ASIA / PACIFIC

BADAIN JARAN DESERT – TOWERS OF SAND AND LAKES

CHINA

Badain Jaran Desert © IUCN / Kyung-Sik Woo

WORLD HERITAGE NOMINATION – IUCN TECHNICAL EVALUATION

BADAIN JARAN DESERT – TOWERS OF SAND AND LAKES (CHINA) – ID N° 1638

IUCN RECOMMENDATION TO WORLD HERITAGE COMMITTEE: To inscribe the nominated property (consisting of the nominated component part Badain Jaran Megadunes) under 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 2020

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 regarding threats to the nominated property, the current protection regime for the nominated property, including the planned designation as national park and regarding the justification of the boundaries of the nominated component parts of the Badain Jaran Megadunes. The supplementary information was provided by the State Party on 21 February 2024.

c) Additional literature consulted: IUCN's evaluation consulted a wide array of relevant reference material for the geology, geomorphology, protection and management as well as the comparative values of the nominated property. References included: Chen J. S., Li, L., Wang J. Y., Barry, D. A. (2004) Groundwater maintains dune landscape. Nature, 432, p.459–460; Goudie, A. ; Goudie, A. & Viles, H.A. (2021). The distribution and nature of star dunes: A global analysis. *Aeolian Research*, 50, 10.1016/j.aeolia.2021.100685; IUCN (2011) World Heritage Desert Landscapes: Potential Priorities for the Recognition of Desert Landscapes and Geomorphological Sites on the World Heritage List. 44p; IUCN (2021) Geological World Heritage, A revised global framework for the application of criterion (viii) of the World Heritage Convention. 118p; Jiang, G. *et al.* (2021). Hydrological Evolution of a Lake Recharged by Groundwater in the Badain Jaran Desert Over the Past 140 years. *Frontiers in Earth Science*, Doi: 10.3389/feart.2021.721724; Liu, S. W., Lai, Z. P., Wang, Y. X. (2016) Growing pattern of megadunes in the Badain Jaran Desert in China revealed by luminescence ages. Quaternary International, 410, p.111–118; Miao, Y. F., Herrmann, M., Wu, F., Yan, X., Yang, S. (2012) What controlled Mid-Late Miocene long-term aridification in Central Asia? – Global cooling or Tibetan Plateau uplift: A review. Earth-Science Reviews. 112(3-4), p.155-172; Walker, A. S., Olsen and Bagen, J. W. (1987) The Badain Jaran desert: remote sensing investigations. Geographical Journal, v.153(2), p.205-210; Wang, L., Wang, Z., Liu, M., Shen, J., Nie, Z., 2023. The temperature and precipitation change and its impact on lakes in Badain Jaran Desert over the last 60 years. *Geological Bulletin of China*, 42, 7, 1218-1227; Wang, N. A, Ning, K., Li, Z. L. (2016) Holocene high lake-levels and pan-lake period on Badain Jaran Desert. Science China Earth Sciences, 59(8), p.1633-1641; Wang, Z. *et al.* (2021). Groundwater characteristics and climate and ecological evolution in the Badain Jaran Desert in the southwest Mongolian Plateau. *China Geology,* 3, 421−432. doi:10.31035/cg2021056; Yan M. C., Wang G. Q., Li, B. S. (2001) Formation and growth of high megadunes in Badain Jaran Desert. Acta Geographica Sinica, v.56(1), p.83-91; Wu, B., Wu, J., Liu, J., Wu, Y. (2016). Evaluation with Travel Photos on the Natural Beauty of the Badain Jaran Desert. *Journal of Desert Research*, 36, 2, 522-532; Zhang T. C., Sun, H. (2011) Phylogeographic structure of Terminalia franchetii (Combretaceae) in southwest China and its implications for drainage geological history. Journal of Plant Research, v.124, p.63-73.

d) Consultations: 10 desk reviews received. The mission was able to meet with the National Forestry and Grassland Administration, local officials from the Inner Mongolia Autonomous Region, Alxa League, and Alxa Right Banner, experts, mayors, local communities, and local businesses.

e) Field Visit: Kyung-Sik Woo, 5 to 12 June 2023

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

2. SUMMARY OF NATURAL VALUES

Badain Jaran Desert - Towers of Sand and Lakes is nominated under criteria (vii) and (viii). The nominated property extends on an area of 726,291.41 ha and comprises mega-dune systems, intersected with inter-dunal lakes. A buffer zone of 891,114.36 ha surrounds the nominated property. It is situated in the Western section of the Alashan Plateau, encircled by the Yabrai, Heli, Beida, Hongshi, Malagai, Alateng and Zongnai mountain ranges.

