system that extends into Guatemala, Belize and to a smaller extent El Salvador. Following historic conversion and modification during the highly sophisticated Maya civilization, the forests continue to be shaped by past human use (IUCN, 2014).

- **Rare species and high species richness**
  Criterion:(x)

  The forests within and beyond the property boast a remarkable species richness and provide critical habitats for numerous rare and threatened species. The Maya Forest is a heterogeneous landscape mosaic, including closed forests, seasonally inundated lowland forests and grasslands. Accordingly, the property offers a wide array of habitats and niches for a highly diverse flora and fauna (IUCN, 2014, The Nature Conservancy n.d.). The vertebrate fauna is particularly noteworthy, with charismatic species including two endangered species of primates, Yucatán Black Howler Monkey

(Alouatta pigra) and Geoffroy’s Spider Monkey (Ateles geoffroyi). Calakmul is also home to important populations of the endangered Baird's Tapir (Tapirus bairdii). Five out of the six feline species of the region have been reported, including the near-threatened Jaguar (Panthera onca,) and a large number of birds (IUCN, 2014 and IUCN Red List).

Other important biodiversity values

► Importance in regional connectivity

Many of the above values, such as major populations of large vertebrates, depend on habitats and landscape connectivity beyond the scale of the property. The property is a large and important component of the national and regional protected areas network, within and beyond the Maya Forest. Jointly with the contiguous Area de Proteccion de Flora y Fauna Bala'an K'aax in the adjacent Mexican state of Quintana Roo, as well as with Mirador-Rio Azul National Park and Biotopo Naachtn-Dos Lagunas in Guatemala, which in turn is contiguous with the Rio Bravo Conservation and Management Areas in Belize, the property forms a major protected area cluster. Despite important land use change in the wider forest region the property has maintained ecological linkages across the borders into Guatemala and Belize and to the Mexican Caribbean coast.

► Remarkable geology and geomorphology

While not inscribed under criterion (viii) the property has a noteworthy karst geology featuring a wide spectrum of corresponding surface expressions. In a region of extremely scarce surface water, in particularly during the dry season, evaporites retaining water in so-called aguadas are crucial for both human beings and wildlife, constituting a direct link between the geology of the region, its biodiversity and human history (IUCN, 2014, Government of Mexico, 2013).

Assessment information

Threats

Current Threats

High Threat

Among the particularities of Calakmul is the fact that it is not only a fairly large site but also one that is embedded in a vast forest landscape. The property is contiguous with several other protected areas. Given the increasing pressures on this landscape in all countries, there is a risk of isolation unless functions and connectivity can be maintained at landscape levels beyond the property. Challenges in terms of insufficient sector coordination at the landscape and at the protected area level are well documented. In the property itself and its immediate surroundings, there continue to be concerns about poor natural resources management, uncontrolled resource use, including for illicit trade, and tensions with local communities.

► Logging/ Wood Harvesting, Other Biological Resource Use

High Threat
Inside site
Outside site

Widespread uncontrolled extraction of timber and non-timber forest products, including for illegal trade in plants, wildlife and wildlife derivates with multiple direct and indirect effects on the ecosystem and its natural values (e.g. IUCN, 2014, Government of Mexico, 2013, Garcia-Frapolli et al., 2009, TNC n.d.).

► Logging/ Wood Harvesting

High Threat
Outside site

Well-documented ongoing and intensified forest loss and degradation in the Maya Forest impacting on the overall integrity of the natural resources in the

region, including the property. This is partially driven by population growth, migration and improved access through improving road infrastructure (e.g. Government of Mexico, 2013, Garcia-Frapolli et al. 2009, TNC n.d., Ericson et al., 1999). The land use change coincides with a poor boundary design and zonation.

► Crops, Livestock Farming / Grazing

High Threat
Inside site
Outside site

While small-scale in the property, both subsistence and commercial agriculture and cattle-raising cause consistent concern, aggravated by inadequate land use practices by immigrants from other parts of Mexico (e.g. Government of Mexico, 2013, Garcia-Frapolli et al. 2009, TNC n.d.).

► Fire/ Fire Suppression

Low Threat
Inside site
Outside site

Fires are a major natural disturbance factor but also a land clearance tool leading to an overlap between natural and anthropogenic factors. Risks of accidental fires could be increased by improved visitor access. There are some concerns about structural changes in the ecosystem and the role of fire in it, as dry seasons are expected to become more pronounced (Government of Mexico, 2013).

► Dams/ Water Management or Use

High Threat
Outside site

Inappropriate use of vulnerable freshwater resources (e.g. Government of Mexico 2013).

