In the language of the Mayan peoples who once inhabited this region, Sian Ka'an means 'Origin of the Sky'. Located on the east coast of the Yucatán peninsula, this biosphere reserve contains tropical forests, mangroves and marshes, as well as a large marine section intersected by a barrier reef. It provides a habitat for a remarkably rich flora and a fauna comprising more than 300 species of birds, as well as a large number of the region's characteristic terrestrial vertebrates, which cohabit in the diverse environment formed by its complex hydrological system. © UNESCO

**SUMMARY**

**2020 Conservation Outlook**

Even though some of the threats to Sian Ka'an are buffered by the large size of the site and many encouraging management efforts, the long list of current threats is of concern. Among the key concerns on land are the direct and indirect impacts of mass tourism development, such as infrastructure, excessive freshwater use, contamination and waste. However, the challenges are well understood and appear manageable. In the medium and longer term, widespread rural poverty is likely to take its toll on the natural resources. The conservation outlook for the marine and coastal environments is even more challenging in terms of management due to the combination of local factors and factors beyond the control of site management. Namely, increased sea levels and temperatures and related ocean acidification, as well as the invasion of lionfish, which will require responses beyond Sian Ka'an.
FULL ASSESSMENT

Description of values

Values

World Heritage values

▶ Scenic beauty of mosaic of landscape elements

The aesthetics and beauty of Sian Ka’an derive from the relatively undisturbed interface of sea and land along a comparatively well-conserved coastline. The mosaic of landscape elements is diverse in shapes, forms and colours allowing intriguing views and impressions. Noteworthy and rare natural phenomena include the “Cenotes”, water-filled natural sinkholes hosting specialised communities of life and the “Petenes”, tree islands emerging from the swamps (World Heritage Committee, 2013).

▶ Fascinating variety of life forms

The scale and conservation status of Sian Ka’an and its ecosystem diversity, including 17 different vegetation types, support a fascinating range of life forms. Over 850 vascular plants, including 120 woody species, have been confirmed in what is assumed to be a still incomplete inventory. In terms of fauna, noteworthy representatives among the more than 100 documented mammals include endangered species like Black-handed Spider Monkey, Yucatan Black Howler Monkey and the Central American Tapir. A small population of the vulnerable West Indian Manatee occurs in the coastal waters. Some 330 bird species have been recorded, 219 of them breeding in Sian Ka’an. Amphibians and reptiles are represented by more than 40 recorded species, among them the vulnerable American Crocodile and four of the six turtle species found along the Mexican coast, all reproducing within the World Heritage site. The isolation of some of the “Cenotes” led to the evolution of several species, which are locally endemic to single sinkholes. With numerous recorded species of reef-building coral, the portion of the Mesoamerican Reef within the site is one of the richest in Mexico. Jointly with the many other aquatic habitats, it harbours more than 400 species of fish and a wealth of other marine life (World Heritage Committee, 2013).

Other important biodiversity values

▶ Integral component of the system of mangroves, seagrass beds and coral reefs of Mesoamerica

It deserves to be noted that Sian Ka’an belongs to an important and relatively intact part of the Mesoamerican Reef, a marine area of global conservation significance. The reef has attracted a lot of national and international attention. It is functionally and ecologically linked with the coastal mangroves and the seagrass beds. In this context, it is noteworthy that the World Heritage site is part of a larger conservation complex which is contiguous with two additional protected areas, "Area de Protección de Flora y Fauna Uaymil" and "Reserva de la Biosfera Arrecifes de Sian Ka’an". Despite the slightly confusing identical name, the latter protected area established to conserve the coral reefs is not part of Sian Ka’an Biosphere Reserve and also not included in the World Heritage site.

▶ Ecological connectivity

Sian Ka’an area is an important biological corridor for bird species. Mangroves play a functional role in connecting with other ecosystems such as seagrasses, low flood forests and coral reefs.

▶ Hydrological system

The Sian Ka’an Complex has an underground water system that interconnects cenotes and petenes and
is unique in the Peninsula of Yucatan and in the world (CONANP, 2014).