The Badain Jaran Desert is a meeting point for three sandy regions of China and is the third largest desert and the second largest drifting desert in the country. The nominated area is located in the southern part of the desert and showcases a diverse array of desert landscapes, including oases, inter-dunal lakes, shifting sand dunes, mega-dunes, and other aeolian features such as erosion formations and ripple effects. The dune types found in the nominated property include barchans, barchanoid chains, mega-dunes and star dunes. Noteworthy features include the world's tallest, stabilised sand mega-dune (relative relief of 460 m), the largest expanse of so-called singing sands (describing the resonance caused e.g. by wind moving dry and loose sand), and wind-eroded landforms, among others. The varied landscape also results in a high level of habitat diversity, and hence a high level of biodiversity.

The nominated property, as initially nominated, comprised four component parts (see section 5.1). The largest of the four nominated component parts and the one the State Party retained, Badain Jaran Megadunes, hosts the tallest mega-dunes and the inter-dunal lakes. It extends to the eastern rim of the desert, displaying the transition from eroding granite hills to stony gobi foothills and small dune chains leading to larger dunes towards the centre. Additionally, three significantly smaller serial component parts, Haisenchulu, Eribugai Gorge, and Mandela Mountain, were included in the initial nomination to highlight features such as tafonis (i.e. rounded and smooth-edged openings in rock surfaces), yardangs (i.e. sharp, irregular sand ridges formed by wind erosion), sandstone gorges, and historic petroglyphs (on petroglyphs, see also section 5.2). Finally, the nominated property is presented as an important site for the study of the paleoenvironment and desert evolution, thanks to the dense network of lakes which record environmental change. Further to IUCN's progress report of 14 December 2023, the States Party confirmed in supplementary information by letter of 21 February 2024 that only the nominated component part of the Badain Jaran Megadunes are retained in the nomination, with slightly revised boundaries (see section 5.1).

3. COMPARISONS WITH OTHER AREAS

The nomination dossier provides a comparative analysis that covers most of the planet's desert landforms and landscapes. It compares the nominated property not only with other World Heritage properties but also with sites on Tentative Lists, and sites in Asian arid regions. Under given geological, geographic, and climatological conditions, the nominated property appears to display highly significant hyper-arid desert landforms and landscapes under temperate climate, with outstanding geoheritage values.

The nominated property was already highlighted in IUCN's 2011 thematic study on desert landscapes as representing a selection of the most significant desert landscapes and geomorphological sites that are currently not included on the World Heritage List. The 2021 IUCN thematic study on the application of criterion (viii) noted that the nominated property belongs to one of the evident geographical gaps (Central and East Asia) in current listings. The nominated property also represents desert lakes and playas (i.e. flat and dry desert basins), which are recognised as lacking appropriate recognition on the World Heritage List. In addition, the nominated property is seen as holding potential of filling a gap for evidencing historic climatic change.

Regarding criterion (vii), IUCN notes that the nominated property displays spectacular ongoing geological and geomorphic features of desert landscapes and landforms which may well be unparalleled. The nominated property's aesthetic values are characterized by the dense distribution of stabilized and parallel to subparallel mega-dunes as well as by the associated unique collection of inter-dunal lakes with various salinities and colours, which are rich in desert fauna, flora, and microbial communities. The aesthetic appeal of the nominated property also results from unusual vegetation on the dune surface in some places and a wide variety of desert landforms, such as smaller, crescent-shaped and pyramidal dunes and various types of soils under a hyper-arid, temperate climate. Whilst the property is not nominated under biodiversity criteria, it deserves to be noted that the various conditions of the inter-dunal lakes with different salinities also give rise to important biodiversity values. Microbial communities are the reason for the unexpected colouring of the lake landscape, adding to the aesthetic appeal of the nominated property. The nominated property also overlaps with the range of the Critically Endangered Wild Camel (*Camelus ferus*) and the Endangered 腾格里蛙 (Yellow River Frog, *Pelophylax tenggerensis*) and Saker Falcon (*Falco cherrug*). Further notable species include the Vulnerable Goitered Gazelle (*Gazella subgutturosa*) and Asian Houbara (*Chlamydotis macqueenii*) as well as desert-adapted vegetation, rare and endemic plants

Regarding criterion (viii), the Badain Jaran Desert provides an outstanding example of the ongoing evolution of desert landscapes and landforms under a temperate hyper-arid climate. It records and displays a great variety of desert geomorphic and aeolian features, including a continuously upward-grown, stabilized mega-dunes and associated inter-dunal lakes. The dunes are considered to be among the tallest in the world, and are different in form compared to the notable features found in the Namib Sand Sea World Heritage property. The144 inter-dunal lakes are exceptional and contribute to the high degree of geodiversity and exhibit a unique surface process resulting from the following factors: tectonically induced basin topography; two-directional seasonal strong winds; high moisture contents in the vadose zone (i.e. the zone of underground water above the water table); and past climate change from humid to arid during the Holocene. There are both freshwater and saline lakes, which results in a wide range of lake biochemistry depending on the hydraulic setting of the region as well as from lake sediments. In addition, the

nominated property represents regional and global tectonic and geomorphic evolution as well as hydro-geological changes associated with past climatic history.

