

AFRICA

ENNEDI MASSIF: NATURAL AND CULTURAL LANDSCAPE

CHAD



Aloba Arch - © IUCN Guy Debonnet

WORLD HERITAGE NOMINATION – IUCN TECHNICAL EVALUATION

ENNEDI MASSIF: NATURAL AND CULTURAL LANDSCAPE (CHAD) – ID No. 1475

IUCN RECOMMENDATION TO WORLD HERITAGE COMMITTEE: To defer the extension under natural criteria.

Key paragraphs of Operational Guidelines:

Paragraph 77: Nominated property has potential to meet World Heritage criteria.

Paragraph 78: Nominated property does not meet integrity or protection and management requirements.

Explanatory note on boundaries of the nomination: The nominated area and buffer zone of the nominated property have been revised on two occasions in the course of the evaluation. The first changes occurred after the first request for supplementary information submitted by ICOMOS on 28 September 2015, and new maps were shared by the State Party to the ICOMOS Panel during their discussion on the nomination dossier on 28 November 2015. The core zone was mostly increased in the North-West and South-East, and the buffer zone was modified to surround the entire property, with a major addition to the West, when it was only covering a minor area around Fada in the original submission. This is referred to in the report as the “interim boundary” of the nomination and was not officially communicated to IUCN, and was not evaluated formally by the IUCN World Heritage Panel.

The second set of changes occurred following the joint IUCN and ICOMOS progress report and request for supplementary information sent on 16 December 2015. The State Party responded to this letter on 25 February 2016 and submitted yet another map. This time the nominated area was cut in the North to follow the 17th Parallel North, reducing the area from 3 044 500 ha in the original nomination to 2 441 200 ha, i.e. a reduction of about 20%. The buffer zone was fully removed from the North, and reduced to a 1km only corridor to the East and South, while the Western buffer zone remained more or less as it was submitted on 28 November 2015 to ICOMOS. This is the final boundary of the nomination, and it is this boundary that has been evaluated below.

The State Party indicates that this last minute substantial change in boundaries is motivated by the fact that an oil exploration concession was granted in this area. This substantial reduction of the nominated property removes significant attributes of potential Outstanding Universal Value, and impacts the integrity and effective management of the property, as discussed in the below report.

1. DOCUMENTATION

a) Date nomination received by IUCN: 16 March 2015

b) Additional information officially requested from and provided by the State Party: Following the IUCN World Heritage Panel a joint progress report with ICOMOS was sent to the State Party on 16 December 2015. Further information was sought on a range of matters including the need of a further analysis of biological characteristics for criterion (ix), adaptation of the boundaries to include additional areas, institutional governance and traditional management by local communities. The State Party responded on 25 February 2016. It is noted that the information most recently provided by the State Party's includes a major change to the proposed boundaries of the property, reducing substantially the nominated area, and this is discussed in the below report.

c) Additional literature consulted: Various sources, including Goudie, A. and Seely, M. (2011) *World Heritage Desert Landscapes: Potential Priorities for the Recognition of Desert Landscapes and Geomorphological Sites on the World Heritage List*.

IUCN, Gland. Mitchell, NI (2013) *Study on the Application of Criterion (vii)*. IUCN, Gland. Hekkala, E., Shirley, M., Amato G., Austin J., Charter S., Thorbjarnarson J., Vliet, K. Houck M., Desalle R. and Blum M. (2011). *An ancient icon reveals new mysteries: mummy DNA resurrects a cryptic species within the Nile Crocodile*. *Molecular Ecology* 20, 4199 – 4215. Britto J., Martinez-Freiria F., Sierra P., Sillero N., Tarroso P., Fenton B. (2011). *Crocodiles in the Sahara Desert: An Update of Distribution, Habitats and Population Status for Conservation Planning in Mauretania*, PLoS ONE, e14734. IUCN evaluation of Tassili n'Ajjer (Algeria), Air and Ténéré Natural Reserves (Niger), Wadi Rum (Jordan). Tubiana, J. (1999), *Les crocodiles de l'Ennedi*, Le Point.

d) Consultations: 8 desk reviews received. The mission met with the Governor, Prefect, and Sub-Prefect of Fada; the district chief representative; the Director of Biodiversity Conservation of National Parks and Hunting, Ministry of Environment, Delegation of the European Union in the Republic of Chad; the Minister of Culture and the General Secretary of the Ministry of Culture, Youth and Sports; the General Secretary of the Chad National Commission for UNESCO; the Head of the Rural Development and

Food Security section; representatives from the technical committee, NGOs, religious authorities, experts involved in the nomination. The mission met with the National World Heritage Committee and some representatives of local communities.

e) Field Visit: Guy Debonnet (IUCN) and Christian Dupuy (ICOMOS), 4 to 15 October 2015

f) Date of IUCN approval of this report: April 2015

2. SUMMARY OF NATURAL VALUES

The Ennedi mountains are situated in north-eastern Chad, in the administrative regions of “Ennedi - Est” and “Ennedi - Ouest”. The Ennedi mountains are one of the six major mountain massifs rising out of the Sahara Desert, which is the largest hot desert and one of the most inhospitable regions in the world.