**Assessment information**

**Threats**

**Current Threats**

The greatest current threats are a combination of the direct and indirect impacts of tourism and inadequate use of natural resources both on land and in the sea. In the region, the coastal zone is the main target of tourism development and recreational use (extension of the Cancun-Tulum tourist corridor). However, the depletion of freshwater aquifers, sewage and waste are equally worrisome. In the marine realm, the combination of overuse of several species, alien invasive species, destructive harvesting practices, land and seaborne pollution and worrying broader trends in the Mesoamerican Reef in terms of bleaching and acidification have changed the ecosystem and are likely to induce further damage if unaddressed.

The already observed decline of coral cover in the region is likely to be the result of a synergy of different drivers including bleaching events coupled with disease outbreaks, severe hurricane damage and anthropogenic stressors.

**Fishing / Harvesting Aquatic Resources**

*Overfishing*

Overfishing is well documented in the entire reef and aggravated by competition with and predation from the invasive lionfish (Healthy Reefs for Healthy People, 2012; Con Pro, 2011; CONANP, 2007). Despite encouraging management improvements, the high demand for spiny lobster puts major pressure on this species. In some areas, harvesting techniques continue to be destructive. In response to population declines of queen conch, harvesting of that species has been banned but continues illegally. Illegal, unreported, and unregulated (IUU) fishing and the lack of effective enforcement remains an important challenge. It has been reported that both fishers and managers consider illegal fishing and the lack of enforcement as the greatest challenge facing this site and across all protected areas within the region (Ayer et al., 2018). A decreasing budget is weakening the enforcement capacities of the National Commission for Fisheries and Aquaculture (CONAPESCA). Also, the National Commission for Natural Protected Areas (CONANP) lacks the authority to detain poachers or confiscate equipment (Ayer et al., 2018). The budget of CONANP has also been reduced in 2019 and 2020, further affecting its capacities (IUCN Consultation, 2020).

**Water Pollution**

*Marine pollution and garbage*

High levels of chemicals and heavy metals have been detected in the coastal marine environment and brackish water wetlands. Garbage piled up on the coast, in particular plastic debris, is suspected to come from coastal shipping and poor waste management but also appears to stem from remote sources (Con Pro, 2011; CONANP, 2007). Household sewage and wastewater are not being disposed of properly and are polluting freshwater, brackish water, and marine environments (Con Pro, 2011; CONANP, 2007). Coastal dredging, construction and marine ports contribute sedimentation and pollution locally, while coastal development and urbanization has resulted in wide scale eutrophication of coastal waters across the Mexican Caribbean (Suchley and Alvarez-Filip, 2018).

**Crops, Forestry/ Wood production**

*Land conversion, poor agricultural and livestock practices and fires*

Watersheds are being degraded by conversion of land for agriculture, urbanization, forestry, tourism and excessive use of agrochemicals (Con Pro, 2011; CONANP, 2007; Espinoza-Tenorio et al., 2019). Climate change and traditional use of fire for weed control outside the World Heritage site presents a
high risk of spreading (CONANP, 2014). A decreasing budget is weakening the enforcement capacities of the National Forestry Commission (CONAFOR). Fire continues to be an important threat to the site. For instance, fires in 2019 impacted 2,500 hectares in July and 1,085 hectares in August (about 85% savannah, 15% forests) in the southern part of the Reserve, near the area known as Uaymil (Mexico News Daily, 2019).

**Invasive Non-Native/ Alien Species**

*(Alien Invasive Species)*

To date, 36 exotic species have been identified in Sian Ka’an, with some invasives, such as Casuarina equisetifolia and coconut palms in the coastal area, threatening native flora (Con Pro, 2011; CONANP, 2007). Massive invasion by lionfish in the marine realm (NOAA, 2012) is of concern. Control and eradication programs are limited to some species and require increased efforts.

**Tourism/ Recreation Areas**

*(Inappropriate tourism development and damaging recreational activities)*

Poorly planned and inadequately controlled tourism and development of related infrastructure, such as roads and highways, fishing lodges, clubs, small hotels, vacation homes, cabins and trailer parks, negatively impact natural habitats, especially in the coastal zone, by fragmenting mangrove and vegetation of coastal dunes. Although still scarce in the site, inappropriate recreational activities including hunting, fishing and harvesting, as well as use of off-road vehicles, are resulting in disturbance, while physical damage to reefs is caused by inexperienced divers (Con Pro, 2011; CONANP, 2007). Mass tourism in the vicinity of Riviera Maya (to the north) and, more recently, Majahual (the south), two of Yucatan’s major tourist attractions and associated coastal urbanisation with well-documented water, garbage and sewage problems, require monitoring and management responses. The water demands outstrip the capacity of the freshwater aquifer, thereby causing its depletion and affecting the delicate water composition of the coastal lagoons (Con Pro, 2011; CONANP, 2007).

