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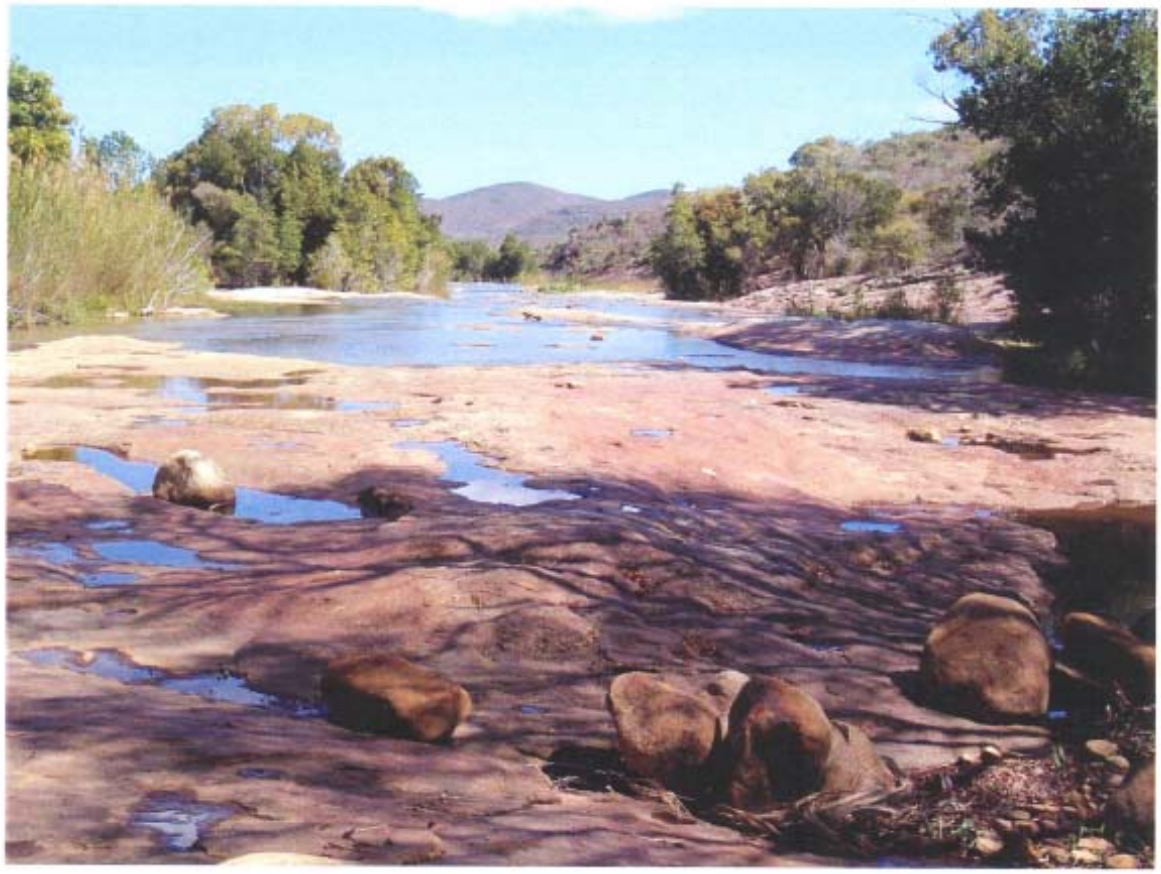
Convention Concerning the Protection of the World Cultural and Natural Heritage

IUCN Evaluation of Nominations of Natural and Mixed Properties to the World Heritage List



Report to the World Heritage Committee
31st Session
June/July 2007 – Christchurch, New Zealand

Prepared by IUCN – The World Conservation Union
May 2007

IUCN
The World Conservation Union

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THE WORLD HERITAGE CONVENTION

IUCN TECHNICAL EVALUATION REPORT OF WORLD HERITAGE NOMINATIONS

May 2007

1. INTRODUCTION

This technical evaluation report of natural and mixed properties nominated for inclusion on the World Heritage List has been conducted by the Programme on Protected Areas (PPA) of IUCN – The World Conservation Union. PPA co-ordinates IUCN's input to the World Heritage Convention. It also works closely with IUCN's World Commission on Protected Areas (WCPA), the world's leading expert network of protected area managers and specialists.