► Invasive Non-Native/ Alien Species

Low Threat

Inside site
Outside site

Challenges include for example predation by feral pigs and Bracken Fern competing with native vegetation (e.g. Earp, 2011, Government of Mexico, 2013). Bracken fern (Pteridium aquilinum) is documented to be an agent of land use change causing many agricultural spaces to be abandoned (e.g. Earp, 2011, Schneider 2004). Reported feral and non-native vertebrate species include pigs, cattle, turkeys and Tilapia (Government of Mexico, 2013).

Potential Threats

High Threat

In light of the publicly announced plans to promote tourism following World Heritage inscription, there is serious concern about the direct and indirect impacts of such development. New access and visitor infrastructure, increased water demand, waste and waste water management all would pose new challenges in the property which today receives very limited numbers of tourists.

► Temperature changes

High Threat
Inside site
Outside site

Increasing risk of droughts and occurrence of hurricanes may exceed the resilience of the system despite adaptations to these natural disturbance factors.

► Tourism/ visitors/ recreation

High Threat
Inside site
Outside site

While current visitation is modest due to the location and limited access and facilities, highest level political statements and press releases leave no doubt about plans to promote tourism. This includes investments in access infrastructure and local tourism infrastructure.

► Utility / Service Lines, Roads/ Railroads

High Threat
Inside site
Outside site

Regional plans to improve road infrastructure, including access to the marginalized Petén region of Guatemala under the Mesoamerica Project, formerly known as Plan Puebla Panama (www.proyectomesoamerica.org/). Regional infrastructure plans include plans for power lines and communication infrastructure under. One road crosses the buffer zone of the property.

Protection and management

Assessing Protection and Management

► Relationships with local people

Serious Concern

The resource use conflicts with mostly poor local communities since the establishment of the protected area are well documented (e.g. Gaudry Sada 2013, García-Frapolli et al. 2009, Andrews 2006, Galindo-Leal, 1988).

► Legal framework and enforcement

Some Concern

While there is an adequate legal framework for both cultural and natural heritage, there are strong concerns about law enforcement and insufficient harmonization between nature conservation and other sectors.

► Integration into regional and national planning systems

Serious Concern

Lack of coherence of sector policies at the national level and across the international boundaries is widely recognized as ongoing key challenge.

► Management system

Some Concern

Community involvement is formally possible but conflicts persist going back to the lack of involving local communities in the establishment of the biosphere reserve (García-Frapolli et al. 2009, Andrews 2006, Galindo-Leal, 1988).

► Management effectiveness

Some Concern

Lack of system in place for assessing management effectiveness (IUCN 2013).

► Implementation of Committee decisions and recommendations

Data Deficient

The 2014 inscription decision (38COM 8B.16) included a number of requests and additionally encouraged defined conservation activities.

► Boundaries

Serious Concern

A function of land tenure and administrative boundaries, there is a longstanding and consistent documentation of shortcomings of both the boundary design and the zonation (e.g. Galindo-Leal 1988). In addition, the boundaries are not demarcated. The buffer zone design seems only partially compatible with the basic functions of buffer zones.

► Sustainable finance

Mostly Effective

The Calakmul Biosphere Reserve receives annual budgets from the National Commission of Natural Protected Areas which covers the main operational costs. The site also receives grants for some community programmes. Additional funding comes from the Mexican Fund for the Conservation of Nature and the GEF (Nomination file, 2013).

► Staff training and development

Some Concern

There are strong indications that skills to facilitate public participation leave much room for improvement (García-Frapolli et al. 2009, Andrews 2006, Galindo-Leal, 1988).

► Sustainable use

Some Concern

Separation of use regimes according to a zonation which was not negotiated with local communities (García-Frapolli et al. 2009, Andrews 2006, Galindo-Leal, 1988).

► Education and interpretation programs

Some Concern

Currently limited facilities. Visitor education will become increasingly important in light of the planned promotion of tourism.

► Tourism and interpretation

Some Concern

While currently of secondary importance due to low visitation, increasing numbers of visitors will require considerable preparation and investment.

► Monitoring

Some Concern

Selective monitoring but no comprehensive monitoring framework (IUCN, 2013)

► Research

Mostly Effective

Considerable research has been carried out by national and international institutions. ECOSUR in particular has generated a wealth of information from both the natural and social sciences, most of it publicly available.