**Storms/Flooding**

*(Extreme weather events)*

The site is affected on a regular basis (mostly between July and November) by severe tropical storms, which can have a wide range of impacts on coastal ecosystems. Anthropogenic modifications in the coastal area increase these impacts on mangroves and adjacent ecosystems, potentially altering biotic structure in reefs and nutrient cycling (Con Pro, 2010; CONANP, 2007). Reef and mangrove protection are the best investment in reducing the vulnerability, risks and costs. Increases in temperatures and droughts are increasing the occurrence and severity of fires (World Heritage Committee, 2013; Con Pro, 2011; CONANP, 2007, IPCC 2014). The decline of coral cover in the region is likely to be the result of a synergy of different drivers including bleaching events coupled with disease outbreaks, severe hurricane damage and anthropogenic stressors (Rioja-Nieto et ál., 2019).

**Other**

*(Loss of architectural complexity of coral reefs)*

The loss of reef architectural complexity may lead to the loss of the natural coastal protection provided by reefs. The vulnerability of the coast to an increase in the intensity of storms and sea level, will likely be compounded by the reduced wave dissipation function of architecturally simpler reefs (Rioja-Nieto et ál., 2018).

**Water Pollution, Household Sewage/ Urban Waste Water**

*(Groundwater pollution)*

One of the main threats is groundwater pollution in this karstic region (Rioja-Nieto, et ál., 2018). The coastal aquifer is highly vulnerable to contamination, and connects with the sea (Hernández-Terrones, 2014).
et al. 2015). Sewage systems are limited, and local regulations establish that human settlements should have septic wells to inject the sewage into the ground. Several studies have established a strong connectivity and a high mixing with the aquifer. Freshwater resources are becoming contaminated with ever increasing amounts of untreated wastewater (Secaira and Acevedo, 2017). Hydrocarbons contamination is consistent with the level of urban and tourism development, higher in the North of the Caribbean, lower in the South (Medina-Moreno, et al., 2014). Sian Ka'an is in between these two regions.

### Potential Threats

<table>
<thead>
<tr>
<th>Threat</th>
<th>Threat Level</th>
<th>Inside Site</th>
<th>Outside Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ocean acidification, Temperature extremes (Climate change)</td>
<td>High Threat</td>
<td>Inside site (throughout (&gt;50%))</td>
<td>Outside site (throughout (&gt;50%))</td>
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<tr>
<td>Sargassum arriving massively and seasonally</td>
<td>Data Deficient</td>
<td>Inside site (throughout (&gt;50%))</td>
<td>Outside site</td>
</tr>
</tbody>
</table>

Increasing water temperatures and ocean acidification are expected to have devastating effects on coral reefs and all calcifying organisms (IUCN, 2011; Con Pro, 2011; CONANP, 2007; IPCC 2014). Hero et al. (2017) predict that under RCP8.5 Sian Ka'an will be exposed to severe coral bleaching at least twice per decade after 2025 and after 2033 under RCP4.5. The groundwater recharge in the Yucatan Peninsula is also predicted to decline by 20-23% under RCP4.5 and RCP8.5 scenarios, which would negatively impact the socio-ecological balance of the region (Rodríguez-Huerta et al., 2019).

### Other

(Sargassum arriving massively and seasonally)

The massive seasonal influx of sargassum since 2014, but much more massive since 2018-2019, is becoming a serious threat to the site and its marine/coastal life (Pérez Ortega et al., 2019). This situation needs to be monitored closely.

### Overall assessment of threats

Out of the large number of current threats coastal development, mostly related to tourism, stands out as a major concern with multiple direct and indirect impacts on land and in the sea, including pressure on species, disturbance, land and seascape fragmentation, depletion of freshwater and sewage and waste. There are clear indications that the marine and coastal environments may be severely affected by expected sea level rise and the effects of anticipated temperature increases and related ocean acidification on reefs and other marine ecosystems. The already observed decline of coral cover in the region is likely to be the result of a synergy of different drivers including bleaching events coupled with disease outbreaks, severe hurricane damage and anthropogenic stressors.