External desk reviewers supported both the application of criteria (vii) and (viii). The review base considers that the nominated property holds outstanding aesthetic values under criterion (vii), which are characterized by the dense distribution of stabilized, linear, and parallel mega-dunes interspersed with countless inter-dunal lakes. Under criterion (viii), the nominated property is distinguished from other World Heritage properties by the stability of its linear mega-dunes and abundance of inter-dunal lakes. The nominated property holds the world's densest assemblage of stabilized mega-dunes, including the tallest sand dunes in the world and the highest concentration of inter-dunal lakes.

In conclusion, IUCN considers that the nominated property presents a strong case for global significance, both under criterion (vii) and under criterion (viii). In addition, the reader is also referred to section 5.2 regarding ICOMOS' views on the cultural heritage of the nominated property and to section 5.1 regarding the initial proposal of the nominated property as a serial site.

4. INTEGRITY, PROTECTION AND MANAGEMENT

4.1. Protection

This section discusses the protection of the nominated property on the basis of revised and clarified boundaries in supplementary information, provided by the State Party. Further details are also provided in section 5.1. The nominated property is publicly owned and subject to several layers of legal protection, including buffer zones. These layers include the designation as UNESCO Global Geopark, National Geopark, and regional designations as Scenic Site and Nature Reserve, paired with corresponding national and local laws and regulations, such as the Regulations on Scenic and Historic Areas, Regulations on Nature Reserve, and the Regulations of the Inner Mongolia Autonomous Region on Environmental Protection.

The Alxa Desert National Geopark of Inner Mongolia covers the central section of the nominated property whilst the Badain Jaran Desert Scenic Site of Inner Mongolia covers its Northern section. Both protected areas fall under IUCN Protected Area Category V. The Badain Jaran Desert Lake Nature Reserve of Inner Mongolia, falling under IUCN Protected Area Category Ia, protects the majority of the nominated area. The Badain Jaran Nature Reserve of Inner Mongolia serves as additional layer of protection at autonomous region level. This Reserve also covers a large part of the buffer zone. The protection of the remaining part of the buffer zone is ensured by the recently introduced "ecological red line" regulation. This regulation provides an additional layer of protection to protected areas against potentially damaging developments. Finally, the nominated property will be granted another layer of protection in case of inscription based on a site-specific law at the level of the autonomous region as well as national regulations for management of World Heritage properties. In addition, IUCN notes that the State Party intends to designate the nominated property as national park, which is a newly introduced designation.

Based on the revised nomination as presented in supplementary information, IUCN considers that the nominated property is adequately protected

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

4.2 Boundaries

This section discusses the boundaries of the nominated property on the basis of the revised and clarified maps provided by the State Party in supplementary information. The revision of the boundaries responds to the Preliminary Report of the IUCN World Heritage Panel, and was also discussed during the field mission. Further details are provided in section 5.1.

The revised boundaries of the nominated property include the main distribution range of mega-dunes, as well as of other types of sand dunes and desert landform features, including pyramidal dunes and crescent-shaped dunes and dune chains, and, importantly, the inter-dunal lakes of different shapes, salinities and colours with the associated flora, fauna, and microbial communities in and around lakes. In particular, the boundaries capture the area with the highest density of mega-dunes with a relative height of more than 200 m. According to the nominated dossier, the boundaries have also been designed in a way to avoid any negative impacts from possible human activities, such as new settlements and industries.

The buffer zone surrounds completely the revised nominated area and includes a very wide area to the east of the nominated property covering a large section of the rim of the desert and of the Yabrai Mountains. On the eastern side, the boundary coincides with the boundary of the Badain Jaran Nature Reserve. The southern boundary of the buffer zone straddles along the road S317, which coincides with the boundary of the Badain Jaran Desert Lake Nature Reserve. The nomination dossier states that the buffer zone covers the transition zone from eroding granite hills to stony foothills. Based on the field visit, the width of the buffer zone appears to be sufficient to effectively protect the aesthetic values and the geoheritage values of the mega-dune field within the nominated property. The area covered by the buffer zone includes important areas for the near-source recharge of the inter-dunal lakes and does not contain any potential sources for pollution. Thus, the buffer zone provides additional protection to the nominated property.

Therefore, IUCN considers that the nominated property is able to maintain continuing evolutionary processes of desert landscape and landform formation with the linked aeolian features. Based on the reconfigured nominated area consisting of one large nominated component part (see section 5.1), IUCN considers that the nominated property encompasses a sufficient representation of the attributes of the proposed OUV within its boundaries. The vast nominated area is large enough to protect the complete set of attributes that convey the proposed Outstanding Universal Value of the nominated property. It is also large enough to ensure the sustained integrity of the desert landscape and landforms within the nominated property.