In carrying out its function under the World Heritage Convention IUCN has been guided by four principles:

i) the need to ensure the highest standards of quality control and institutional memory in relation to technical evaluation, monitoring and other associated activities;

ii) the need to increase the use of specialist networks of IUCN, especially WCPA, but also other relevant IUCN Commissions and specialist networks;

iii) the need to work in support of the UNESCO World Heritage Centre and States Parties to examine how IUCN can creatively and effectively support the World Heritage Convention and individual properties as "flagships" for conservation; and

iv) the need to increase the level of effective partnership between IUCN and the World Heritage Centre, ICOMOS and ICCROM.

Members of the expert network of WCPA carry out the majority of technical evaluation missions. This allows for the involvement of regional natural heritage experts and broadens the capacity of IUCN with regard to its work under the World Heritage Convention. Reports from field missions and comments from a large number of expert international reviewers are comprehensively examined by the IUCN World Heritage Panel. PPA then prepares the final technical evaluation reports which are presented in this document and represent the corporate position of IUCN on World Heritage evaluations.

The WCPA membership network now totals 1400 protected area managers and specialists from 140 countries. This network has provided much of the basis for conducting the IUCN technical evaluations. In addition, PPA has called on experts from IUCN's other five Commissions (Species Survival, Environmental Law, Education and Communication, Ecosystem Management, and Environmental, Economic and Social Policy), from international earth science unions, other IUCN Global Programmes, and scientific contacts in universities and other international agencies. This highlights the considerable "added value" from investing in the use of the extensive networks of IUCN and partner institutions.

IUCN has also placed emphasis on providing input and support to ICOMOS in relation to those cultural landscapes which have important natural values. IUCN recognises that nature and culture are strongly linked and that many natural World Heritage properties have important cultural values.

During 2005 IUCN commissioned an external review of its work on World Heritage evaluations, which was carried out by Dr. Christina Cameron. This resulted in a number of recommendations to improve IUCN's work and the majority of these are now being implemented. The final review and the IUCN management response are available on IUCN's website: www.iucn.org/themes/wcpa/pubs/pdfs/heritage/christina_cameron_review.pdf

2. EVALUATION PROCESS

In carrying out the technical evaluation of nominations IUCN is guided by the Operational Guidelines of the Convention. The evaluation process is carried out over the period of one year, from the receipt of nominations at IUCN in April and the submission of the IUCN evaluation report to the World Heritage Centre in May of the following year. The process (outlined in Figure 1) involves the following steps:

1. **Data Assembly**. A standardised data sheet is compiled on the nominated property by UNEP's World Conservation Monitoring Centre (UNEP-WCMC), using the nomination document, the World Database on Protected Areas and other available reference material;

2. **External Review**. The nomination is sent to independent experts knowledgeable about the property or its natural values, including members of WCPA, other IUCN specialist commissions and scientific networks or NGOs working in the region (approximately 120 external reviewers provided input in relation to the properties examined in 2006 / 2007);

3. **Field Mission**. Missions involving one or more IUCN and external experts evaluate the nominated property on the ground and discuss the nomination with the relevant national and local authorities, local communities, NGOs and other stakeholders. Missions usually take place between May and November. In the case of mixed properties and certain cultural

landscapes, missions are jointly implemented with ICOMOS.

4. **IUCN World Heritage Panel Review**. The IUCN World Heritage Panel meets at least once per year, usually in December at IUCN Headquarters in Switzerland to examine each nomination. A second meeting or conference call is arranged as necessary, usually in the following March. The Panel intensively reviews the nomination dossiers, field mission reports, comments from external reviewers, the UNEP-WCMC data sheets and other relevant reference material, and provides its technical advice to IUCN on recommendations for each nomination. A final report is prepared and forwarded to the World Heritage Centre in May for distribution to the members of the World Heritage Committee.

5. **Final Recommendations**. IUCN presents, with the support of images and maps, the results and recommendations of its evaluation process to the World Heritage Committee at its annual session in June or July, and responds to any questions. The World Heritage Committee makes the final decision on whether or not to inscribe the property on the World Heritage List.