### Protection and management

#### Assessing Protection and Management

**Management system**

The Sian Ka'an World Heritage site is managed by National Commission for Natural Protected Areas (CONANP) based on an updated Management Program outlined in 2014, and Annual Operations Plans. Activities are coordinated with international and local NGOs, other national and state management agencies, and state, national and foreign academic institutions (Con Pro, 2010; CONANP, 2014).
**Effectiveness of management system**  
Data Deficient  
The updated management plan (2014) provides for an evaluation process of management effectiveness to be implemented. However, no recent information is available about management effectiveness evaluation. Since the start of the 21st century, the overall government financial support to protected areas in Mexico and in the Mexican Caribbean (Rioja-Nieto and Alvarez-Filip, 2019) has greatly diminished and this is reflected in the dramatic reduction of CONANP’s budget. If this support continues dwindling, the managerial, research/monitoring, vigilance, capacities of the Sian Ka’an site would be affected in the coming years (IUCN Consultation, 2020).

**Boundaries**  
Some Concern  
The boundaries of the World Heritage site follow natural features as much as possible and are relatively well known by local communities (CONANP, 2007). However, the fact that the contiguous “Arrecifes de Sian Ka’an Biosphere Reserve” is not inscribed as part of the World Heritage site is little known and creates confusion.

**Integration into regional and national planning systems**  
Some Concern  
The management of the World Heritage site is partially integrated into planning for the national system of protected areas (CONANP, 2007). While there is good coordination in terms of the contiguous "Arrecifes de Sian Ka'an Biosphere Reserve" and the “Área de Protección de Flora y Fauna Uaymil” (1994, IUCN category VI), coordination with other sectors such as archaeology and culture, and other marine and terrestrial protected areas nearby leaves much room for improvement.

**Relationships with local people**  
Some Concern  
A total of 1,500 persons live within the Reserve, in majority fishermen based in Punta Allen. Good relations have been established with organized groups such as fishing and lobster harvesting cooperatives (Méndez-Medina et al., 2020) and several small-scale tourism operators. Relationships with marginalized and not formally organized residents and resource users continue to be difficult, and they have been generally been left out of management processes (Brenner and Vargas, 2010; Brenner and Job, 2012). It is estimated that 80% of the population surrounding Sian Ka’an has never visited the protected area due to extreme poverty in this region (Connecting Practices Report, 2015).

**Legal framework**  
Mostly Effective  
Sian Ka’an has been declared as a Biosphere Reserve by a Presidential decree on 20 January 1986. 99% of its area (528,147.66 ha) is owned by the federal government (CONANP, 2014).

**Law enforcement**  
Some Concern  
Between 2001 and 2004, four State of Conservation Reports on this site were presented to the World Heritage Committee, raising concerns about urban pressure and its impacts on the site (housing, ground transport infrastructures and tourism). In response, the State Party launched a project to implement an Environmental Land Use system at regional level.

**Implementation of Committee decisions and recommendations**  
Data Deficient  
The State Party has responded to Committee decisions of 2002 with respect to regulation of tourism development. More recent World Heritage Committee Decisions only concern the adoption of a retrospective Statement of Outstanding Universal Value (World Heritage Committee, 2013).

**Sustainable use**  
Serious Concern  
Sustainable use is inherent to the biosphere reserve concept and being promoted by multiple projects and management activities (Con Pro, 2010, CONANP, 2007). Despite progress, for example as regards the management of spiny lobster, population declines of target species indicate inappropriate harvesting levels. Illegal fishing and unsustainable extraction of non-timber forest resources by local
IUCN World Heritage Outlook: https://worldheritageoutlook.iucn.org/
Sian Ka’an - 2020 Conservation Outlook Assessment

Communities are common and have negative impacts that need to be addressed.

