LATIN AMERICA / CARRIBBEAN

LENÇÓIS MARANHENSES NATIONAL PARK

BRAZIL

Lençóis Maranhenses National Park © IUCN / Raphael Glemet

WORLD HERITAGE NOMINATION – IUCN TECHNICAL EVALUATION

LENÇÓIS MARANHENSES NATIONAL PARK (BRAZIL) – ID N° 1611

IUCN RECOMMENDATION TO WORLD HERITAGE COMMITTEE: To inscribe the nominated property under natural criteria (vii) and (viii)

Key paragraphs of Operational Guidelines:
Paragraph 77: Nominated property meets World Heritage criteria.
Paragraph 78: Nominated property meets integrity requirements and protection and management requirements.

1. DOCUMENTATION

a) Date nomination received by IUCN: February 2023

b) Additional information officially requested from and provided by the State Party: Following the session of the IUCN World Heritage Panel, a progress report was sent to the State Party on 14 December 2023. This letter advised on the status of the evaluation process and requested supplementary information on the definitions adopted in Brazil of Indigenous communities and traditional communities as understood in the nomination document, including an explanation on any differences between these two definitions; details on the areas used by local and traditional communities (and any relationships with communities that identify as Indigenous peoples); and, if relevant, considering the above two points, confirmation with appropriate documentation that Free, Prior and Informed Consent (FPIC) is in place for any matters where the nomination could affect Indigenous communities. The supplementary information was provided by the State Party on 26 February 2024.

c) Additional literature consulted: IUCN's evaluation consulted a wide array of relevant reference material for the geomorphology, biology, ecology, protection and management as well as the comparative values of the nominated property. Comprehensive reference lists were compiled within IUCN's evaluations which are available as referenced above. Further references included: Amaral, Y.T., dos Santos, E.M., Ribeiro, M.C., & Barreto, L. (2019). Landscape structural analysis of the Lençóis Maranhenses National Park: implications for conservation. *Journal for Nature Conservation*, 125725. doi:10.1016/j.jnc.2019.125725; Andrade de Paula, M., Filho Souza, B., Neto Shiraishi, J., Souza Vieira, U.D., Dias Roseane, G., Mendes Patrícia, D., Ristau Garcia, N., Cabral Ribeiro, D.D., Santos Silva, C.V. & Pereira Sousa, M. (2019). Informação Técnica - Análise Técnica do Projeto de Lei do Senado (PLS) No 465-2018 que altera os limites do Parque Nacional dos Lençóis Maranhenses. Universidade Federal do Maranhão Centro de Ciências Humanas Programa de Pós-graduação em Ciências Sociais Grupo de Estudos Rurais e Urbanos; Dos Santos Souza, J.H. and dos Santos Furtado, N. (2015). The Lençóis Maranhenses: A paradise of dunes and ponds. World Geomorphological Landscapes, DOI 10.1007/978-94-017-8023-0_8; Dos Santos, A. L. S., Borges, H. P., Silva Júnior, C. H. L., Piedade Junior, R. N., & da Silva Bezerra, D. (2019). Modelling Dunes from Lençóis Maranhenses National Park (Brazil): Largest dune field in South America. *Scientific Reports, 9(1)*. doi:10.1038/s41598-019-43735-0; Dos Santos, A.L.S., Borges, H., Silva Junior, C.H. et al. (2019). Modelling Dunes from Lençóis Maranhenses National Park (Brazil): Largest dune field in South America. Sci Rep 9, 7434. https://doi.org/10.1038/s41598-019-43735-0;
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d) Consultations: A total of 18 desk reviews received, including four reviews from IUGS. The field mission was able to meet with the Park Council – a participation arrangement between the management of Lençóis Maranhenses National Park (LMNP) and several actors living in the nominated property, which include representatives from federal and state authorities (e.g. the Ministry of Environment, the national park service – Instituto Chico Mendes - ICMBio, the governor's office), as well as from a variety of stakeholders at the main municipalities, service providers, fishermen and craftsmen, universities, local NGOs and traditional owners; a number of meetings were also conducted with municipality and state government authorities (e.g. tourism, environment, cultural and communications secretariats), in addition to conversations with different groups and individuals from the economic sector linked to the nominated property.

e) Field Visit: Paula Bueno and Raphael Glemet, 21 to 25 August 2023

f) Date of IUCN approval of this report: May 2024

2. SUMMARY OF NATURAL VALUES

The Lençóis Maranhenses National Park (LMNP hereinafter) is located in northeastern Brazil, on the east coast of Maranhão. The nominated property has an area of 156,562 ha, of which about 90,000 ha are composed of an extensive white coastal dune field with temporary and permanent lagoons. The climate at LMNP is tropical and semi-humid with a rainy season in the first half of the year, during which lagoons are formed by rainfall, raising the water table, and forming mostly temporary lagoons between the dunes.