The envisaged designation of the nominated property as national park may have implications for the future boundaries of the nominated property. Supplementary information by the State Party notes that the area, timelines and regulations are yet to be defined. However, the boundaries of the World Heritage property are expected to inform the identification of the boundaries of the future national park. IUCN welcomes the decision of the State Party to include the nominated property in this future national park. In case the national park boundaries could further enable the improvement of the nominated property's boundaries, IUCN considers that a minor boundary modification request should be submitted by the State Party, in case the nominated property is inscribed on the World Heritage List, so that the boundaries of the nominated property align with the boundaries of the national park.

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

4.3 Management

The nominated property is managed by the National Forest and Grassland Administration and the UNESCO Commission at national level, by the Inner Mongolia Autonomous Region Forestry Department at regional level and at local level by the Alxa League Forestry Bureau and the Alxa Right Banner Badain Jaran Desert World Heritage Nomination Administrative Office. Management coordination for the vast area covered by the nominated property is ensured through a comprehensive Management Plan. The Management Plan for the nominated property details the responsibilities of each management level. The Badain Jaran Desert World Heritage Management Office is responsible for the day-to-day protection and management of the property. The Chinese Academy of Sciences and other research organisations provide technical support to monitoring, research and the protection of the nominated property.

According to the nomination dossier, the Inner Mongolia Autonomous Region People's Government will establish a World Heritage Management Committee to lead on the protection and management of the nominated property and its buffer zone. The Committee will strengthen community participation, conduct trainings and promote heritage protection and nature conservation. In addition, the nominated property is subject to the Badain Jaran Desert Tourism Area Master Plan (Revised) 2017-2030, which takes into account the zoning defined in the Master Plan of Alxa Desert National Geopark and in the Master Plan of Alxa Desert Global Geopark Badain Jaran Park Tourism (2010-2020).

The nomination dossier notes that national and local governments have prioritised the protection of the nominated property for a long time. A total of 71 million Yuan (USD 9,808,391) has been invested into the geological resource protection, landscape resource survey, scientific research, environmental remediation and infrastructure of the nominated property during the period of 13th Five-Year Plan. The final figure allocated under the 14th Five-year Plan has not been announced yet at the time of this evaluation. Annual budgets are prepared based on the 5-year allocations and the future financial support to the nominated property confirmed to the field evaluation mission.

The field evaluation mission concluded that the current management regime of the nominated property appears to guarantee its long-term protection. IUCN considers that the nominated property fulfils the management requirements outlined in the Operational Guidelines.

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

4.4 Community

Most of the publicly owned area of the nominated property is uninhabited. There are no towns, roads, agriculture, or mining activities found within the nominated property. However, around 100 herders follow their traditional livelihoods through grazing with camels, goats, and other livestock, and this activity appears to be fully in harmony with the area. The IUCN field evaluation mission noted that the Alxa Right Banner Badain Jaran Desert Application Office communicates with local residents. Local people are also included in the teams in charge of the protection, co-management, monitoring and public education of the nominated property. Based on discussions with local stakeholders, the field evaluation mission had the impression that the stakeholders value living harmoniously with the natural environment and are aware of the nominated area's nature conservation values. The nominated property already has the status of UNESCO Global Geopark, but it is expected by the local authorities that the potential inscription as World Heritage property would provide further benefits to local communities.

The prospect of the nominated property receiving national park status is highly relevant for the potential World Heritage property, and requires appropriate consultation with local communities, including traditional herders. It needs to be ensured that local communities and traditional herders are fully

consulted, involved and in agreement with the national park proposal, ensuring that the herders are able to maintain and continue their traditional activities within the nominated property.

4.5 Threats

The overall level of threats to the nominated property appears to be low. Impacts of current use on the nominated area are negligible as the livelihoods are based on very limited traditional grazing. However, the salinization of the lakes offers potential for salt mining, as evidenced by industrial facilities in Shugui and Yabrai Town. These areas have been excluded from the buffer zone and are monitored to ensure no pollution affects the nominated property. The nomination dossier reports that previous mineral exploration licenses overlapping with the nominated property expired in 2019 and will not be renewed. As a result of the new regulations for ecological red lining (see section 4.1), no mining or extraction licenses may be issued within the nominated property or its buffer zone.

Increased tourism pressure was noted by the IUCN field evaluation mission as the most important potential threat to the nominated property. However, it appears that sustainable eco-tourism is the dominant form of tourism in the nominated property. There are small settlements for local people including tour facilities located around a few lakes, but resource use is not permitted in these areas. At the time of this evaluation, only a small number of tourists visit the nominated property and the buffer zone. These tourists include a small number of adventure hikers as well as tours by car. Due to extreme weather conditions, the shifting desert has a very limited tourist season, generally from June to October, with August and September being the best period. The degree and scale of the tourism activities is therefore very low in relation to the significant size of the nominated property. Even if the number of tourists grows rapidly in the future, the mission did not consider this a serious threat that would be likely to affect the nominated property.