**Sustainable finance**

Mostly Effective

Multiple donors support Sian Ka’an, one of best-known reserves in Mexico. Fundings for management of the site are provided by regular government budgets, the national protected area fund and national and local projects (Sian Ka’an Biosphere Reserve is eligible for the national fund for natural protected areas, which supported two conservation projects). Due to its global importance, Sian Ka’an also attracted considerable attention from international NGOs and agencies (GEF/UNDP). A Trust Fund for protected areas of Quintana Roo State is being developed (Con Pro, 2010; CONANP, 2007). However, since 2019, the overall government financial support to protected areas in Mexico is greatly diminishing and this is reflected in the dramatic reduction of CONANP’s budget. If this support continues dwindling, the managerial, research/monitoring, vigilance capacities of the Sian Ka’an site would be affected in the coming years (IUCN Consultation, 2020).

There are some new projects that started in 2019, dealing with scientific monitoring and conservation; these are listed and briefly described under Projects.

**Staff capacity, training, and development**

Data Deficient

Capacity building for management agencies and personnel is part of the current Conservation and Management Program (Con Pro, 2010; CONANP, 2014). The management plan (2014) aims to increase capacity of administrative and operational personnel without mentioning the priority areas. Data is deficient on the degree to which it has been implemented.

**Education and interpretation programs**

Some Concern

Environmental education programs are part of the current Conservation and Management Program. The NGO Amigos de Sian Ka’an runs education programs to raise awareness in conserving Quintana Roo aquifer. Work by Amigos de Sian Ka’an is being expanded since 2019 (see Projects).

**Tourism and visitation management**

Serious Concern

Tourism management and the development of interpretive materials are part of the current Conservation and Management Program (Con Pro, 2010, CONANP, 2014). There are encouraging efforts to establish local tour operators to capture niche markets, in particular from the NGO Amigos de Sian Ka’an, which aims to brand the Biosphere Reserve as a major ecotouristic destination (Maya Ka’an), with the support of the Inter-American Development Bank. But overall, data is deficient on tourism impacts and despite the continuing growth in tourism over the last three decades, there is no visitor management programme. Data on economic impacts of visitor spending and visitor segmentation are also missing.

**Monitoring**

Data Deficient

Monitoring of indicators of threat reduction and the state of conservation targets is on-going in the framework of the management plan (2014). A monitoring system for activities outlined in the Conservation and Management Program has been proposed, but to date, data is deficient on the degree to which it has been implemented (Con Pro, 2010, CONANP, 2007).

**Research**

Mostly Effective

There is a strong potential for scientific research on both natural and cultural heritage. Considerable research has been undertaken in the Reserve on wildlife, terrestrial and marine ecology, geology and hydrology over many years, with an emphasis on its application to management and conservation. Recently (2019), several scientific and conservation projects by NGOs have begun/expanded in Sian Ka’an and are contributing to the site’s management. The impacts of the massive, seasonal influx of sargassum in the coastal/marine areas of Sian Ka’an needs to be closely monitored and researched. However, up-to-date research on visitor segmentation and visitor spending is scare.
Overall assessment of protection and management

The establishment of Sian Ka'an has made a marked difference on a coastline massively transformed since the arrival of mass tourism. At the same time, the site is not immune to the direct and indirect impacts of such broader developments and management has little influence on these developments. However, the challenges are well understood and significant efforts are being undertaken to overcome them. However, since 2019, the overall government financial support to protected areas in Mexico has greatly diminished and this is reflected in the dramatic reduction of CONANP’s budget. If this support continues dwindling, the managerial, research/monitoring, vigilance capacities of Sian Ka'an site would be affected in the coming years.

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

Threats outside the World Heritage site are those related to deforestation for subsistence agriculture and livestock, and it is proposed in the Conservation and Management Plan that these threats be addressed (Con Pro, 2010; CONANP, 2014). However, data is deficient on the degree to which these activities have been implemented.

State and trend of values

Assessing the current state and trend of values

World Heritage values

Scenic beauty of mosaic of landscape elements

While overall there is low concern for the state of natural phenomena, there is high concern with respect to scenic beauty because of uncontrolled coastal development (ConPro, 2010; CONANP, 2007). The massive seasonal influx of sargassum since 2014, but much more massive since 2018, is becoming a serious threat to the site and its marine/coastal life. This situation needs to be monitored closely (Pérez Ortega et al., 2019).