The dunes originate from marine sediments, which, combined with winds, formed dune fields along the Quaternary. They are separated from the coastline by a broad deflation plain ranging from 600 m to 2000 m in width. The sand deposited by tides on the beach is gradually eroded by the wind, shaping small barchans with heights ranging from 50 cm to one metre near the shoreline, reaching heights of up to 30 m as they migrate inland, downwind and atop dunes from previous generations.

The LMNP is in a transition zone between three Brazilian biomes: *Cerrado*, *Caatinga*, and *Amazon*. The vegetation found in the nominated property and its buffer zones comprises pioneer formations of *Restingas* (i.e. shrubby areas of coastal broadleaf forests), mangroves, and alluvial communities that, together with marine and freshwater environments, are fundamental for conserving species diversity. Whilst the nominated property includes important biodiversity values, the nomination considers – further to independent World Heritage expert advice – that these values are likely not outstanding at the global level, whereas the property's aesthetic and geological/geomorphological values would be globally significant under criteria (vii) and (viii).

The nomination notes an 80 km coastline, with beaches followed by plains, where the inward movement of the prevailing winds allow dunes to take the form of long chains of barchans, filled in the rainy season to create temporary lagoons of various colours, shapes, sizes and depths. The nominated property presents its best scenery when the lagoons reach their maximum volume, creating rare beauty, and attracting domestic and international visitors. Under criterion (vii), the nomination dossier therefore highlights the exceptional landscape of the LMNP, showcasing a remarkable blend of dune formations and diverse lagoons. These features are interconnected, with barchan dunes forming extensive chains stretching over 75 km and extending more than 20 km inland.

Under criterion (viii), the nomination dossier highlights coastal dynamics that shape the sediments overlaying the Barreirinhas Basin as a result of the interaction between climate, coastal drifts, tidal regime and river currents. Through the influence of wind, these sediments are transported to form a vast expanse of both stable and shifting dunes, recognized as the largest in South America. This phenomenon is presented as remarkable evidence of the evolutionary progression of coastal dunes throughout the Quaternary period.

The buffer zone of the nominated property covers an area of 268,231 ha, surrounding the nominated property both along the coast and inland. The terrestrial part of the buffer zone is essentially formed of *Caatinga* (i.e. semi-arid shrubland and thorn forest) and *Cerrado*-type (i.e. tropical savannah) vegetation, which ensure an ecological buffering of the core ecosystems of the LMNP from urbanised areas.

3. COMPARISONS WITH OTHER AREAS

The comparative analysis presented in the nomination dossier compared the LMNP with similar sites at a global scale, whether or not they are included on the World Heritage List and considering areas containing dune fields and lagoons. The analysis identifies commonalities in features or aesthetics but then demonstrates differences in terms of biotic and abiotic factors, emphasizing the uniqueness of the nominated property. The analysis compares the LMNP with the following sites: Air and Ténéré Natural Reserves (Niger), El Pinacate and Gran Desierto de Altar Biosphere Reserve (Mexico/USA) and the Altar Great Desert (USA), Namib Sand Sea (Namibia), Lakes of Ounianga (Chad) and the Badain Jaran Desert (China). Main findings from these comparisons rely on the unique combination that occurs in the nominated property, involving annual rainfall of up to 2,000 mm that raises the water table and fills the various temporary and perennial lakes that form in the dunes sequentially, with exceptional beauty (criterion vii), in contrast to other sites where the dunes of similar width contain lagoons formed by either sea or river waters and not rainwater. Moreover, the geomorphological processes of transgressions and marine regressions are presented as one of the most significant records of dune fields developed along the Quaternary, with global significance to understand the past few millennia geoenvironmental change (criterion viii).