   It should be noted that IUCN seeks to develop and maintain a dialogue with the State Party throughout the evaluation process to allow the State Party every opportunity to supply all the necessary information and to clarify any questions or issues that may arise. For this reason, there are three occasions at which IUCN may request further information from the State Party. These are:

   - **Before the field mission** – IUCN sends the State Party, usually directly to the person organising the mission in the host country, a briefing on the mission, in many cases raising specific questions and issues that should be discussed during the mission. This allows the State Party to prepare properly in advance;
   - **Directly after the field mission** – Based on discussions during the field mission, IUCN may send an official letter requesting supplementary information before the IUCN World Heritage Panel meets in December, to ensure that the Panel has all the information necessary to make a recommendation on the nomination; and
   - **After the IUCN World Heritage Panel** – If the Panel finds some questions are still unanswered or further issues need to be clarified, a final letter will be sent to the State Party requesting supplementary information by a specific deadline. That deadline must be adhered to strictly in order to allow IUCN to complete its evaluation.

Note: If the information provided by the State Party at the time of nomination and during the mission is adequate, IUCN does not request supplementary information. It is expected that supplementary information will be in response to specific questions or issues and should not include completely revised nominations or major changes.

In the technical evaluation of nominated properties, the Udvardy Biogeographic Province concept is used for comparison of nominations with other similar properties. This method makes comparisons of natural properties more objective and provides a practical means of assessing similarity. At the same time, World Heritage properties are expected to contain special features, habitats and faunistic or floristic peculiarities that can also be compared on a broader biome basis. It is stressed that the Biogeographical Province concept is used as a basis for comparison only and does not imply that World Heritage properties are to be selected solely on this criteria. In addition, global classification systems, such as Conservation International Biodiversity Hotspots, WWF Ecoregions, Birdlife International Endemic Bird Areas, IUCN/WWF Centres of Plant Diversity and the IUCN/SSC Habitat Classification, and the 2004 IUCN/UNEP-WCMC Review of the World Heritage Network are used to identify properties of global significance. The guiding principle is that World Heritage properties are only those areas of outstanding universal value.

Finally, the evaluation process is aided by the publication of some 20 reference volumes on the world's protected areas published by IUCN, UNEP-WCMC and several other publishers. These include (1) Reviews of Protected Area Systems in Africa, Asia and Oceania; (2) the four volume directory of Protected Areas of the World; (3) the six volume Global Biodiversity Atlas series; (4) the three volume directory of Centres of Plant Diversity; (5) the three volume directory of Coral Reefs of the World; and (6) the four volume synthesis on "A Global Representative System of Marine Protected Areas". These documents together provide system-wide overviews which allow comparison of the conservation importance of protected areas throughout the world.

3. THE IUCN WORLD HERITAGE PANEL

Purpose: The Panel advises IUCN on its work on World Heritage, particularly in relation to the evaluation of World Heritage nominations. The Panel normally meets once a year for a week in December. Depending on the progress made with evaluations, and the requirement for follow up action, a second meeting or conference call in the following March may be required. Additionally, the Panel operates by email and/or conference call, as required.

Functions: A core role of the Panel is to provide a technical peer review process for the consideration of nominations, leading to the formal adoption of advice to IUCN on the recommendations it should make to the World Heritage Committee. In doing this, the Panel examines each available nomination document, the field mission report, comments from external reviewers and other material, and uses this to help prepare IUCN's advice, including IUCN recommendations relating to inscription under specified criteria, to the World Heritage Committee (and, in the case of some cultural landscapes, advice to ICOMOS). It may also advise IUCN on other matters concerning World Heritage, including the State of Conservation of World Heritage properties and on policy matters relating to the Convention. Though it takes account of the policy context of IUCN's work under the Convention, its primary role is to deliver high quality scientific and technical advice to

IUCN, which has the final responsibility for corporate recommendations made to the World Heritage Committee.