Fascinating variety of life forms

Overall, there is concern for the state and trend of biological diversity and threatened species, though the rating is somewhat different among conservation targets. The rating for freshwater and brackish water wetlands, bays and seagrass beds, and terrestrial apex predators such as pumas and jaguars is good. There is relatively low concern for tropical forests, while there is high concern for coral reefs, beaches and coastal dunes (Healthy Reefs for Healthy People, 2012; Con Pro, 2010; CONANP, 2007). A decline of coral cover has been observed in the broader region and is likely to be the result of a synergy of different drivers including bleaching events coupled with disease outbreaks, severe hurricane damage and anthropogenic stressors (Rioja-Nieto and Álvarez-Filip, 2019).

From 2000 to 2012, Sian Ka'an lost 1.1% of its forest cover, mostly in the coastal zones, due to expansion of the Cancun-Tulum tourist corridor. Mangrove loss was around 2% during 1981-2005 period and 1% between 2005 and 2010 (GEF, 2015).

Summary of the Values
Assessment of the current state and trend of World Heritage values

Low Concern
Trend: Deteriorating

Due to its large size and relatively difficult access, large parts of the site continue to be in a good state of conservation. Despite an overall good state of the World Heritage values related to natural beauty, there is a concern with respect to the coastal zone, which is affected by uncontrolled development and plastic debris. Key concerns in terms of overall trends are forest fires, the depletion and contamination of freshwater resources and the uncontrolled use of certain marine and terrestrial species. The massive seasonal influx of sargassum since 2014, but much more massive since 2018, is becoming a serious threat to the site and needs to be monitored closely. A decline of coral cover has been observed in the broader region and is likely to be the result of a synergy of different drivers including bleaching events coupled with disease outbreaks, severe hurricane damage and anthropogenic stressors.

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

Data Deficient
Trend: Data Deficient

The massive seasonal influx of sargassum since 2014, but much more massive since 2018, is becoming a serious threat to the site and its marine/coastal life. This situation needs to be monitored closely.

Additional information

Benefits

Understanding Benefits

Outdoor recreation and tourism,
Natural beauty and scenery

Tourism is a driver of the local and national economy and largely based on the natural resources of the coast.

Factors negatively affecting provision of this benefit:
- Pollution: Impact level - High, Trend - Decreasing
- Overexploitation: Impact level - High, Trend - Decreasing
- Habitat change: Impact level - High, Trend - Decreasing

Tourism facilities are growing stressors for the mangroves, dunes and coral reefs.

Importance for research

As a Biosphere Reserve, the site is of great importance for developing and transmitting knowledge of conservation and sustainable use; and the Maya civilization that has been inhabiting and continues to inhabit the area and continues to use the natural resources of the World Heritage site and its surroundings.

Legal subsistence hunting of wild game,
Collection of wild plants and mushrooms,
Fishing areas and conservation of fish stocks

Hosting areas of breeding and reproduction of fishes and crustaceans with commercial relevance, Sian Ka’an is important for the maintenance of local fisheries. Within the area, fishing communities of Punta Allen, Maria Elena and Punta Herrero have rights granted for lobster catch (Palinurus argus). A study indicates that reef-related fisheries in the Mesoamerican Caribbean Reef System, including the Sian Ka’an Biosphere Reserve in Quintana Roo, represent a potential annual value of between US $ 150 and US $ 1,500 per hectare. In peripheral areas, Maya communities produce gum extraction and beekeeping with native bees (Melipona), in addition to traditional agriculture and forest uses. But alternative
incomes generated by international programmes are unbalanced, as they disproportionately benefited a group of approximately 40 families members of the first fishers cooperative established in the area in the mid-1980s (GEF).

Factors negatively affecting provision of this benefit:
- Overexploitation: Impact level - Moderate, Trend - Increasing

► Carbon sequestration, Coastal protection, Flood prevention, Pollination

Mangroves provide multiple environmental services but their potential for the sequestration of blue carbon is especially crucial. Blue carbon is key to mitigating the long-term effects of climate change because it is stored in the soil and biomass of coastal marine ecosystems.

Factors negatively affecting provision of this benefit:
- Climate change: Impact level - High, Trend - Increasing
- Overexploitation: Impact level - High, Trend - Increasing
- Habitat change: Impact level - High, Trend - Increasing

Due to their locations on the boundaries between land and sea, mangroves form highly sensitive and vulnerable ecosystems. Spatiotemporal mangrove coverage increasingly depends on the multiple and cumulative impacts that are characteristic of the coastal zone. Thus, in the local context, urban and touristic developments have reduced mangrove areas, while at a larger scale, municipal waste, pesticides and farming fertilizers, and changes in hydrological conditions have impacted the structure and composition of mangrove communities.