Expert desk reviewers consider that the nominated property is undoubtedly outstanding for criterion (vii), representing a superlative natural phenomenon and site of exceptional aesthetic beauty. Scientific literature suggests the creation and constant modification of dune chains and lagoons as an exceptional natural phenomenon based on a rare balance of sand, rain, wind, river, and vegetation. The vast stretches of white sand dunes, combined with green and blue ponds, *Restingas*, beaches, tropical rivers, and lush mangroves, create stunning and contrasting vistas. The highly dynamic nature of the landscape is an important factor in support of criterion (vii). The temporary interdunal lakes are formed in the rainy season and then disappear during the dry season causing a continuous change of the landscape as the lakes reappear in different places and with different contours in the rainy season of the following year as a result of dune mobility with migration rates from 4-25 m per year. The lake bottoms are covered by a soft brown or green sheet of algae and cyanobacteria. This results in ever-changing vistas and combination of shapes and colours. The IUCN field evaluation mission highlighted that the nominated property is of outstanding beauty that is hard to compare to any other places in the world, a view unanimously shared by external desk reviewers.

Regarding criterion (viii), most expert reviewers consider that the value of the nominated property is globally outstanding. Nevertheless, some reviewers called for a more in-depth description of geological and geomorphological features and comparative analysis for criterion (viii) whilst noting the potential of the nominated property to demonstrate global significance under criterion (viii). Further to the information obtained from the field evaluation mission, additional desk review and literature, the IUCN World Heritage Panel was satisfied with the justification for criterion (viii). Scientific literature suggests that the nominated property represents one of the largest coastal dune areas formed in the Quaternary. The nominated property is remarkable within the context of the complex set of climatic, oceanographic, and geomorphological elements of the Brazilian coast. With no inlet or outlet, the lagoons are exclusively fed by rainwater amidst very clean sand. In turn, the fluctuation of the water table controls the morphology of dunes (rather than the seasonal change in wind strength).

Noting the nominated property as representing an intact section of the interface of a tropical coastal area where the old continent meets with a passive oceanic margin, desk reviewers highlighted the nominated property as a spectacular Quaternary geology site with global significance that preserve sites potentially key to understand the past few millennia of geoenvironmental change. Desk reviewers also noted that the claim for criterion (viii) is closely interlinked with the claim for criterion (vii). Furthermore, the nominated property was noted as the only site on Earth with this type of dune and lagoon formation, with freshwater lagoons interspersed with sand dunes. Similar sites differ from the nominated property mostly in the amount of precipitation and the different climatic conditions. The area is formed by unique local geological, geomorphological, pedological, climatic and biological attributes. Desk reviewers considered that there are many coastal areas with dunes globally, many of which are deserts, but none of which would exhibit such extensive morphological dynamics in such a spectacular way. LMNP was noted as exceptional area for the evolution of geomorphological processes influenced by unique climatic and geological conditions that give rise to unique flora and fauna. The non-vegetated, fluvial-aeolian landscape of the nominated property is also important to understand pre-vegetation fluvial landscapes using the nominated area as present time analogue.

In conclusion, IUCN considers that the nominated property is globally significant under criterion (vii). Whilst the comparative analysis could have included further geologically similar, yet scarce locations, the nominated property appears to be globally significant under criterion (viii).

4. INTEGRITY, PROTECTION AND MANAGEMENT

4.1. Protection

The entire nominated property is protected as a national park, legally established in 1981, under IUCN Management Category II and under the administration of the federal protected area agency (ICMBio), linked to the Ministry of Environment and Climate Change. It is part of the National System of Protected Areas (SNUC) and belongs to a regime of integral protection.

The objective of this regime is the conservation of nature, with only the indirect use of natural resources.

In addition to the SNUC regulations, the Native Vegetation Protection Law defines protected areas in rural areas that need to be maintained with their natural and protected vegetation cover. The Law establishes protective measures for environmentally sensitive areas, such as riverbanks, springs, hilltops, and vegetation. Furthermore, the nominated property is surrounded by the so-called Permanent Protection Areas and Legal Reserves, which are particularly relevant for the *Cerrado* where every rural property or settlement project has to maintain native vegetation in 30% of its area, serving as buffer zones to provide an additional layer of protection to the nominated property's attributes. At local levels, the nominated property is also protected by municipal legislation related to infrastructure, land-use planning and public use, especially in Barreirinhas, including environmental licensing. Decision-making on LMNP's resources and on the regulation of activities, including subsistence agriculture and aquaculture, crafts, solar power, etc. is ensured through participatory mechanisms, such as through the LMNP Council and the newly introduced Terms of Commitment (see section 4.4).