Overall assessment of protection and management

Some Concern

The area has long benefited from its remoteness and limited infrastructure in addition to a high degree of natural protection from the by vast surrounding forest areas. The formal protection was a key step in countering the governmental policies promoting regional development based on unsustainable exploitation of natural resources and poorly adapted land use. The drastic policy shift prevented the cultural and natural heritage from exploitation while also leading to poorly communicated and negotiated exclusion of local communities from traditionally used resources. Uncontrolled resource use and conflicts are common. Landscape level planning requires better coordination and cooperation across sectors and administrative boundaries. Management planning is well-structured but requires consolidated implementation and adequate resources. One particular concern is the insufficient coordination between agencies in charge of cultural and natural heritage, respectively. It is hoped that the inscription as a mixed site will encourage enhanced coordination.

▶ **Assessment of the effectiveness of protection and management in addressing threats outside the site**

Data Deficient

Data deficient

State and trend of values

Assessing the current state and trend of values

World Heritage values

▶ **Major and highly valuable remnant of a vast human-environment forest system**

High Concern
Trend:Deteriorating

Increasing pressure on natural resources while simultaneously deficient in reserve design and zonation (García-Frapolli et al. 2009, Andrews, 2006, Galindo-Leal, 1988, TNC, n.d.).

▶ Rare species and high species richness

High Concern
Trend:Deteriorating

Ongoing pressure on wildlife through poaching, predator control and illicit trade in species and derivates (Government of Mexico, 2013, Parkswatch, 2002, TNC, n.d.).

Other important biodiversity values

▶ Importance in regional connectivity

Many of the above values, such as major populations of large vertebrates, depend on habitats and landscape connectivity beyond the scale of the property. The property is a large and important component of the national and regional protected areas network, within and beyond the Maya Forest. Jointly with the contiguous Area de Proteccion de Flora y Fauna Bala'an K'aax in the adjacent Mexican state of Quintana Roo, as well as with Mirador-Rio Azul National Park and Biotopo Naachtn-Dos Lagunas in Guatemala, which in turn is contiguous with the Rio Bravo Conservation and Management Areas in Belize, the property forms a major protected area cluster. Despite important land use change in the wider forest region the property has maintained ecological linkages across the borders into Guatemala and Belize and to the Mexican Caribbean coast.

▶ Remarkable geology and geomorphology

While not inscribed under criterion (viii) the property has a noteworthy karst geology featuring a wide spectrum of corresponding surface expressions. In a region of extremely scarce surface water, in particularly during the dry season, evaporites retaining water in so-called aguadas are crucial for both human beings and wildlife, constituting a direct link between the geology of the region, its biodiversity and human history (IUCN, 2014, Government of

Mexico, 2013).

Summary of the Values

▶ **Assessment of the current state and trend of World Heritage values**

High Concern

Trend: Deteriorating

The fast and ongoing land use changes and the loss and degradation of the wider Maya Forest undoubtedly have further direct and indirect impacts on the property. While still impressive, the renowned wildlife populations of Calakmul face increasing pressure from poaching, trade and, in the case of large cats, also predator control. The coincidence of conflicts and the limited ability to enforce existing laws calls for more participatory ways of understanding and negotiating local resource use.

▶ **Assessment of the current state and trend of other important biodiversity values**

High Concern

Trend: Deteriorating

There are no documented hints at major threats to the geological features and values of the property. However, the site’s connectivity within a wider region has been deteriorating.

Additional information

Key conservation issues

▶ **Dynamics of the wider Maya Forest**

Regional

Many of the strategic and longer term issues in terms of the future of Calakmul are also a function of the future of the Maya forest across national and sub-national boundaries. Calakmul is an important component of the forest region,

but the reserve design and zonation that could be improved.

▶ Future tourism development

National

Official statements and press releases following the inscription of the extended site leave little doubt about ambitious tourism plans. While likely to be localized in its surface expression, there are structural concerns related to access and visitation infrastructure, water consumption and the management of solid waste and waste water.

▶ Human use

Local

Local communities are mostly poor and resource-dependent. They are engaged in illegal resource use and partially land use not adapted to the local conditions. Finding a better balance is crucial at a time when more people may be attracted to the area by the infrastructure and promise of tourism.

▶ Climate change

Global

There are serious concerns about the possible effects of extended periods of drought, including through the interplay with fire, both a natural disturbance factor and a widespread land use / land clearing tool.

Benefits

Understanding Benefits

▶ Water provision (importance for water quantity and quality)

The forests of Calakmul are an integral part of the hydrological system that reduces the risk of flooding. It is also an important area for water recharging for the whole Yucatan Peninsula, a key factor in the development of the Maya Culture in the Ancient City of Calakmul and its surroundings (SoOUV, 2012).

▶ Is the protected area valued for its nature conservation?

The high diversity from habitat to genetic level is important from the perspective of resilience and potential use, e.g. in agricultural and pharmaceutical uses.