Research suggests that over the past 50 years, the nominated property has been subject to a warming-drying trend, with annual average temperatures rising by 2.5°C. This coincides with shrinking lakes in the hinterland of the Badain Jaran Desert, whereas the vegetation cover was able to withstand these trends and even increase its cover in the period from 2000 to 2016. However, to maintain the integrity of the inter-dunal lakes with regard to criteria (vii) and (viii), sufficient and clean water supply needs to be ensured in the long term, including in the wider area beyond the nominated property and its buffer zone. Whilst direct precipitation appears to recharge groundwater resources effectively – thanks to low drawdown by the sparse vegetation and to the sand layers' strong infiltration capacity and capillary pressure – recent research indicates that precipitation is not the main factor determining lake change. Consequently, the State Party notes in supplementary information that more than 90% of recharge is dependent on groundwater sources and that stable groundwater recharge is provided from the Heihe River via the Altyn Fault Belt and from the Tibetan Plateau via the Qilian Fault Belt and the Altyn Fault Belt as well as from other near-source recharge from the Beida and Yabrai Mountains. The State Party notes that further research is needed to determine the proportions of the water stemming from these sources. Relatedly, recent research suggested that groundwater recharge through precipitation has poor renewability, and that groundwater was stored in historic periods, fossil water of an age of thousands to tens of thousands of years. Therefore, groundwater should not be over-exploited. This can be ensured through the Regulations on the Protection and Management of Groundwater in the Inner Mongolia Autonomous Region issued in 2022. The Regulation limits groundwater withdrawal amongst others in areas where ecological damage occurred; where ecological damage may be caused; where withdrawals are close to the recoverable amount; as well as in protected areas, including geoparks.

In conclusion, IUCN considers that the nominated property is currently subject to a low level of threat, but that research on the inter-dunal lakes' water sources will need to continue and potentially inform action to ensure adequate water supply. Based on the revised boundaries provided by the State Party in supplementary information, IUCN considers that the nominated property fulfils all requirements of the Operational Guidelines in regard to integrity, protection and management requirements.

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

5. ADDITIONAL COMMENTS

5.1 Consideration in relation to serial properties

The nominated property has initially been proposed as a serial site consisting of four different nominated component parts. Whilst the nominated component part of the Badain Jaran Megadunes comprises the vast majority of the nominated area, the three other nominated component parts (Haisenchulu; Eribugai Gorge; Mandela Mt.) are very small in size, equalling less than 1% of the area of the Badain Jaran Megadunes.

a) What is the justification for the serial approach?

The nomination dossier justified the serial approach with the fact that the Badain Jaran Desert is so large that a single area encompassing the area of all four nominated component parts would be impractical to protect and manage and would restrain development opportunities of the entire region. In addition, the Alxa Desert UNESCO Global Geopark includes four different areas to characterize a range of desert features. The sites provide easy access to visitors.

However, the field evaluation mission concluded that the vast nominated component part of the Badain Jaran Megadunes, which covers more than 99% of the nominated area, appears to adequately convey the proposed OUV of the nominated property for desert landscapes and landforms. The other three nominated component parts would only show the examples of surface erosional features that are not globally significant in very small areas, and therefore do not support the proposed OUV of the nominated property. In addition, the majority of external desk reviewers also suggested the exclusion of the nominated component parts of Haisenchulu, Eribugai Gorge and Mandela Mt. as they would not meet the requirements for global significance. The IUCN field evaluation mission also noted that the nominated area of the Badain Jaran Megadunes component part did not fully match the boundaries of the protected areas. Both the initially nominated area and buffer zone to the east were not legally protected in their entirety. In supplementary information, the State Party revised the boundaries of the Badain Jaran Megadunes component part and withdrew the nominated component parts of Haisenchulu, Eribugai Gorge and Mandela Mt.

Nevertheless, further to IUCN's 2011 thematic study on desert landscapes, a future serial extension and renomination of the nominated property could be considered to include the Taklamakan Desert and biodiversity criteria. The Taklamakan Desert is considered one of the world's largest and highest deserts and is known for its remarkable arrays of dune forms, its large bounding alluvial fans, its pluvial lakes, and significant ancient braided channel system. In addition, the potential of loess deposits containing records of paleoclimatic history dating back to 3 million years may be explored, as noted in IUCN's 2021 thematic study on the application of criterion (viii).

b) Are the separate component parts of the nominated property functionally linked in relation to the requirements of the Operational Guidelines?

Whilst the nominated component part of the Badain Jaran Megadunes encompasses an area that fully displays the distribution range and evolution of mega-dunes interspersed with inter-dunal lakes and other types of sand dunes, the other nominated component parts provide only a small sample of attributes on a minimal area. Haisenchulu hosts a weathered granite surface with numerous tafoni features. Eribugai Gorge is entirely composed of a dry valley which was formed by the former fluvial action. These landforms can be observed in many parts of the world, and do not appear to support the desert landforms conveyed by the nominated property's potential Outstanding Universal Value. Mandela Mt. contains numerous Palaeolithic pictographs on basic dyke rocks. Even though past climate can be inferred from the contents shown, the site would appear to be primarily important for cultural values (see section 5.2).