66% of the buffer zone is managed as protected areas for sustainable use, whereas most of the marine section of the buffer zone is not a formal protected area. However, measures to ensure connectivity and additional protection are mostly needed on the terrestrial part of the nominated property, where the attributes of the proposed OUV can be found.. The marine areas are regulated through the Ecological Economic Coastal Zoning (ZEEC) and the National Coastal Management Plan (NCMP). The ZEEC establishes environmental goals and guidelines in marine spatial planning and supports monitoring, licensing, inspection, and environmental management. The NCMP is designed to regulate and protect the use of existing resources on the Brazilian coast. In view of potential future impacts, for instance from tourism (see section 4.5), IUCN recommends that the protection status of the entire marine part of the buffer zone is strengthened.

IUCN notes that the nominated property benefits from a strong and multi-layered protection regime that goes beyond the nominated property itself and beyond the areas where the main attributes of the proposed OUV are found. Therefore, IUCN considers that the nominated property is adequately protected, but recommends that the protection of the marine part of the buffer zone should be further strengthened through the designation of a marine protected area.

IUCN considers that the protection status of the nominated property meets the requirements of the *Operational Guidelines*.

4.2 Boundaries

The nominated property boundaries cover an area of 156,562 ha and encompass almost entirely the Lençóis areas (90,000 ha of dune fields and temporary and permanent lakes) except for some dunes which have moved outside the boundaries in Santo Amaro after the designation of the national park. These areas have however been designated under municipal protection regimes to ensure coherence in protection. The LMNP boundaries also include some non-dune ecosystems important to the integrity of the nominated property, including parts of rivers, coasts, mangroves, and *Caatingas*. The interplay between these elements and the dune system are part of the processes constituting the OUV. These areas also play a conservation and buffering role for the attributes of the proposed OUV already within the nominated property. The nominated property therefore benefits from a boundary design that ensures its integrity.

In addition, the buffer zone covers an area of 268,231 ha fully surrounding the entire nominated property. The terrestrial part of the buffer zone is mostly covered by *Caatinga* and *Cerrado*-type vegetation, which ensure an ecological buffer effect between the ecosystems of the LMNP and more urbanised areas. The Permanent Protection Areas and Legal Reserves outside the nominated property play a fundamental role for the protection of the buffer zone and beyond. The marine section of the buffer zone provides an additional layer of protection straddling along the coast with a mostly uniform width of around 10 km. The nominated property therefore benefits from a complete buffer zone that can provide an additional layer of protection.

In conclusion, IUCN considers that the boundaries of the nominated property and buffer zone meet the requirements of the *Operational Guidelines,* as the national park includes all attributes of the proposed OUV and together with the proposed buffer zone effectively ensure their protection.

IUCN considers that the boundaries of the nominated property and buffer zones meet the requirements of the *Operational Guidelines*.

4.3 Management

The current management plan of the LMNP was developed in 2003 and has been updated in 2022. It includes 15 objectives and a zonation comprising four zones: Firstly, the 'Primitive Zone' is mainly dedicated to preservation of natural values and scientific research. Secondly, the 'Extensive Use Zone' intends to conserve natural values with minimal human impact. These first two zones cover the vast majority of LMNP's area. Thirdly, the 'Intensive Use Zone' comprises two separate areas for the visitor centres and other facilities. Lastly, the 'Special Use Zone' is dedicated to the LMNP administration, maintenance, and services. These latter two zones cover a very small proportion of LMNP

The updates to the management plan were based on the results of management effectiveness assessments under the State Party's Management Analysis and Monitoring System (SAMGe). According to these assessments, LMNP has continually increased its

performance over the past years. The management plan aligns with municipal, state, and federal plans and guidelines, such as the National Coastal Management Plan and the Municipal Land Use and Zoning Law. While it is within ICMBio's mandate to implement the management plan, it receives support from the governor's office and the three mayors' offices.