While the originally nominated property “Massif de l’Ennedi: paysage naturel et culturel” (Ennedi Massif) covered most of the massif, the final configuration proposed by the State Party of an area of 2 441 200 ha excises the entire northern part of the mountains. The proposed boundaries to a large extent follow the contours of the mountain landscape, except to the North where the State Party amended the boundaries during the evaluation process, and now follow a straight line boundary on the 17th Parallel North which does not respect ecological, physical or landscape features. A buffer zone was originally only proposed in the area surrounding the regional capital of Fada, as the State Party considered this was the only area of potential pressure on the property. This buffer zone has also been revised during the evaluation process following feedback from IUCN and ICOMOS and now encompasses 777 800 ha and surrounds the Western, Southern and Eastern borders of the property to minimize potential pressure on the property. Following the most recent amendments to the boundaries, there is no buffer zone on the Northern border and a 1km only corridor to the East and South.

The Ennedi mountains are located in the eastern part of the Sahara and are 1450 m at their highest point; rainfall is estimated between 50 and 150 mm per year but varies greatly according to location and exposure. The mountains create a rapid climatic transition in the space of a few kilometres from hyper-arid conditions to semiarid conditions. Such climatic variations normally stretch over hundreds of kilometres.

The Ennedi massif is composed of sandstone resting on a granitic Precambrian base. Over time, water and wind erosion sculpted the Ennedi plateau, cutting steep canyons and valleys, and creating spectacular landscapes with dramatic and scenically extremely impressive features, including natural arches, rock pillars peaks and cliffs. In larger canyons, permanent water is held in so called Gueltas (notably Archei, Bashikélé, Maya and Koboué), and these play an important role in the ecosystem and are critical for the survival of fauna, flora and people.

Numerous rock paintings and archaeological sites testify to the ancient human occupation and the wetter conditions which prevailed in the Ennedi mountains as a result of its unique orographic position. The current semi-arid conditions in the massif have allowed species of plants and animals which inhabited the wider region when climatic conditions were more favorable to continue to survive in the mountains today. Relict species also occur, mostly trees, which are survivors of the ancient times although they are not capable of reproducing. In the Ennedi gueltas and canyons, a variety of plants and animals is found, far away from their normal distribution ranges in the sub-tropics and tropics; the massif has been dubbed the Garden of Eden of the Sahara.

One of the most striking conservation features is the small population of crocodiles, estimated at around 10 individuals, which live in the Guelta Archei. During the last glacial period when wetter conditions prevailed, the hydrological and river system of the Ennedi mountains was connected to other river systems to east and the west; these fluvial connections allowed crocodiles to move into the region. With the return of the drier conditions, these fluvial connections dried out and only a small population was able to survive in the Ennedi refugium, thanks to the presence of permanent water in the Guelta Archei.

3. COMPARISONS WITH OTHER AREAS

The originally submitted comparative analysis was very weak, especially for criterion (ix). However a strengthened comparative analysis for criterion (ix) was provided as part of the supplementary information requested by IUCN, and has been further extended during the evaluation by the IUCN World Heritage Panel.

With respect to criterion (vii), the Ennedi Massif as a whole is undoubtedly of great significance and IUCN’s highly experienced field mission, together with the input of reviewers, testify to the exceptional and impressive natural landscape of a very large scale in the original nomination. IUCN notes the range of rock formations, many of which are outstanding on their own, but are notable for the very large number and density of these phenomena, creating a truly unique landscape of high aesthetic quality and diverse and changing vistas.

The property compares favourably to the World Heritage site of Wadi Rum (Jordan) which is also a desert landscape of great beauty. The Ennedi has both greater scope and a greater variety of landscapes, and is much more natural, remote and isolated. In Twyfelfontein in Namibia, listed as a World Heritage Site for its cultural values, the sandstone formations are less impressive and the tourism impact stronger than Ennedi.

The site contains very large concentration of rock arches, probably only exceeded by Arches National Park in the USA. With a height of 120 metres, the Aloba stone arch is reportedly the second highest

stone arch in the world, after Shipton's Arch in Western China which stands at 365 m. With a span of 77 meters, Aloba Arch is also amongst the widest known natural arches in the world. These features together with the phenomenon of the gueltas also contrast favourably with the World Heritage listed areas of Aïr Ténéré (Niger) and Tassili n'Ajjer (Algeria), both of which are recognised under criterion (vii). The Ennedi, as a whole, can be seen to be of at least equivalent scenic beauty to either of these two sites. The Aïr Mountains are geologically very different and the scenic beauty of the site is linked to different landscape phenomena such as the impressive dune landscape of the Ténéré desert and also to the mountains of the Aïr, characterized by cipollino marble outcroppings, which have a distinct bluish color. The mountain range of Tassili n'Ajjer is characterized by eroded sandstone forming so-called rock forest (sometimes called tassilian landforms) and is therefore more comparable to the Ennedi. However, the area is of a different character, with more human use and interactions, and subsequent impacts, reflected in its listing for natural and cultural values.