► Importance for research

Given the widespread transformation and degradation of the Maya Forest, relatively large areas with a limited direct human footprint are an increasingly scarce scientific resource.

► Outdoor recreation and tourism

Calakmul has high touristic potential based on both its cultural and natural wealth. The distribution of benefits – and costs – depends on the planning and implementation of tourism development.

Summary of benefits

The natural resources of what is today the property were the basis of a sophisticated past civilization. Governmental programmes in the second half of the 20th century focused on exploitation of natural resources. While more recent efforts put more focus on conservation, the effective implementation remains to be consolidated. The contemporary dilemma boils down to the common need to balance conservation with use. This includes the planned promotion of tourism development.

Projects

Compilation of active conservation projects

№	Organization/ individuals	Project duration	Brief description of Active Projects

1	GIZ (formerly GTZ), KfW and “Comisión Centroamericana de Ambiente y Desarrollo (CCAD)”	Regional progrmme “Conservation and Sustainable Use of the Selva Maya” operating in Belize, Guatemala and Mexico. Activities in Mexico build on earlier project “Management of Natural Resources and Sustainable Regional Development in Southeast Mexico, (PROSURESTE)”.
2	Mesomerican Biological Corridor	Major regional conservation initiative by 8 countries formalized in 1997 based on even earlier discussions (“Paseo Pantera”) with many activities in Campeche and specifically in Calakmul. This includes a wealth of information on the corridor between Calakmul and Sian Ka’an, the World Heritage property in the neighboring state of Quintana Roo.
3	El Colegio de la Frontera Sur (ECOSUR)	Public research institution (natural and social sciences) with a focus on sustainable development in Southern Mexico. Numerous past and current research projects in and around Calakmul, documented in publicly accessible database.
4	Inter-American Development Bank (IADB or BID)	According to the nomination dossier there was a Project on “Management Promotion of the Trinational Ecosystem of the Maya Tropical Forest (Mexico-Belize-Guatemala)”, a cooperation based on 2005 trilateral MoU between Mexico, Belize and Guatemala. Status and results are not specified.

Compilation of potential site needs

№	Site need title	Brief description of potential site needs	Support needed for following years
1	Sustainable Tourism Development	Official speeches and press releases at the occasion of the inscription of the significantly enlarged and now mixed World Heritage property focus on ambitious tourism plans. This implies risk of direct and indirect impacts (water consumption, waste and wastewater management, immigration, additional infrastructure), as well as opportunities in terms of conservation funding, local creation of income and employment and visitor education. Careful planning seems indispensable in order to balance the expected economic benefits with social and environmental costs.	

№	Site need title	Brief description of potential site needs	Support needed for following years
2	Follow-up to World Heritage Committee decision inscribing the extended mixed property in 2014 (38COM 8B.16)	The inscription decision formulates concrete “requests” for follow-up by the State Party in addition “encouraging” investment in a better scientific understanding of the property. The decision defines products and deadlines in this regard. The Committee requests lend themselves as a basis for follow-up projects, be it individual projects or as components of a coherent overall programme. In order of the above decision, key areas are as follows: 1. Integrated management planning and provision of adequate financial resources for implementation. The guidance is to be elaborated in a joint Management Plan. The strengthening of the existing Advisory Council is to be used as a coordination mechanism. 2. In response to the documented shortcomings of the boundary design and zonation of the property from the perspectives of both cultural and natural values, a revision and optimization of the current design seems indispensable. 3. The monitoring system for both cultural and natural values is to be strengthened.	
3	Coordination and cooperation of management and conservation in the Selva Maya	The property is an integral part of a vast and contiguous network of protected areas of different categories and governance types. Despite many past and current efforts there is much room for improved coordination and cooperation. Examples in the state of Campeche include the contiguous “Zones of Ecological Protection” Balam-Kú and Balam-Kin. Further opportunities in Mexico include cooperation with the neighboring state of Quintana Roo, including but not limited to the connectivity between Calakmul and Sian Ka’an. Across the border with Guatemala, the Mirador-Rio Azul National Park and Biotopo Protegido Naachtún Dos Lagunas deserve to be mentioned in particular as they are adjacent to the property	
4	Local and indigenous knowledge and practice	Considering the longstanding natural resource use, including scarce and vulnerable freshwater, the knowledge and practices of the local communities deserve full consideration in the management of the property.	