Law enforcement related to access, vehicle permits, and authorised activities within the nominated property is central to management priorities. The LMNP is well equipped with all-terrain vehicles, four-wheel drives, and a helicopter from the regional coordination section of ICMBio. However, IUCN notes there are staffing shortages within the nominated property, limiting their capacity to respond to various demands from the community, with a number of requests going beyond the ICMBio mandate. Current staff and resources are primarily assigned to administrative or surveillance work, with limited capacity to monitor biodiversity values. However, new permanent positions are being allocated, and additional support personnel on fixed-term contracts are being hired so the situation is expected to improve, with anticipated staff increase from 17 to 24 in addition to short-term contractors.

The overall strategy for the use of the nominated property is presented in the Public Use Plan, essentially a programmatic, technical document that covers management strategies, guidelines, and priorities to stimulate public use, guide management, improve experiences, and diversify visiting opportunities in the LMNP. The strategy presented in the Public Use Plan includes better signage of the official paths to be followed, better signage of the boundaries of the nominated property and the buffer zone, recruitment of additional staff to strengthen law enforcement and possible cooperation between the three levels of government on enforcement and patrolling. This Plan already considers necessary provisions to a comprehensive regulation of the tourism activity within and outside the nominated property, though it can be reinforced by determining the nominated property's carrying capacity, the development of a tourism management plan, including a monitoring plan.

To enhance coordination between the different levels of governance, ICMBio and the Ministry of Environment and Climate Change expressed their will to the field evaluation mission to work on an improved governance mechanism and partnership between the federal, state and municipal level. This partnership would aim at supporting the complementary use of resources to enhance enforcement, among other priorities. While this expression of interest demonstrates political will for the long-term management of the nominated property and its buffer zone, a formal tripartite agreement is not yet in place at the time of this evaluation.

Overall, IUCN considers that the management of the nominated property meets the requirements of the *Operational Guidelines,* as the management is currently able to ensure the integrity of the nominated property. Nevertheless, monitoring, enforcement and governance should be strengthened in step with the increasing tourism demand (section 4.5). Whilst the marine part of the buffer zone is subject to the NCMP and ZEEC, IUCN also recommends strengthening the protection and management regime for the marine part of the buffer zone to ensure any potential threats from offshore and from tourism can be effectively addressed in future. This should include an analysis of the nominated property's carrying capacity that is to be based on the attributes of OUV and the biodiversity values of the property as well as the development of a tourism management plan based on the carrying capacity.

IUCN considers that the management of the nominated property meets the requirements of the *Operational Guidelines*.

4.4 Community

In supplementary information, the State Party noted that there are currently 4,154 people living within the boundaries of LMNP, including traditional communities. According to supplementary information provided by the State Party, there are no communities self-identifying as Indigenous peoples living within the nominated property. Traditional communities are recognised by law and have been present in the territory before the LMNP was designated. They depend on the LMNP for their livelihoods, including for local agriculture, fishing and cattle raising. Tourism has also brought a significant livelihood opportunity, and several households now own homestays and restaurants. The National Park officially recognises these uses, and "Terms of Commitment" have been signed between the ICMBio and the communities. However, the identification and recognition of the traditional communities is still at an early stage.

Inhabitants of the nominated area hold tenure rights and participatory schemes have been established to organise the land use whilst conserving biodiversity. These mechanisms include the LMNP Council, which is operational since 2014 and which is mainly composed of landowners, along with the local businesses, fishers, local NGOs, tourist service providers and handcrafters. The recently established "Terms of Commitment" intend to facilitate a system that relates needs and sustainable activities carried-out by local inhabitants within the boundaries of the nominated property, based on a use baseline developed by the ICMBio through surveys. They acknowledge that the communities precede the creation of the national park and serve as a management and governance instrument and mediation tool for conflicts, signed between the Institute Chico Mendes and traditional communities residing in conserved areas, aiming to guarantee traditional communities' socioeconomic and cultural interests and the conservation of biodiversity. Furthermore, the "Terms of Commitment" regulate infrastructure development, traditional and historical fisheries, cattle, and poultry raising, waste management and tourism activities.

All stakeholders and communities met during the field evaluation mission appeared to be aware and supportive of the nomination process. Whilst stakeholders voiced some concerns related to for instance the need for stronger enforcement, there appears to be a strong consensus that the World Heritage nomination would bring recognition to the LMNP and benefits to the communities.