Different mountain ranges in the Sahara present similar characteristics and all are serving as refugia to some extent. This is in particular the case for the Tibesti (Chad), Hoggar (Algeria), Tassili n'Ajjer (Algeria), Aïr (Niger), Gilf Kebir (Egypt) and Djebel Ouweinat (Egypt/Sudan/Libya) massifs. However, the nomination file shows that, of these, the species diversity is the highest in the Ennedi (526 species); the species density of Ennedi is second highest and it is also the only one of these massifs which still harbours a relict crocodile population.

Only Tibesti and Aïr and Ennedi contain species coming from the tropical regions of Africa and of these three areas, the percentage of tropical species found in the Ennedi is extremely high (74,5 %) and higher than Tibesti and Aïr and Tenere. Of those massifs, two are currently inscribed on the World Heritage List under criterion (ix): Tassili n'Ajjer in Algeria and Aïr and Ténéré in Niger.

The comparative analysis in the nomination in relation to criterion (ix) has been extended by a comprehensive review by UNEP-WCMC and IUCN. The Ennedi Massif is a unique ecosystem of the Sahara: an island of biodiversity in the vast Sahara desert, with the presence of Sahelian and subtropical species and relict species. The property is in the Sahara province of Udvardy, which is already represented on the World Heritage List with four sites, one of which inscribed under biodiversity criteria, namely Aïr and Ténéré Natural Reserves, in Niger. In addition to this, there are also eight sites on the Tentative List, including five biodiversity sites. The nominated property covers two terrestrial biomes: the Afrotropic Deserts and Xeric Shrublands and the Afrotropic Tropical and Subtropical Grasslands, Savannas, and Shrublands, which are already well represented on the World Heritage list with 5 and 20 existing World Heritage site, respectively.

The Ennedi Massif is situated in two ecoregions: the East Saharan montane xeric woodlands and the Sahelian Acacia savannah. The Eastern Saharan montane xeric woodlands is not currently represented on the World Heritage but there are also many Tentative List sites in these two ecoregions. The 'gueltas' are particularly important for biodiversity: thanks to the almost constant availability of water, they host a high percentage of relict flora and rare species; for instance, in the Maya gorge, 44% of the trees are relict species. Other examples include crocodiles in the Guelta d'Archei and the vegetation of the Maya guelta. The flora of the Guelta of Bachikélé is also important, notably with a population of *Rauwolfia caffra*, a tree that normally grows in tropical and equatorial Africa. The nominated property does not belong to any biodiversity hotspots, high biodiversity wilderness areas, priority ecoregions, endemic bird areas or centres of plant diversity.

4. INTEGRITY, PROTECTION AND MANAGEMENT

4.1. Protection

The nominated property is protected through a special decree (Decree 260/PR/PM/MCDT/2016) of 5 March 2016, which establishes the area as a "mixed protected site (cultural and natural)". The decree also establishes the buffer zone as noted in the supplementary information. This protection status is based on the Law 14-60 dated 2 November 1960 concerning the protection of monuments, natural sites and sites and monuments of pre-historical, archaeological, scientific, artistic or picturesque values, the protection of historical or ethnographical objects and the regulation of excavations.

The legal protection of the nominated site is somewhat weak in relation to the nature of the proposed listing, and is assessed as equivalent to the regime of protection of an IUCN category III protected area. This designation would seem appropriate to protect individual natural and cultural features which are attributed to criteria (iii) and (vii), but it seems less appropriate to provide adequate large-scale legal protection to an area of 24 000 km² nominated under criterion (ix), and which is *de facto* a multiple use area. The protection status as currently in place foresees no zonation or other differentiated protection regime.

Part of the nominated property was also designated as a wildlife reserve, the Fada-Archei Faunal Reserve (Reserve de faune Fada – Arche), created in 1963 (Decree 232-PR-EFLC-PNR), but the legal status of this reserve has now expired. This former Reserve has an area of 211 300 ha and covers part of the buffer zone and a small portion of the property. It was confirmed to the mission that the Reserve is not being managed and thus only has past status on paper.

The field mission was however informed that the Minister for Agriculture and the Environment signed an MOU with the NGO African Parks Network (APN) on 3 February 2015 to assess the feasibility of creating a

new protected area in the Ennedi mountains. The State Party should be encouraged to use this current process to create a new protected area in order to provide a more robust legal protection for the nominated property, prior to considering its possible inscription.