Membership: The members of the Panel comprise a) those IUCN staff with direct responsibility for IUCN's World Heritage work, and b) other IUCN staff, Commission members and external experts selected for their high level of experience with the World Heritage Convention. Thus the members are:

- The Head of the IUCN Programme on Protected Areas (Chair)
- Other staff of the Programme on Protected Areas (2)
- The IUCN Senior Advisor for World Heritage (1)
- The WCPA Vice Chair for World Heritage (1)
- The Head of the UNEP-WCMC Protected Areas Programme (1)
- Up to three other technical advisors, whose World Heritage expertise is recognized at a global level (3)

The Panel's preparations and its meetings are facilitated through the work of the World Heritage Officer (who serves as the Executive Officer for the Panel).

The Panel may also be attended by other IUCN staff (particularly from other Global Programmes with expertise in the subject matter of particular nominations), Commission members (including the Chair of WCPA) and external experts, upon invitation, for specific items as necessary. The Director General of IUCN and the Director of Global Programmes are also invited to attend a session of the Panel for a full briefing on the process and recommendations.

4. EVALUATION REPORTS

Each technical evaluation report presents a concise summary of the nominated property, a comparison with other similar properties, a review of management and integrity issues and concludes with the assessment of the applicability of the criteria and a clear recommendation to the World Heritage Committee. IUCN also submits separately to the World Heritage Centre its recommendation in the form of a draft decision, and a draft Statement of Outstanding Universal Value for all properties it recommends for inscription. Standardised data sheets, prepared for each natural or mixed nomination by UNEP-WCMC, are available separately on request. In addition, IUCN carries out field missions and/ or external reviews for cultural landscapes containing significant natural values, and provides its comments to ICOMOS. This report contains a short summary of these comments on the cultural landscapes for which joint missions were carried out with ICOMOS.

5. NOMINATIONS EXAMINED IN 2006 / 2007

20 nomination dossiers were examined by IUCN in the 2006 / 2007 period, involving 14 field missions. These comprised:

- 11 natural property nominations (including 10 new nominations and 1 extension),
- 2 mixed property nominations (including 1 new nomination and 1 referred nomination), and
- 7 cultural landscapes.

Joint missions were carried out with ICOMOS for the new mixed property nomination and two cultural landscapes.

6. COLLABORATION WITH INTERNATIONAL EARTH SCIENCE UNIONS

IUCN has taken steps to implement the global theme study on Geological Heritage published in 2005. It has concluded collaboration agreements with the International Union of Geological Sciences (IUGS) and the International Association of Geomorphologists (IAG) during 2006. These agreements are focused on strengthening the evaluation process by providing access to the global networks of earth scientists coordinated through IUGS and IAG. Of particular importance is a focus on increasing the number of desk reviews by experts with appropriate expertise.

It is also anticipated that the collaboration agreements will lead to increased support to States Parties more generally through the preparation of targeted theme studies to further develop the guidance on earth science sites. IUCN considers the top priorities for such studies are volcanoes and deserts.

IUCN would like to record its gratitude to IUGS and IAG for their willingness to provide support for its advisory role in the implementation of the World Heritage Convention, and will update the World Heritage Committee each year on the implementation of the collaboration agreements with both organisations.

7. RECOMMENDATIONS TO THE WORLD HERITAGE COMMITTEE

In the 2006 / 2007 period, IUCN has sought to ensure that States Parties have the opportunity to provide all the necessary information on their nominated properties through the process outlined in section 2 above. As per the decision of the World Heritage Committee at its 30th session in June / July 2006 (30 COM 13), IUCN has not taken into consideration or included any information submitted by States Parties after 28 February 2007, as evidenced by the postmark.

In order to allow for adequate evaluation of supplementary information from States Parties on their nominations, IUCN had proposed shifting the deadline for receiving supplementary information to 28 February. However, the Committee shifted the deadline for supplementary information from reception by 31 March to submission by 28 February, potentially leaving as little time as before.

IUCN therefore recommends that the World Heritage Committee reconsider its decision and *ensure the deadline of 28 February is the final date of reception, not submission, of supplementary information*.