4.5 Threats

The nomination dossier provides an analysis of threats affecting the nominated property, including their trends and extent within the nominated area, and estimates of their impacts. The most important threats identified are tourism, waste disposal and threats from outside the nominated property. Regarding threats from outside the nominated property and its wider setting, IUCN notes the impacts of the offshore oil spill from 2019, which has affected over 2,000 km of the Brazilian coast. Besides the environmental impacts, this has particularly affected coastal communities and their fisheries activities. Oil exploration activities in the *Foz de Barreirinhas* are hence a concern. Therefore, IUCN considers that the coastal-marine part of the nominated property needs a broader governance approach beyond the nominated property itself, including within the national and transnational coastal regulations to address potential issues arising from offshore oil exploration and exploitation.

Whilst the IUCN field evaluation mission noted tourism as the main threat, the nominated property is currently in an excellent state of conservation with only a limited impact from tourism. LMNP itself is difficult to access, which contributes to its preservation. The nominated property is only accessible through guided tours by car provided by tour agencies, limiting the potential impacts. The field evaluation mission noted that all municipal, state, and federal governments allocate legal and financial resources to ensure activities are well regulated and monitored. The Maranhão governor's office has an entire department with specialised professionals undertaking several planning and visitation activities and do provide important support to the nominated property's needs.

Tourism also plays an important role for the local economy, a relevant factor in promoting social engagement and conserving the values of the nominated property, promoted by the Public Use Plan itself. In the view of the mission, tourism should also be recognised as a potential conservation tool that provides livelihood opportunities to the local population and that enables further engagement of communities in the management of the nominated property. Visitation density is low to moderate overall in the nominated property, and is high only in a few specific locations of particular interest due to their scenic beauty (e.g. Lagoa Bonita and Lagoa Azul). Despite the efforts observed by the mission to properly handle waste, localised plastic pollution was evident, especially in the buffer zone. Thus, waste management will have to be a management priority, especially if the number of tourists increases.

Increasing tourism demand has led to the construction of a bridge in Barreirinhas to facilitate access to the LMNP. ICMBio requested legal action to stop this construction as the Environmental Impact Assessment (EIA) contained gaps. After the revision of the EIA and the provision of guarantees by the developer, the bridge construction was authorized and resumed. The IUCN field evaluation mission considers that the bridge could be used an asset for the management as it will concentrate visitor access to one entry point and facilitate enforcement, provided that access is carefully controlled as recommended by the national authorities in the review of the EIA. Increasing tourism could also lead to an increase in illegal activities, including access by unauthorized private vehicles. This issue currently remains limited but will probably require enhanced capacity for enforcement in the nominated property. There is also an increasing demand for windsurfing on the margins of the LMNP in the coastal area of Atins prompting the construction of hotels, guesthouses, and tourism-related infrastructure, with implications for possible illegal construction on a fringe area bordering the nominated property, as evidenced during the mission. Whilst this issue is currently limited in scope, the ICMBio is exploring measures to control this potential threat and anticipate future issues.

In conclusion, IUCN notes that the responsible authorities are aware of and taking action to address the challenges facing management of the nominated property. IUCN considers that the nominated property is currently adequately protected and managed and subject to a boundary design that can ensure the integrity of the nominated property. Whilst the marine part of the buffer zone is subject to the National Coastal Management Plan and Ecological Economic Coastal Zoning (ZEEC), IUCN recommends strengthening the protection and management regime for the marine part of the buffer zone to ensure any potential threats from offshore can be addressed in future.

In summary, IUCN considers that the integrity requirements and protection and management requirements of the *Operational Guidelines* are met.

5. ADDITIONAL COMMENTS

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6. APPLICATION OF CRITERIA

The **Lençóis Maranhenses National Park (Brazil)** has been nominated under natural criteria (vii) and (viii).