IUCN considers that the protection status of the nominated property does not meet the requirements of the Operational Guidelines.

4.2 Boundaries

The initial nomination file indicates that the entire Ennedi Massif was included in the property given that the attributes justifying the criteria for inscription are dispersed throughout the mountain range. In light of the fact that the entire massif was originally included the nominated property, it was reasonable to assume that most areas where the values for criteria (vii) and (ix) could be found were within the nomination. However, the boundaries have been modified twice during the nomination process, with the most recent modification significantly reducing the area and thus effectively undermining the integrity of the nomination as was originally submitted.

The final revised nomination covers only the central and southern parts of the Ennedi mountain range, excluding the north of the massif which was originally included. During the evaluation mission it was noted that even the original nomination had excluded some important areas, and lacked an adequate buffer zone, and during the December ICOMOS Panel the State Party had presented an increased (not decreased) boundary, and a larger buffer zone as its proposal. That interim configuration was not available for evaluation by IUCN, but is also no longer proposed. The original submission and the final revised submission are included as maps 2 and 3 at the end of this report, to allow the Committee an easy means to compare them.

The revised boundary, which could not be considered during the field mission, clearly excludes a range of important attributes noted in the nomination. IUCN also notes that both cultural and natural attributes are now excluded from the nomination as revised, such as Niola Doa which was cited in the nomination as one of the most significant rock art sites – the implications of the change will be assessed by ICOMOS. The northern part of the Ennedi Massif borders the hyper arid Mournia depression which is an important transition zone between the desert environment and the massif and the region where the sharpest gradient in rainfall occurs (from hyper arid to semi-arid), and which is cited in the nomination as unique. The southern edge of the massif borders a much wetter area, which is sahelian rather than saharian. While there is very little data in the nomination on the geographical location of the attributes justifying criterion (ix), it seems logical that this northern area of rapid climatic transition is important, and its exclusion clearly impacts the justification of criterion (ix). In summary it is no longer possible to conclude that the nomination includes all necessary attributes that reflect

criteria (vii) or (ix), following the excision of the northern part of the Ennedi Massif.

Aside from the direct impacts on integrity that result from reducing the area, this very late change in the northern boundaries of the property is stated to be motivated by the fact that oil exploration/exploitation rights have been granted to companies across the whole of the northern part of the massif since 2012, which is directly in contradiction to what was said to the evaluation mission during its field visit.

The new proposal includes a partly enlarged buffer zone, which had been recommended by the evaluation mission, but this zone is still very narrow to the south of the nominated property, and does not provide a buffer to the entire nominated property, as the northern area, which is adjacent to the area where extractive exploration permits seem to have been delivered has no buffer zone.

It would appear that the interim proposal of increased boundaries, as had been presented to ICOMOS in December 2015, reflecting the whole of the massif and an adequate buffer zone, may have provided a solution that would have met integrity requirements, but this configuration has not been formally proposed for evaluation by the State Party.

In conclusion, the newly revised boundaries of the nominated property are not appropriate to the natural features and values that are the basis for its nomination under natural criteria, exclude key attributes of Outstanding Universal Value, and do not provide appropriate protection to the property from adjacent land uses.

IUCN considers that the boundaries of the nominated property, as revised, do not meet the requirements of the Operational Guidelines.

4.3 Management

The nomination file states that the traditional management by the indigenous people has until now safeguarded the integrity of the proposed property. It states that these indigenous communities have lived in harmony with their environment for millennia and that they are the guarantors for the preservation of the site. However the nomination confirms that the traditional management is poorly documented as it is governed by oral traditions.

The nomination indicates that this traditional management should be complemented by additional professionalised management to be able to respond to the challenges facing the site, for example from extractive industries or anticipated impacts from climate change. However, such management is not yet in place.

The Ministry for Culture, Youth and Sports has planned to put in place a National Multidisciplinary Inter-ministerial Scientific Committee (Comité Scientifique National Interministériel et Pluridisciplinaire – CSNIP) should the nominated

property be inscribed on the World Heritage List which would be in charge of coordinating the management of the property. The goal is to also establish Local Organisation and Implementation Committees (Comités Locaux d'Organisation et d'Exécution), which would participate actively in the management and conservation of the site. A site manager and a deputy would also be appointed and would have direct responsibility for the management of the site and liaising between the CSNIP and local committees. The proposed management system, while probably sufficient for a property nominated under criterion (vii) only, is not adequate for a property nominated under criterion (ix), as no field staff, field resources or management structure are planned to ensure the necessary protection and management measures.

A feasibility study to establish a protected area in the Ennedi appears to be underway, conducted by APN; but it is still unclear how this would eventually be designed, and also how this proposal might interact with the proposed management structure of the nominated property. There is currently neither fully functioning management, nor budget and adequate management plan available for the nominated property. In summary there is much work to be done to address the strong need for a more robust management framework, although the proposed partnership with APN has good potential to offer solutions in this regard.