As the nominated component parts of Haisenchulu, Eribugai Gorge and Mandela Mt. do not appear to represent outstanding desert landforms and features, the IUCN World Heritage Panel considered that the nominated component part of the Badain Jaran Megadunes sufficiently represents the proposed Outstanding Universal Value of the nominated property. The Panel considered that the nominated component parts of Haisenchulu, Eribugai Gorge and Mandela Mt. would not contribute to the potential Outstanding Universal Value of the nominated property. In supplementary information, the State Party provided an updated map of the nominated property, which excludes the nominated component parts of Haisenchulu, Eribugai Gorge and Mandela Mt.

c) Is there an effective overall management framework for all the component parts of the nominated property?

An overall management framework for all four initially nominated component parts is no longer required as the supplementary information revised the boundaries of the nominated property to only include the Badain Jaran Megadunes, because neither the serial approach was justified, nor functional links between the four nominated component parts confirmed. However, it deserves to be noted that all the four initially nominated component parts were comprised in the Alxa Desert UNESCO Global Geopark. Thus, they would have been managed within a single overall management framework through the UNESCO Global Geopark designation.

5.2 Consideration in relation to cultural values

The nomination dossier notes an extensive corpus of rock art. The IUCN field evaluation mission also noted that the initially nominated component part of Mandela Mt. appears to contain significant cultural heritage values as it hosts a remarkable collection of 4,234 prehistoric and historic records on the surface of black diabase dykes. The petroglyphs describe a wide variety of animals inhabiting the region some 6000 to 4000 years ago. The depicted wildlife can no longer be found in Badain Jaran Desert. The rock art therefore testifies to past climatic and environmental change.

IUCN therefore requested ICOMOS to comment on the cultural significance of these artefacts. In response, ICOMOS notes that "the rock art of Inner Mongolia has been well studied and was considered in the ICOMOS publication: ICOMOS Thematic Study of Rock Art in East Asia, 2019. As the ICOMOS Thematic study points out, Inner Mongolia is one of the birthplaces of Chinese civilization. Its steppe culture has left abundant archaeological and historical records that date back to the Paleolithic period. So far more than 30 Paleolithic sites have been discovered, more than 2,000 Neolithic sites and some 7,000 Bronze age sites, reflecting numerous different cultures. By the Warring States period (475-221BCE) and during the Qin (221-207BCE) and Han (202BCE-220CE) dynasties numerous sites were constructed of which some 100 been discovered archaeologically, including Tuchengzi City, with its 500 tombs. Many of these were still inhabited during the Wei, Jin, Southern and Northern Dynasties. In the 11th century CE, Khara Khoto, a trading centre, became the centre of the

Tangut Empire. In a comparatively small area in Inner Mongolia and neighbouring Ningxia province are found the largest number of rock art sites in China. These northern rock-art sites share a cultural unity, and are considered to be the richest and best-documented in the Chinese northern frontier areas (…).

At present, a total of about 11,000 rock art sites with over 60,000 individual images are known in the Yinshan area. Most of the Yinshan sites are found in valleys between the mountains where there are abundant water resources and transportation lines for inter-regional communication between north and south. The so-called Steppe route through this area, a precursor of the Silk Road by perhaps as much as two millennia, and an important route for trade in commodities and minerals also ran from east to west.

The rock art images are almost entirely engraved on granite rocks covered with 'desert glaze'. The differential weathering of the images indicates a long time period for their creation. As well as images of isolated animals, hunting and herding scenes, there are also abstract symbols such as spirals or circular, as well as human faces or masks, and a few human figures, possibly illustrating dancing and the birth of a child.

The Rock Art can be divided into three major historical periods, namely Upper Palaeolithic, Neolithic and Bronze Age, during which the images reflect much wetter, greener and more forested conditions than are found today. There are also some later images from the Han period and from the Tang, Song and Yuan dynasties which include galloping horses, two-humped camels, herdsman, etc. indicating desert conditions similar to today.

In 2013, the Mandela Mountain rock art was listed as an important heritage site under State protection. In 2017, the local government approved the construction of a Rock Art Museum."

In conclusion, ICOMOS noted that "the rock art in the Yinshan Mountains, and the rock art of Inner Mongolia which is the largest corpus in China, and one of the two most important areas in China for rock art, the other being neighbouring Ningxia to which it appears to be linked, is of world importance and deserves protection and conservation." In case rock art sites are still contained within the nominated area also after the revision of the boundaries, ICOMOS recommends that "cultural heritage be incorporated into the current management system by including the expertise of cultural heritage conservation in the site management body and by inviting the cultural heritage protection administration and related right-holders and stakeholders into the decision-making process.