REFERENCES

№	References
1	Andrews, J.M., 2006. Shifts of strategies and focus of the conservation efforts of PRONATURA on the Yucatan Peninsula: a personal history. Landscape and Urban Planning 74: 193–203.
2	BirdLife International. 2012. Important Bird Areas factsheet: Maya-Lacandon. www.birdlife.org
3	Bray, D.B., Duran, E., Ramos, V.H., Mas, J.F., Velazquez, A., McNab, R.B., Barry, D., Radachowsky, J. 2008. Tropical Deforestation, Community Forests, and Protected Areas in the Maya Forest. Ecology and Society 13 (2): 56. www.ecologyandsociety.org/vol13/iss2/art56/
4	Castillo, M.A. 2003. The Mexico-Guatemala Border: New Controls on Transborder Migrations in View of Recent Integration Schemes? FRONTERA NORTE 15(29): 35-64
5	Chowdhury, R.R. 2006. Landscape change in the Calakmul Biosphere Reserve, Mexico: Modeling the driving forces of smallholder deforestation in land parcels. Applied Geography 26: 129–152.
6	Conservation International. 2013. Mesoamerica. Hotspot description. www.conservation.org/where/priority_areas/hotspots/north_ce…
7	Earp, C. 2011. Characterizing Invasive Species: The Case of Bracken Fern (Pteridium aquilinum) in the Mesoamerican Biological Corridor Sian Ka’an-Calakmul, Mexico. Master’s Thesis. The State University of New Jersey.
8	Ericson J., Freudenberger, M.S., Boege, E. 1999. Population Dynamics, Migration, and the Future of the Calakmul Biosphere Reserve. Occasional Paper No. 1 Program on Population and Sustainable Development (PSD). American Association for the Advancement of Science (AAAS).
9	Galindo-Leal, C. 1988. Diseño de reservas: el “mal congénito” de Calakmul. Biodiversitas 4(17): 9-15.
10	García-Frapolli, E., Ramos-Fernández, G., Galicia, E., Serrano, A. 2009. The complex reality of biodiversity conservation through Natural Protected Area policy: Three cases from the Yucatan Peninsula, Mexico. Land Use Policy 26: 715–722.
11	Gaudry Sada, K.H. 2013. Territorial governance through nature conservation regimes. An analysis of spatial planning traditions and the role of UNESCO Biosphere Reserves. Thesis submitted in partial fulfilment of the requirements of the degree of Dr. rer. Nat. Albert-Ludwigs Universität Freiburg, Germany. www.freidok.uni-freiburg.de/volltexte/9144/pdf/GAUDRY_2013…

№	References
12	Gorenflo, L.J., Brandon, K. 2003. Demographic Change, Land Use, and Conservation in and Around Calakmul Biosphere Reserve, Mexico. Draft paper.
13	Government of Mexico. 2013. Nomination of Ancient Maya City and Protected Tropical Forests of Calakmul, Campeche.
14	IUCN, 2014. World Heritage Nomination – IUCN Technical Evaluation. Ancient Maya City And Protected Forests Of Calakmul, Campeche (extension And Renomination Of The “ancient Maya City Of Calakmul, Campeche”). Gland, Switzerland.
15	Lawrence D., Vester, H. F. M., Pérez-Salicrup, D., Eastman, J.R., Turner B.L., Geoghegan. J. 2004. Integrated Analysis of Ecosystem Interactions With Land-Use Change: The Southern Yucatán Peninsular Region.
16	ParksWatch. 2002. México: Reserva de la Biosfera de Calakmul. www.parkswatch.org
17	Porter Bolland, L., Drew, A.P., Vergara-Tenorio, C. 2006. Analysis of a natural resources management system in the Calakmul Biosphere Reserve. Landscape and Urban Planning 74: 223–241.
18	Pronatura Península de Yucatán, A.C., The Nature Conservancy (compiladores). 2005. Plan de Conservación para Calakmul-Balam Kin-Balam Kú, Campeche, México. 88 p.
19	Schneider, L.C. 2004. Bracken Fern Invasion in Southern Yucatan: A Case for Land-change Science. The Geographical Review 94(2): 229-241.
20	Secretaría de Medio Ambiente, Recursos Naturales y Pesca. 2000. Programa de Manejo del Area Natural Protegida con el carácter de Reserva de la Biosfera la región conocida como “Calakmul”, ubicada en los municipios de Champotón y Hopelchén (hoy Municipio Calakmul), en el Estado de Campeche, establecida mediante Decreto Presidencial publicado en el Diario Oficial de la Federación el 23 de mayo de 1989. Diario Oficial. Viernes 7 de abril de 2000.
21	Steadman-Edwards, P, 1997. Socioeconomic Root Causes of Biodiversity Loss: The Case of Calakmul, Mexico. World Wildlife Fund-Mexico, Mexico, DF.
22	The Nature Conservancy (TNC). N.d. Calakmul Biosphere Reserve, Mexico. Parks in Peril.