IUCN considers that the management of the property does not meet the requirements of the Operational Guidelines.

4.4 Community

According to the original nomination c.40 000 nomadic or semi-nomadic pastoralist people live in the region of the property (including its buffer zone), following traditional lifestyles. Community representatives who met with the evaluation mission were aware of the nomination process and supportive of it, and indicated their pride in the fact that the nominated property is proposed for inscription on the World Heritage List. Support for the nomination was expressed by the representative of the different Chefs de Canton at the initial meeting in Fada. The management plan foresees that local communities will remain actively involved in the management of the site through the proposed local committees. It is also clearly specified in the nomination file and the management plan and was confirmed to the field mission that the existing tenure and land use rights of the local communities will not be affected by a potential inscription.

4.5 Threats

The site is very isolated and remote, requiring several days of travel through a barren landscape to reach it, and has a low level of population using its natural resources. Human use is still limited and issues such as overgrazing are limited to a few areas. The nomination document mentions the following threats: pastoralism, agriculture, poaching, harvesting of wood

for firewood and construction, mining and oil exploration / exploitation and tourism.

Pastoralism is the basis of the local economy. Concentration of livestock around areas with permanent water access may result in a heavy localized grazing pressure. The grazing pressure at this stage does not seem to have reached a critical stage and even in the most heavily used areas, no desertification was observed by the field mission. The increasing pastoral pressure is however a clear potential threat in relation to criterion (ix) and it will need careful management in the future. Zoning to ensure that the most fragile/sensitive areas are protected from overgrazing should be established and the issue of increasing livestock numbers should also be clearly addressed with the pastoral communities.

Agriculture is not traditionally practiced in the property and the potential to develop it is limited due to the lack of water; the rural activities are currently limited to some small-scale gardens in areas like Fada, where permanent water is available. Nevertheless, agriculture could possibly be developed further in some oueds by accessing underground water supplies and there seem to be no measures in place to regulate or limit those activities. It is also of concern that the proposed budget of the management plan includes the introduction of drip irrigation in the property. Whilst the regulation stipulates that intensive agricultural use in particular by unlimited usage of water resources is not allowed in the property, this issue should be considered cautiously in the new management plan, in view of the potential impacts due to the limited water supplies to maintain the natural processes.

Wood is harvested by the local communities for cooking, charcoal production and construction. Firewood collection does not seem to currently present a significant threat, but could become an issue in the future as a result of increasing population and visitor numbers. The management plan foresees the introduction of solar energy and improved stoves and gas cooking for tourists; wood harvesting should also be clearly addressed and limited in the management plan.

Poaching has decimated much of the wildlife in the property and is reported to have led to the local extinction of several key species such as Oryx, Addax, Dama Gazelle, Ostrich and Lion. Some Cheetah (VU) are reportedly still present as well as Argali Sheep (NT) and Dorcas Gazelle (VU), in small numbers. The sharp decline in wildlife reportedly occurred past times when conflict has affected the property. The present situation is that there is still a viable population of some key species, but these continue to be threatened.

Large scale mining activities is forbidden in the property and there are no mining or oil exploration/exploitation permits overlapping with the property as designed after the boundaries modification; however, as noted above, the area that is permitted for oil exploration and was excised from the nomination in February 2016, north of the 17th Parallel,

contains significant attributes critical to the case for Outstanding Universal Value, and any future oil exploitation activities in the vicinity of the property and possibly inside the massif may have indirect effects on its protection.

Tourism is little developed in the area due to logistical challenges; visitor numbers are currently estimated between 200 to 600 people a year. Nevertheless, this sector of activities is expected to rise in the future. A specific section of the management plan is devoted to those activities, and will need to be fully implemented; this sector should be managed and developed sustainably in the future, in close association with the local communities and so that impacts on the values and integrity of the property are minimized.

Vandalism is a common problem in emblematic scenic sites and rock art sites, but overall the problem is very limited and seems well contained. The issue is recognized and local communities are being sensitized on this issue.

Due to the environmental conditions, decomposition of waste is very slow in a desert environment. Waste management is therefore an important issue in particular given the nomination of the property under criterion (vii). Littering can be a problem linked to tourists and local people but there is also an issue on the management of waste of the settlements in the property. Nevertheless, the problem of littering is remarkably limited compared to many other similar properties.

There is no road system in the property but multiple tracks all over. Off-road driving is common, impacting the sparse vegetation. While the number of vehicles is low, tracks can be found everywhere, impacting on the intactness of the landscape and on the fragile vegetation. There is therefore a need to set up a more rigorous track system and limit off-road driving, especially in the more densely inhabited and visited area around Guelta Archei.