Summary of benefits

At the national and global levels, the most valued benefits of Sian Ka'an are conservation and the generation of knowledge, while at the local level the site is most valued as a provider of livelihoods for local communities and a key resource for tourism development. However, other benefits have been undervalued, and more information is needed.

Projects

<table>
<thead>
<tr>
<th>№</th>
<th>Organization</th>
<th>Brief description of Active Projects</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Centro Ecológico Sian Ka'an</td>
<td>A small ecotourism and education center, it serves as a model for sustainable development in sensitive tropical ecosystems. The revenue generated through tours, fishing, beautiful accommodations, and various on-site activities is used to fund conservation and education programs.</td>
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<tr>
<td>№</td>
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<tr>
<td>2</td>
<td>The Nature Conservancy, The Gillette Company, the United Nations Foundation and Amigos de Sian Ka'an (ASK) are working together through the International Corporate Wetlands Restoration Project (ICWRP)</td>
<td>Together these organizations are developing a project to protect critically important wetlands in the Sian Ka’an World Heritage site. The project is implemented by Mexican conservation organization Amigos de Sian Ka’an, which seeks to promote the protection of critical coastal habitats and ensure the viability of the region’s freshwater system by: • Implementing an easement and conservation land buyer program targeting the coastal areas of the Reserve; • Promoting the implementation of the existing land use and zoning plan with landowners and government agencies; • Enabling the acquisition of a key tract of land that strategically protects the only access to an extensive wetland system; • Mapping priority water catchment areas important to the Sian Ka’an wetlands and analyzing sources of contamination in freshwater system; • Promoting best practices for wastewater management to communities, local hotels, and property owners.</td>
<td><a href="https://worldheritageoutlook.iucn.org/">Link</a></td>
</tr>
<tr>
<td>3</td>
<td>The Nature Conservancy and Amigos de Sian Ka’an (ASK)</td>
<td>These organizations are undertaking a project to address the growing threat of development outside the Reserve, the Conservancy and ASK have engaged the private sector, working with local landowners to establish conservation easements and acquire critically threatened, privately owned lands. The Conservancy and ASK are also working with local communities in and around the Reserve to promote sustainable resource use and best practices for land use and development.</td>
<td><a href="http://www.nature.org/initiatives">Link</a></td>
</tr>
<tr>
<td>4</td>
<td>UNDP/GEF/SGP/COMPACT</td>
<td>Sian Ka'an is one of several global sites supported by a specialized programme under the GEF Small Grants Programme named COMPACT. COMPACT is implemented by UNDP and focuses on landscape approaches working with community-based organizations on the ground.</td>
<td><a href="http://www.amigosdeesiankaan.org/es/">Link</a></td>
</tr>
<tr>
<td>5</td>
<td>Cooperative Society of Fishing Production Cozumel</td>
<td>Program for the control and eradication of lionfish in the Sian Ka'an Biosphere Reserve.</td>
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<tr>
<td>№</td>
<td>Organization</td>
<td>Brief description of Active Projects</td>
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<tr>
<td>6</td>
<td>UNDP / CONANP</td>
<td>Optimizing the effectiveness of Protected Areas in Mexico to contribute to the conservation of endangered species</td>
<td><a href="http://www.mx.undp.org/content/mexico/es/home/operations/projects/environment_and_energy/species-en">http://www.mx.undp.org/content/mexico/es/home/operations/projects/environment_and_energy/species-en</a> riesgos-gef.html</td>
</tr>
<tr>
<td>7</td>
<td>Amigos de Sian Ka’an</td>
<td>Building sustainable recreational experiences in the Sian Ka’an Biosphere Reserve and its surrounding areas.</td>
<td><a href="http://www.amigosdesiankaan.org/es/">http://www.amigosdesiankaan.org/es/</a></td>
</tr>
<tr>
<td>8</td>
<td>El Colegio de la Frontera Sur - Chetumal</td>