IUCN also recommends that the World Heritage Committee *clearly define the meaning of supplementary*

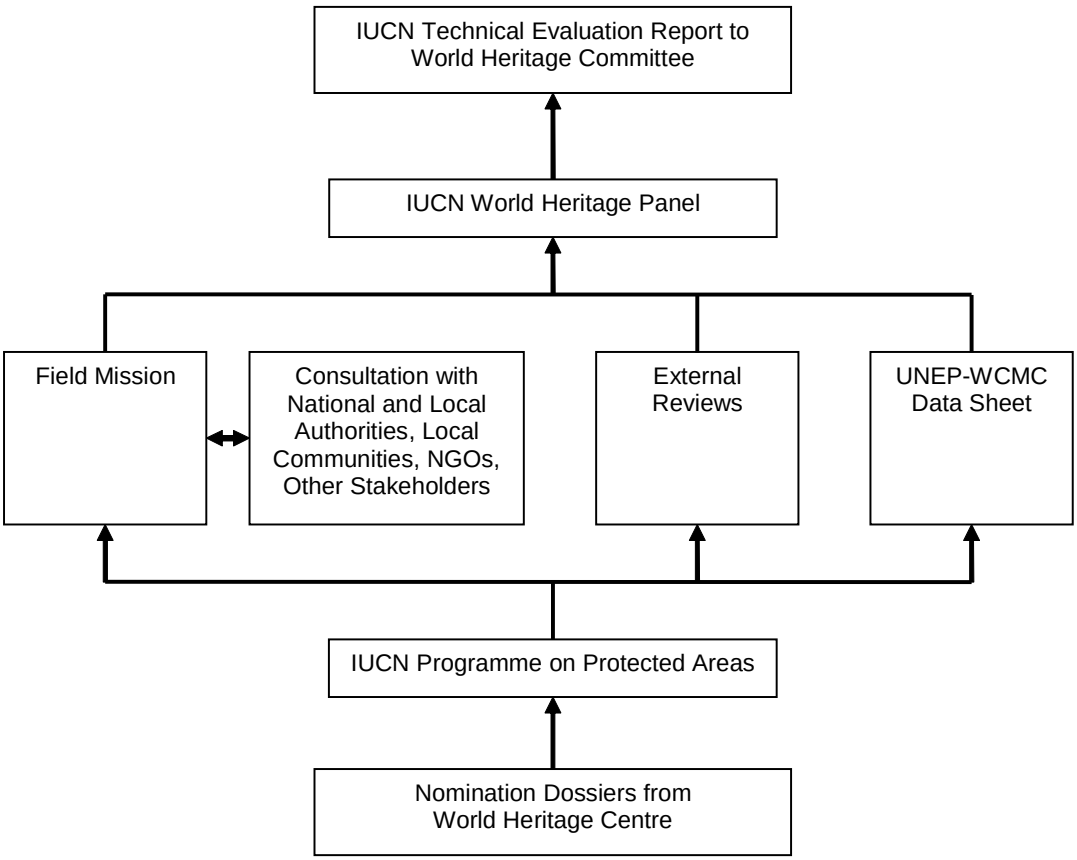
information, so that States Parties cannot submit substantial amounts of new information and completely revised nominations at the last minute. IUCN considers supplementary information to include responses to specific questions or issues raised by the Advisory Bodies.

IUCN further recommends that the World Heritage Committee *clearly define the meaning of factual errors and to shift the deadline for submission of factual error letters*, currently at least two working days before the opening of the session of the Committee, to at least two weeks before the opening of the session of the Committee, to allow for their adequate expert evaluation. To further improve this process, IUCN suggests a standard form for submission of factual errors be developed, including a clear definition of the meaning of factual errors.

8. ACKNOWLEDGEMENTS

As in previous years, this report is a group product to which a vast number of people have contributed. Acknowledgements for advice received are due to the external evaluators and reviewers, and numerous IUCN staff at Headquarters and in the field. Many others contributed inputs during field missions. This support is acknowledged with deep gratitude.