In conclusion, for the reasons outlined above, IUCN considers that the integrity, protection and management of the extended property do not meet the requirements of the Operational Guidelines.

5. ADDITIONAL COMMENTS

None.

6. APPLICATION OF CRITERIA

The **Ennedi Massif: natural and cultural landscape** has been nominated under natural criteria (vii) and (ix), as well as under cultural criteria (iii) which will be evaluated by ICOMOS.

Criterion (vii): Superlative natural phenomenon or natural beauty and aesthetic importance

The Ennedi Massif is one of the 6 major mountain massifs rising out of the Sahara Desert, which is the

largest hot desert and one of the most inhospitable regions in the world. The massif is composed of sandstone and is sitting on a granite Precambrian base. Over time, water and wind erosion sculpted the Ennedi plateau, interspersed with canyons and cliffs, creating a spectacular landscape of dramatic rock formations, including natural arches, pitons, mushroom rocks, labyrinths, pinnacles, chimney rocks, needles and other distinct structures. Many of these rock formations are outstanding on their own, but the exceptional number and density of these phenomena creates a truly unique landscape of high aesthetic quality and constantly changing vistas. However the nomination as conceived does not meet the integrity requirements in relation to this nomination and, as revised, appears to exclude key attributes in the northern part of the Ennedi Massif.

IUCN considers that there is potential for a revised and extended nomination of the Ennedi Massif to meet this criterion, but the property as nominated does not meet this criterion.

Criterion (ix): Ecosystems/communities and ecological/biological processes

The plateau is cut by steep canyons and valleys, in which water can accumulate and vegetation can grow. These canyons play an important role in the ecosystem. In larger canyons, so called Gueltas are formed, some of which have permanent year round water. This permanent water is critical for the survival of fauna, flora and people.

The wetter conditions which prevail in the Ennedi mountains as a result of its unique orographic position also allowed species of plants and animals, which inhabited the wider region when climatic conditions were more favourable, to continue to survive in the mountains until today. In addition relict species also occur, mostly trees, which are survivors of these ancient times although they are not capable of reproducing. In the Ennedi gueltas and canyons, plants and animals can be found, which are far away from their normal distribution ranges in the sub-tropics and tropics. The Ennedi has therefore been called the Garden of Eden of the Sahara.

Probably the most striking example of a relict population is the small population of crocodiles, estimated at around 10 individuals, which can be found in the Guelta Archei. During the last glacial period when wetter conditions prevailed, the hydrological and river system of the Ennedi mountains was connected to other river systems to east and the west. These fluvial connections allowed crocodiles to move into the region. With the return of the drier conditions, these fluvial connections dried out and only a small population was able to survive in the Ennedi refugium, thanks to the presence of permanent water in the Guelta Archei.

The Ennedi Massif is therefore an outstanding example of a very specific relict ecosystem and refugium harbouring a population of fauna and flora which testifies of a major climatic change in the Sahara Desert. However the nomination as revised does not

include or protect the full range of these features, and the integrity requirements are therefore not met. The attributes which express this criterion are largely not mapped and documented, but given that the spectacular gradient from hyper-arid to semi-arid noted in the nomination is found in the north, this area clearly includes significant and distinctive attributes. Whilst not nominated in relation to criterion (x) it should also be noted that significant loss of wildlife populations is noted from the nominated property, which also is a factor in considering the application of criterion (ix) in relation to the functioning of the ecosystem.

IUCN considers that there is potential for a revised and extended nomination of the Ennedi Massif to meet this criterion, but the property as nominated does not meet this criterion.

7. RECOMMENDATIONS

IUCN recommends that the World Heritage Committee adopts the following draft decision, noting that this will be harmonised as appropriate with the recommendations of ICOMOS regarding their evaluation of this mixed site nomination under the cultural criterion and included in the working document WHC/16/40.COM/8B:

The World Heritage Committee,

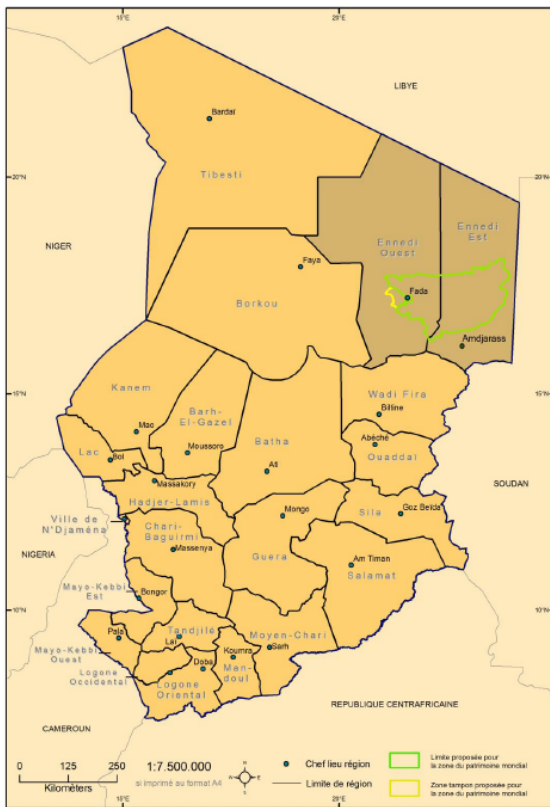
1. Having examined Documents WHC/16/40.COM/8B and WHC/16/40.COM/INF.8B2,