If the full value of these rock art sites is to be defined and sustained, more active management is necessary, as in terms of on-going recording and documentation, as well as continuing research and archaeological investigations. The work so far undertaken on survey, documentation and analysis provides an excellent basis for such work.

ICOMOS recommends that cultural heritage should be included in the current conservation and monitoring activities, and a set of parameters for cultural heritage could be developed and included in the existing conservation and monitoring activities. (…) Community involvement in the decision-making process should be strengthened, while the mechanism for community involvement in the decision-making process is incorporated into the current site management system.

While in terms of numbers and quality, these sites in Inner Mongolia, including those in the nominated natural property, if any, are important, their full significance would depend on analysis of the images and features of the nearby landscape, as well as their relationship to known archaeological sites and overall their archaeological and historical contexts.

Therefore, ICOMOS recommends that the State Party of China considers the feasibility of a serial rock art nomination that could include rock art sites within the Inner Mongolia Autonomous Region, Mandela, Helanshan and Yinshan mountains, and in the Ningxia Autonomous Region. These areas together, contain a range of the most significant Chinese rock art sites from the past 10,000 years. Yinshan mountains, in particular, contains some of the oldest rock art in this region. This could fill a gap nomination as regards the geocultural region at the east end of the Euroasia steppe. ICOMOS remains at the disposal of the State Party to provide advice should it be considered useful."

6. APPLICATION OF CRITERIA

The **Badain Jaran Desert - Towers of Sand and Lakes (China)** have been nominated under natural criteria (vii) and (viii).

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

Badain Jaran Desert - Towers of Sand and Lakes display spectacular ongoing geological and geomorphic features of desert landscapes and landforms subject to a temperate, hyper-arid climate. These features create exceptional aesthetic values emerging from the dense range of stabilized, linear, and parallel mega-dunes with numerous inter-dunal lakes as well as various types of smaller dunes in-between the mega-dunes. 144 inter-dunal lakes exhibit a myriad of colours, caused by different levels of salinity and microbial communities. With an exceptional expanse of so-called singing sands (describing the resonance caused e.g. by wind moving dry and loose sand), the nominated property also presents a remarkable soundscape. Wind-eroded landforms, oases, ripple effects and the grandeur of the world's tallest sand mega-dunes (relative relief of 460 m) compose a landscape of remarkable natural beauty. The dynamic of shifting sand dunes creates an ever-changing visual environment.

IUCN considers that the nominated property meets this criterion.

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

The nominated property is located at the junction of three sandy regions of China and provides an outstanding example of the ongoing evolution of desert landscapes and landforms under a temperate and hyper-arid climate. It records and displays an exceptional variety of aeolian features and desert geomorphology, such as linear and parallel, stabilized mega-dunes and associated inter-dunal lakes. The nominated property appears to be a very rare example at global scale that reflects the evolutionary landforms as a combined result of regional tectonism and hydrogeological changes associated with climatic evolution. The nominated property also stands out due to the remarkable stability of its linear mega-dunes and the abundance of inter-dunal lakes. It boasts the densest collection of stabilized mega-dunes globally, encompassing among the tallest sand dunes and the highest concentration of inter-dunal lakes found anywhere on Earth. With 144 inter-dunal lakes and the considerable variety of dune formations, the nominated property hosts a remarkable geodiversity. Both IUCN's 2011 thematic study on desert landscapes and IUCN's 2021 study on the application of criterion (viii) highlighted the nominated property as one of the most significant desert landscapes and geomorphological sites, not currently represented on the World Heritage List.

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 **Badain Jaran Desert - Towers of Sand and Lakes, China**, on the World Heritage List under criteria (vii) and (viii);

3. Adopts the following Statement of Outstanding Universal Value:

Brief synthesis

The property covers an area of 726,291.41 ha, with a buffer zone of 891,114.36 ha. Badain Jaran Desert, located in the Alashan Plateau in the hyper-arid and temperate desert region of northwestern China, is the third largest desert in China and hosts an irreplaceable natural heritage of lake and dune desert features. It stands out with its high density of mega-dunes, including the tallest stabilized sand dunes in the world, a myriad of interdunal lakes, and a range of aeolian landform features. The mega-dunes form an undulating landscape, among which the tallest sand dune achieves a relative height of 460 m. For a sandy desert and sand sea, Badain Jaran is home to abundant plant life and mostly nocturnal animal life. The lakes are mostly saline and diversely coloured, providing a favourable habitat for thriving worms, molluscs, crustacea and some fish.

Due to its geographical location and geological background, the property is strongly influenced by climate change and the continuing tectonic uplift of the Qinghai-Tibet Plateau. Its desert-forming process is continuing, so that the site and its relics offer insights into long-term climatic changes and desert forming processes. The size and integrity of the site is important in understanding its ongoing evolution.

The property holds outstanding aesthetic values thanks to the significant abundance of mega-dunes, aeolian landscape diversity and to the uniqueness of its lakes.