Figure 1: IUCN Evaluation Process



A. Nomination of Natural Properties to the World Heritage List

A1. New Nominations of Natural Properties

AFRICA

RAINFORESTS OF THE ATSINANANA

MADAGASCAR

WORLD HERITAGE NOMINATION – IUCN TECHNICAL EVALUATION

RAINFORESTS OF THE ATSINANANA (MADAGASCAR) – ID No. 1257

1. DOCUMENTATION

i) **Date nomination received by IUCN**: April 2006

ii) **Dates on which any additional information was officially requested from and provided by the State Party**: IUCN requested supplementary information on 19 December 2006 after the IUCN Evaluation Mission and the first IUCN World Heritage Panel Meeting. The State Party response was submitted on 26 February 2007, including revised boundaries and responses to all the issues raised by IUCN.

iii) **UNEP-WCMC Data Sheet**: 11 references (including nomination)

iv) **Additional literature consulted**: ANGAP 2001. **Madagascar Protected Area System Management Plan**. ANGAP. Brady, L.D. and Griffiths, R.A. (1999). **Status Assessment of Chameleons in Madagascar.** IUCN. Ganzhorn, J.U. et al. (2000). **Vertebrate species in fragmented littoral forests of Madagascar**. In: W.R. Lourenço and S.M. Goodman (eds). Diversite et Endemisme a Madagascar. Mémoires de la Société de Biogéographie Edition. Museum Histoire Naturelle, Paris: 155-164. Ganzhorn, J.U. et al. (2003). **Biogeographic relations and life history characteristics of vertebrate communities in littoral forests of Madagascar**. In: A. Legakis et al. (eds). The New Panorama of Animal Evolution. Proceedings of the 18th International Congress of Zoology. Pensoft Publishers, Sofia: 377-385. Goodman, S.M. (ed.) (2000). **A Floral and Faunal Inventory of the Parc National de Marojejy, Madagascar: With Reference to Elevational Variation**. Fieldiana Zoology New Series No. 97, Field Museum of Natural History, Chicago. Goodman, S.M. and Benstead, J.P. (eds) (2003). **The Natural History of Madagascar.** Chicago University Press, Chicago. Hilton-Taylor, C. (compiler) (2000). **2000 IUCN Red List of Threatened Species**. IUCN. Mittermeier, R.A. et al. (2004). **Hotspots Revisited: Earth's Biologically Richest and Most Endangered Terrestrial Ecoregions.** Conservation International. Mittermeier, R.A. et al. (2006). **Lemurs of Madagascar**. Conservation International. Rabetaliana, H. et al. (1999). **The Andringitra National Park in Madagascar**. Unasylva No. 196, FAO. Wilmé, L., Goodman, S.M. and Ganzhorn, J.U. (2006). **Biogeographic evolution of Madagascar's microendemic biota**. Science 321, 5776, 1063-1065.

v) **Consultations**: 3 external reviewers. Extensive consultations were undertaken during the field visit including with representatives of relevant government agencies, local communities, representatives of NGOs, researchers and other stakeholders.

vi) **Field visit**: Peter Hitchcock and Geoffroy Mauvais, August - September 2006

vii) **Date of IUCN approval of this report**: April 2007

2. SUMMARY OF NATURAL VALUES

The island of Madagascar is a fragment of the original great southern continent of Gondwana. Originally sandwiched between Africa and India at the breakup of Gondwana, Madagascar was initially in contact with Africa when it split from Antarctica. Madagascar, still attached to India, in turn separated from the continent of Africa around 160 million years ago. Madagascar remained attached to India until India split away around 60 million years ago with the result that Madagascar has remained essentially isolated from other land masses ever since.

The eight nominated national parks are geographically distributed along the eastern margins of the island of Madagascar over the length of the Atsinanana region. The greater part of the nominated areas is located on granitic rocks, the crustal basement of the main plateau that dominates much of Madagascar. Whereas Masoala National Park is located on a peninsula on the north east coast, all of the other nominated areas are associated with the rugged main eastern escarpment and mountainous hinterland of Madagascar which separates the extensive plateau of the interior and the eastern coastal lowlands. Almost the entire remaining areas of rainforest in Madagascar are found along the higher rainfall eastern escarpment and northern highlands. Much of the rainfall in these regions is derived from topographic interception of moisture laden winds off the Indian Ocean, in stark contrast to the extensive semi-arid and arid interior and western regions of the island. Tropical cyclones occasionally impact on the north eastern coastal forests such as those in Masoala National Park.