2. Defers the nomination of the **Ennedi Massif: natural and cultural landscape (Chad)** on the World Heritage List, noting the potential of a larger area, based on the extended version of the original nomination to meet criteria (vii) and (ix);

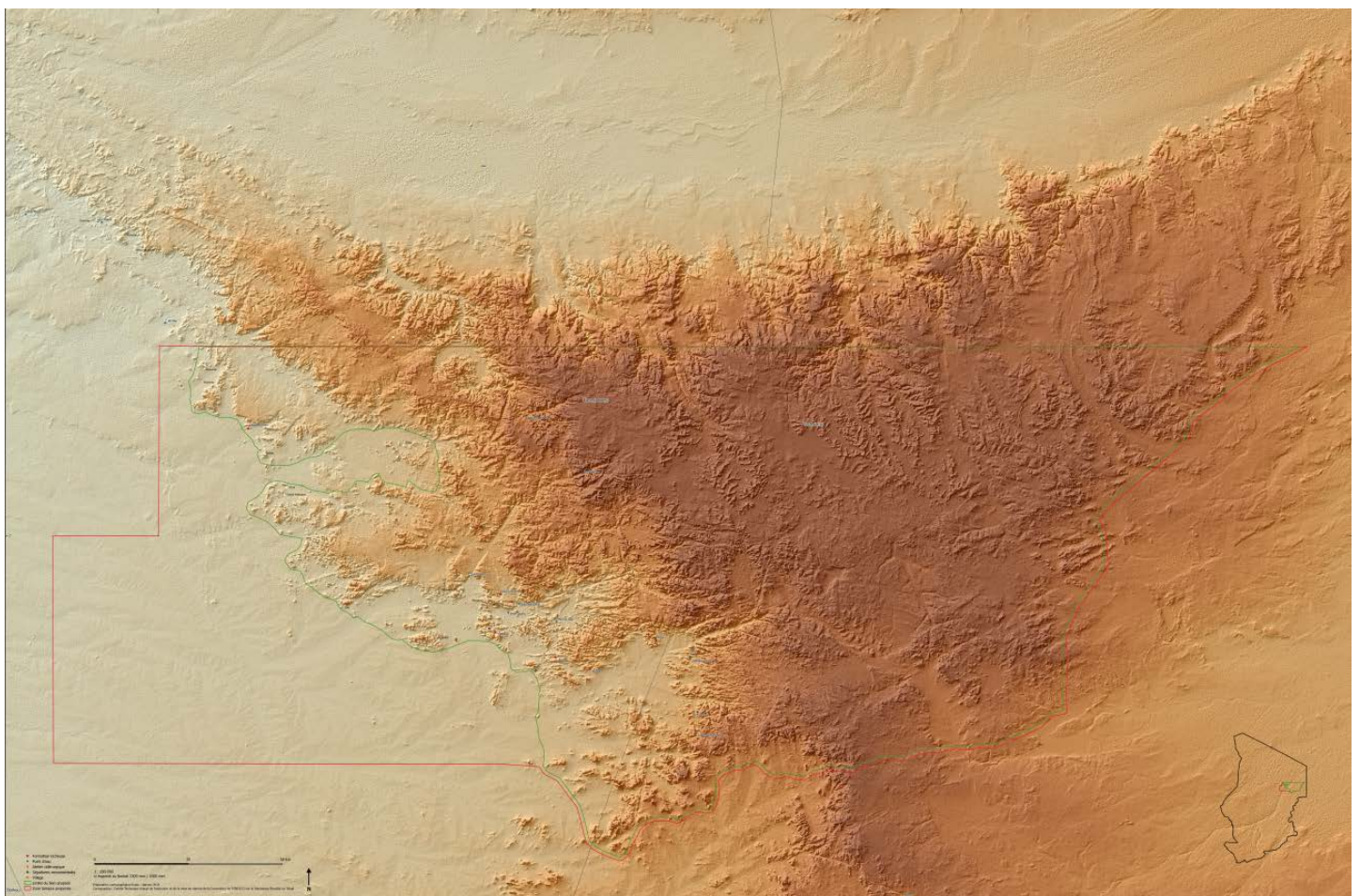
3. Recommends the State Party to present a revised nomination, corresponding to the extended boundaries of the original nomination and meeting the requirements of the Operational Guidelines, which:

- a) comprises a nominated property and buffer zone which ensure the protection of all the attributes which could justify an inscription under criteria (vii) and (ix), including the conditions of integrity;
- b) includes a detailed botanical inventory of the site, to identify all important refugia and areas for relict flora that may justify the application of criterion (ix);
- c) strengthens the legal protection status of the proposed property by the creation of a protected area with a regime of protection adequate to the values of the property and meeting the protection requirements of the Convention ;
- d) establishes a management plan for the whole property, meeting the international standards and which clearly:
 - i. spells out management operations to conserve the World Heritage values;
 - ii. includes a zonation which allows full protection of the key areas for biodiversity;
 - iii. details the measures foreseen to address the main potential threats;
 - iv. guarantees the full participation of the local communities in the management of the property; and
 - v. clarifies the institutional management regime of the property and provides a detailed staffing and budget consistent with the effective implementation of the required management.

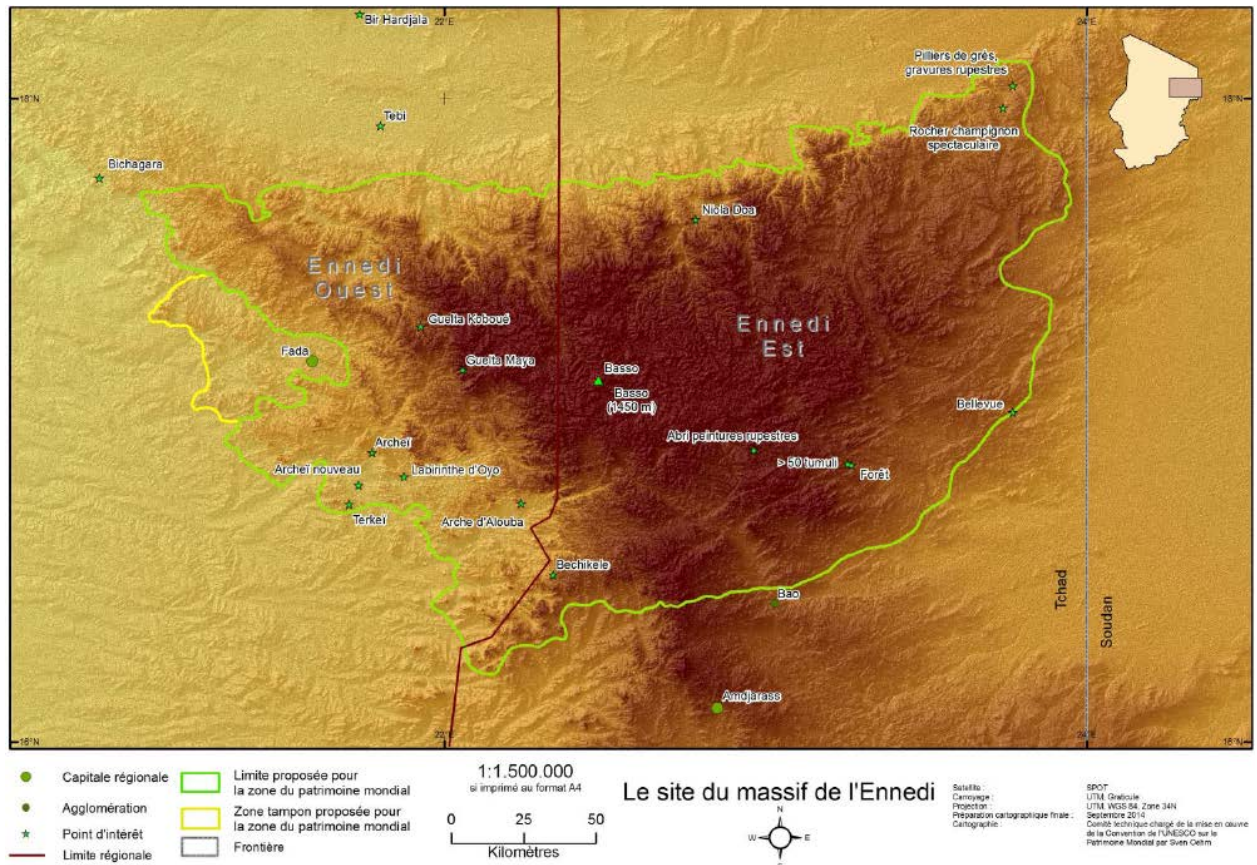
Map 1: Location of the nominated property in Chad



Map 2: Nominated property and buffer zone – final revised submission of 25 February 2016



Map 3: Nominated property and buffer zone – original submission



Map 4: Nominated property and buffer zone – submission to ICOMOS on 30 November 2016 and not evaluated by the IUCN World Heritage Panel