Criterion (vii)

Badain Jaran Desert - Towers of Sand and Lakes display spectacular ongoing geological and geomorphic features of desert landscapes and landforms subject to a temperate, hyper-arid climate. These features create exceptional aesthetic values emerging from the dense range of stabilized, linear, and parallel mega-dunes with numerous inter-dunal lakes as well as various types of smaller dunes in-between the mega-dunes. 144 inter-dunal lakes exhibit a myriad of colours, caused by different levels of salinity and microbial communities. With an exceptional expanse of so-called singing sands (describing the resonance caused e.g. by wind moving dry and loose sand), the property also presents a remarkable soundscape. Wind-eroded landforms, oases, ripple effects and the grandeur of the world's tallest sand mega-dunes (relative relief of 460 m) compose a landscape of remarkable natural beauty. The dynamic of shifting sand dunes creates an ever-changing visual environment.

Criterion (viii)

The property is located at the junction of three sandy regions of China and provides an outstanding example of the ongoing evolution of desert landscapes and landforms under a temperate and hyper-arid climate. It records and displays an exceptional variety of aeolian features and desert geomorphology, such as linear and parallel, stabilized mega-dunes and associated inter-dunal lakes. The property appears to be a very rare example at global scale that reflects the evolutionary landforms as a combined result of regional tectonism and hydrogeological changes associated with climatic evolution. The property also stands out due to the remarkable stability of its linear mega-dunes and the abundance of inter-dunal lakes. It boasts the densest collection of stabilized mega-dunes globally, encompassing among the tallest sand dunes and the highest concentration of inter-dunal lakes found anywhere on Earth. With 144 inter-dunal lakes and the considerable variety of dune formations, the property hosts a remarkable geodiversity. Both IUCN's 2011 thematic study on desert landscapes and IUCN's 2021 study on the application of criterion (viii) highlighted the property as one of the most significant

desert landscapes and geomorphological sites, not currently represented on the World Heritage List.

Integrity

The property covers the continuous distribution area of mega-dunes and associated inter-dunal lakes, as well as other types of desert features. The vast area is large enough to protect the complete range of the necessary elements that convey the Outstanding Universal Value of the property. The area also covers a significant expanse of the desert ecosystem which is used sustainably. The buffer zone provides additional protection to the property and does not contain any potential pollution sources.

Most of the property is in an uninhabited natural desert state, though a few families of herdsmen with some camels, goats, donkeys, and sheep herds inhabit and traditionally use the property in a sustainable way. The property represents a wide and wild area with no paved roads. Towns, factories, and any potential threats are all excluded from the property and buffer zone. Impacts from tourism are controlled and limited to the property's carrying capacity. To ensure the integrity of the inter-dunal lakes, it is essential to ensure that all groundwater sources feeding the lakes are carefully managed and not over-exploited. Further research needs to investigate the groundwater sources and inform potential additional action.

Protection and management requirements

The property is protected through several layers of protective designations. These include one autonomous region-level scenic site and two autonomous region-level nature reserves and designations as UNESCO Global Geopark and as National Geopark. The protection of the property is extended through national nature reserve status for the entire property. In addition, the property is also protected by a range of national, autonomous region-level, and local-level laws and regulations. Local regulations and a management plan have also been developed specifically for the property. The property shall also receive the highest level of legal protection as a national park.

The Inner Mongolia Autonomous Region People's Government establishes a World Heritage Management Committee to assure coordinated leadership over the protection and management of the property and buffer zone. The management institutions involved in the protection of the property are integrated into of the Badain Jaran Desert World Heritage Management Office, which is responsible for the daily protection and management of the property. Local functional departments, monitoring agencies, the Chinese Academy of Sciences and other research institutes provide technical support, and are specifically responsible for the monitoring, research and protection of the property.

Local regulations and a Management Plan have been developed specifically for the property. The State Party undertakes to strictly protect the property and buffer zone, ensuring the integrity of all the natural values and elements. Specific measures include, firstly, strengthening the monitoring and scientific research on natural values and elements such as sand dunes, lakes and vegetation, and implementing adaptive management. Secondly to establish and improve the monitoring system and database for the property, and carry out targeted protection and control measures. Thirdly, local people will be involved in the team for protection, co-management, monitoring and public education. Fourthly, community participation will be strengthened and, fifthly, the balance between heritage protection and local social and economic sustainable development shall be achieved, including through sustainable eco-tourism whilst strictly control the scale and behaviour of tourists to ensure that the impact of tourism on the natural heritage values remains minimal.

4. Welcomes the decision of the State Party to include the property in a future national park and requests that the State Party submits a minor boundary modification request in case the national park boundaries could further enable the improvement of the property's boundaries, and further requests the State Party to ensure that the local communities, including traditional herders are fully consulted, involved and in agreement with this proposal, and to ensure that such a designation ensures that the herders are able to maintain and continue their traditional activities within the property.

Map 1: Boundaries of the nominated property and buffer zone