Criterion (vii): Superlative natural phenomena or natural beauty or aesthetic importance

The nomination dossier highlights the series of dune formations interspersed with both temporary and perennial lagoons, creating an unparalleled environment of exceptional beauty. These dune chains, known as barchan dunes, stretch up to 75 km

in winding patterns and extend over 20 km inland. The vast areas of white sandy dunes, complemented by the presence of green and blue ponds, coastal broadleaf forests, beaches, tropical rivers, and flourishing mangrove ecosystems, form a breathtaking and diverse landscape of striking contrast. The landscape resembles a desert but holds high volumes of water as rainfall fills these dune formations with water from the rising water table during the first half of the year, forming temporary lagoons of various shapes, sizes, and depths. The interplay between wind and rainfall in this region creates a highly dynamic, fast changing dune landscape, which adds to the value for aesthetic appreciation changing every season and every year. Whilst large sand dune systems exist elsewhere, the setting in tropical climatic conditions of a complex dune field with a lacustrine and coastal environment makes the nominated property an unparalleled natural phenomenon.

IUCN considers that the nominated property meets this criterion.

Criterion (viii): Earth's history and geological features

The nominated property is shaped by sediments overlaying the Barreirinhas Basin, shaped by coastal dynamics and the interaction between climate, coastal drifts, tidal regime and river currents. Through the influence of wind, these sediments are transported to form a vast expanse of both stable and shifting dunes, recognized as the largest in South America. This phenomenon stands as remarkable evidence of the evolutionary progression of coastal dunes throughout the Quaternary period. The lagoons within the nominated area are solely replenished by rainwater and are surrounded by pristine sandy terrain. Moreover, the nominated property's non-vegetated, fluvial-aeolian landscape provides valuable insights into pre-vegetation fluvial environments, using the area as a modern-day analogue to illustrate fluvial processes of the past. The nominated property is an extraordinary site for observing the evolution of geomorphological processes, influenced by unique climatic and geological factors that support a distinct flora and fauna.

IUCN considers that the nominated property meets this criterion.

7. RECOMMENDATIONS

IUCN recommends that the World Heritage Committee adopts the following draft decision:

The World Heritage Committee,

1. Having examined Documents WHC/24/46.COM/8B and WHC/24/46.COM/INF.8B2,

2. Inscribes the **Lençóis Maranhenses National Park, Brazil,** on the World Heritage List under criteria (vii) and (viii);

3. Adopts the following Statement of Outstanding Universal Value of the property:

Brief synthesis

Consisting of large and extensive dunes, Lençóis Maranhenses National Park (LMNP) resembles a desert. However, located in northeastern Brazil, on the east coast of Maranhão, the property is subject to a semi-humid climate with a rainy season providing large volumes of water and resulting in the formation of temporary inter-dunal lagoons. The property comprises an area of 156,562 ha, of which about 90,000 ha are composed of an extensive dune field with temporary and permanent lagoons, bordering deflation plains as source area for the dunes along the 80 km coastline. The mostly unidirectional wind shapes barchan dunes up to 75 km in length. The property presents its most stunning scenery, when the lagoons reach their maximum water levels during the rainy season, exhibiting a wide range of different colours, shapes, sizes, and depths. The origin of the dune field is related to sedimentation from marine transgressions and regressions, which combined with the wind action allowed the formation of dune fields along the Quaternary. The property is located in the Barreirinhas Basin in a transition zone between three Brazilian biomes: Cerrado, Caatinga and Amazon. The park's vegetation is composed of pioneer formations of Restinga, mangroves and alluvial communities that, together with marine and freshwater environments, are fundamental for the conservation of species diversity.

Criterion (vii)

The LMNP is part of an incomparable landscape. It is formed by successive dune chains interspersed with temporary and perennial lagoons. Along the park's 80 km of coastline, there is a beach between 600m and 2km. The sand deposited by tides on the beach is gradually eroded by the wind, shaping small barchans with heights ranging from 50 cm to one metre near the shoreline, reaching heights of up to 30 m as they migrate inland, downwind and atop dunes from previous generations. The barchan dunes form winding chains up to 75 km long and move over 20 km inland. During the rainy season, temporary lakes form between the dunes, only to vanish in the dry season, leading to a constant transformation of the landscape. With dune mobility at migration rates ranging from 4 to 25 meters per year, these lakes reemerge in new locations with altered shapes in the subsequent rainy season. The lakebeds are coated with a layer of brown or green algae and cyanobacteria, contributing to the ever-changing scenery and variety of shapes and colours, composing a landscape of unique beauty rarely found anywhere else in the world.