<td>Conservation status of manatees in Quintana Roo and connectivity among populations along the coastal zone, 2019-2021. Through regular aerial monitoring, information about the biology and ecology of the manatees (Trichechus manatus) in Quintana Roo will be updated, focusing mostly on spatial distribution, population size and coastal movements. Threats to the population stemming from growing tourist and marine developments along the coastal zone will be assessed, particularly at sites historically used by manatees (coves and cenotes). Twelve manatees will be captured and tagged with high-precision GPS transmitters along the coastal zone of the Protected Areas of Yum Balam, Sian Ka’an, Xcalak Reef National Park and the Manatee Sanctuary at Bahía de Chetumal. To help promote cooperation with local communities and the authorities responsible for coordinating the protected areas (CONANP), organized local groups, fishing cooperatives and institutions dedicated to manatee conservation will be involved in the capture and monitoring of the tagged manatees. At the end of the project, we will have baseline data regarding the abundance, spatial distribution and movements of manatees along the coastal zone of Quintana Roo, based on which we will be able to recommend preventive measures to help protect manatees and their habitat in Quintana Roo.</td>
<td><a href="https://www.ecosur.mx/unidad/chetumal/">https://www.ecosur.mx/unidad/chetumal/</a></td>
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<td>9</td>
<td>Amigos de Sian Ka’an</td>
<td>Community management and conservation of the aquifers and cenotes in Maya Ka’an and the Mayan Riviera, Quintana Roo, 2019-2021 Maya Ka’an is the latest tourism destination in Quintana Roo. Its appeal is based on the cultural and natural wealth of this Mayan area, and it has been designed to directly benefit local communities by protecting natural resources. Maya Ka’an is home to the Sian Ka’an Biosphere Reserve, which is a UNESCO World Heritage Site, and the Sian Ka’an – Calakmul biological corridor. As part of this project, a sustainability model for tourism and community practices will be designed and implemented through sustainable management, environmental awareness and water monitoring initiatives. To achieve this, technologies will be implemented to manage water resources in 22 communities in Maya Ka’an; the Eres Agua, Toma Conciencia education program will be offered to schools in Maya Ka’an and Playa del Carmen; cenote owners and users will be offered training in best conservation practices for the use of cenotes and their caves along the Yucatán Peninsula; and students from Mayan schools in Maya Ka’an and Playa del Carmen will receive training and equipment to monitor water quality in the wells and cenotes located in their communities.</td>
<td><a href="https://www.amigosdesiankaan.org/en">https://www.amigosdesiankaan.org/en</a></td>
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10  Comunidad y Biodiversidad, AC  Sustainable fisheries through community participation along the Mesoamerican Reef, 2019-2021. Fishing communities along the Mesoamerican Reef System contribute to the sustainability of Mexico’s fisheries. For example, 245 tons (with a value of USD $4,400,000) of lobster (Panulirus argus) are fished every year by 6 cooperatives located in the central-southern region of the state of Quintana Roo. These cooperatives are considered by international standards to be sustainable. The fishing of Caribbean grouper (Epinephelus striatus), once a major source of income, has declined, and it is now an endangered species. Since 2012, as part of a conservation and management strategy, these 6 cooperatives have been pioneers in using fishing sanctuaries to protect coral reefs and reproductive groups of groupers. Despite these efforts, local and global short- and long-term changes are affecting these resources and communities. Through this project, COBI, in conjunction with 254 fishermen from these 6 cooperatives, will take part in citizen science programs through the monitoring of this coral reef ecosystem, in addition to understanding social and ecological connections through the use of cutting-edge technology to help them adapt to the environmental and social challenges they face. By the end of the project, 75 fishermen will have compiled data regarding the socio-ecological connectivity of two of the region’s most important species (lobster and grouper), 45 fishermen and women will have monitored 16 fishing sanctuaries and 10 commercial fishing spawning grounds, and the fishing communities will have co-designed strategies to adapt to environmental changes (e.g., how to adapt to the seasonal influx of sargassum and climate change) to help ensure sustainable fishing. Seven protected natural areas will be created: the Cozumel Island Flora and Fauna Protection Area, the Cozumel and Xcalak Reef Parks, and the Sian Ka´an Biosphere and Sian Ka´an, Banco Chinchorro and Gran Caribe Mexicano Reef Reserves. This project will contribute to the management programs for these protected natural areas and the management plans for the spiny lobster and grouper in the Yucatán Peninsula.

Website: https://cobi.org.mx/
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