Criterion (viii)

The sediments in the Barreirinhas Basin are subject to aeolian processes forming a field of fixed and mobile dunes, considered the largest in South America. This process is considered one of the best and largest examples of the development of coastal dunes along the Quaternary, and the only site worldwide with such extensive development of dynamic dunes and lagoons. The dunes form long chains of barchans arranged in

the same direction and increasing in size as they advance inland. Temporary ponds are formed by the rise of the water table during the rainy season. The property stands out within the complex interplay of climatic, oceanographic, and geomorphological elements along the Brazilian coast, featuring unique dune and lagoon formations fed exclusively by rainwater. These features, shaped by coastal dynamics and various environmental interactions, serve as remarkable evidence of the evolutionary progression of coastal dunes over millennia, including insights into pre-vegetation fluvial landscapes, serving as a present-day analogue for understanding past fluvial processes. The geomorphological processes create pristine and nascent habitats for a diverse and specialised and pioneer flora and fauna.

Integrity

With an area of 156,562 ha, the property encompasses 90,000 ha of dune fields with beautiful chains of barchans interspersed with temporary and perennial lagoons, exclusively fed by rainwater. More than 40,000 ha are covered by Restinga vegetation, which along with mangroves, lagoons, rivers, marine areas and other ecosystems supports species diversity and interact with geomorphological processes. The area is therefore large enough to guarantee the representation of elements and processes that constitute the property's Outstanding Universal Value.

The dunes are separated from the coastline by a broad deflation plain ranging from 600 m to 2000 m in width. The sand deposited by tides on the beach is gradually eroded by the wind, shaping small barchans with heights ranging from 50 cm to one metre near the shoreline, reaching heights of up to 30 m as they migrate inland, downwind and atop dunes from previous generations. The dunes migrate with a speed of up to 25 m per year. During the rainy season, lagoons emerge amidst very clean sand. With no inlet or outlet, they are exclusively fed by rainwater. The fluctuation of the water table controls the morphology of the dunes.

The property is fully surrounded by a buffer zone of 268,231 ha, both along the coast and inland, creating an ecological buffer between the natural ecosystems and urbanised areas.

Protection and management

The property is protected through the designation as Lençóis Maranhenses National Park (LMNP) with an area of 156,562 ha. This legally protected area is recognised since 1981 by legal decree and administered by the national protected areas authority, ICMBio, and comprises the National System of Protected Areas (SNUC), as the main territorial management instrument aimed at environmental protection and biodiversity conservation. The network of protected areas within and beyond the property also interacts with other levels of environmental protection and management at the state and municipal levels, as well as other legal instruments that intend to protect important ecosystems beyond protected areas boundaries.

In addition, it is part of the National System of Protected Areas (SNUC), belonging to the integral protection group, where natural resources can only be used indirectly. It has well defined boundaries and buffer zones with their respective regulation instruments, being the Management Plan and Public Use Plan. Management effectiveness evaluations are conducted regularly, and results publicly addressed. Monitoring, enforcement, and governance needs to be commensurate with the level of action needed to respond to pressures from tourism.

Governance and participatory approaches are secured both for multi-level governmental decision-making as well as users of the property, through at least two instances: the LMNP Council and the Regional Governance Instance Lençóis-Delta. At the time of inscription, more than 4,000 people are living within the boundaries of LMNP. Local and traditional communities need to be equitably involved and their rights observed. The National Park officially recognises the communities through "Terms of Commitment", intending to respond to needs and sustainable activities carried-out by local inhabitants within the boundaries of the property. The identification and recognition of the traditional communities was still at an early stage at the time of inscription and will need to be strengthened.

The marine part of the buffer zone is subject to the National Coastal Management Plan and Ecological Economic Coastal Zoning (ZEEC). To ensure the protection of the property against threats from offshore, a strengthened protection and management regime for the marine part of the buffer zone will be required in future.

4. Requests the State Party to
   a) develop a tourism management plan, determined by the property's carrying capacity that is to be based on the attributes of OUV and the biodiversity values of the property,
   b) further strengthen the protection and management of the marine section of the buffer zone, for instance through the designation of a marine protected area,
   c) Continue to further increase staffing and funding for the protection and management of the property, especially to implement the aforementioned actions and including strengthened biodiversity monitoring.

Map 1: Location of the nominated property