By any measure, the biodiversity of Madagascar is globally exceptional. The long isolation of this 'mini continent', sometimes referred to as the 'seventh continent' in terms of biodiversity, has resulted in a truly exceptional proportion of endemic plant and animal species; approximately

80 to 90 percent for all groups, and endemic families and genera are commonplace. Madagascar is the core of Conservation International's "megadiverse" region known as 'Madagascar and the Indian Ocean Islands', a feature being the extraordinary large number (circa 12,000) of endemic plant species. Madagascar has also been claimed to be in the top 5-6 of the world's 18 "megadiversity" countries.

> "*Madagascar's privileged position in terms of biodiversity is based on its geological history and geographic placement. The world's largest oceanic island and the fourth largest island overall, it has been separated from all other land masses for at least 60-80 million years, meaning that most of its plant and animal life has evolved in isolation. This has resulted in very high levels of endemism, both at the species level and, more importantly, at higher taxonomic levels, with Madagascar having numbers of endemic plant and animal genera and families rivalled only by Australia, which is 13 times larger." (Mittermeier et al. 2004)*

All five families of Malagasy primates, all endemic lemur families, seven endemic genera of Rodentia, six endemic genera of Carnivora, as well as several species of Chiroptera are represented in the rainforests. Of 25 endemic and near-endemic mammal species in the rainforests, 22 are threatened: 8 are critically endangered, 9 endangered, and 5 vulnerable (Hilton-Taylor 2000).

Madagascar's moist and sub-humid forests, together with its ericoid thickets, also constitute one of WWF's Global 200 priority ecoregions for conservation. (The Global 200 list actually contains 238 eco-regions, made up of 142 terrestrial, 53 freshwater and 43 marine eco-regions). The moist lowland forests of eastern Madagascar are the most diverse forests in the country and contain exceptionally high levels of endemism. However, decades of deforestation have left eastern Madagascar with only 8.5 percent of its original forests.

The mid-altitude moist forest, the most common rainforest type in the nomination, is as rich in species as the lowland forest, but tends to have a shorter canopy of 20 to 25 m. Some of the canopy species are common to the lower-elevation forest and some are unique to mid-elevation forest such as the Weinmannia (Cunoniaceae) and Schefflera (Araliaceae). Except for the extensive lowland rainforest of Masoala National Park, little lowland rainforest is represented in the nomination, nor remains elsewhere in Madagascar.

In prehistoric times, and in relatively recent historic times, the rainforests of Madagascar were much more extensive than at present. The last ice age pushed the rainforests to a series of disjunct refugia on and below the eastern escarpment, the east coast and deep valleys in the northern highlands region. Given the topographic characteristics of Madagascar, it is likely that at least some of the nominated areas coincide with those Pleistocene refugia.

The present day distribution of rainforest is an artefact of relatively recent human activity. There is evidence of numerous species of animals (probably plants also) having become extinct since the relatively late arrival of humans in Madagascar due to massive deforestation, including at least 17 lemur species, almost all of which were forest adapted species. The remaining rainforests are therefore of critical importance to the surviving species, many of which now occupy greatly reduced habitat areas than previously available. Notwithstanding the great loss of rainforest on the main plateau and eastern lowlands in recent historic times, there remains a more or less continuous narrow tract of rainforest along the eastern escarpment and across the northern highlands.

The nominated areas represent circa 20-25% of the total area of rainforests remaining in Madagascar, which in turn are just a fraction of the pre-settlement extent of rainforests. The nominated areas are broadly representative of the geographic spread of the rainforests over almost the full latitudinal range down the eastern margin of the island, but less representative of their altitudinal range.

Whereas several of the nominated national parks comprise major parts of regional forest remnants (Marojejy, Masoala, Midongy, Andohahela), others are embedded in or intimately linked to more extensive tracts of rainforest (Zahamena, Mantadia, Ranomafana, Andringitra). These larger core tracts of non-national park are in general much less known and understood than the nominated areas, such that it is not possible to reliably compare their biodiversity with that of the nominated areas. Indeed, the possibility exists that some of the recently (temporarily) protected core tracts have equal or greater biodiversity values than some of the nominated protected areas.

Recent research provides evidence of the importance of three particular mountain massifs in the evolutionary history of the rainforests of Madagascar. (Wilmé et al. 2006). Of those, only one (Andringitra) is included in the nomination, one has been extensively cleared of surrounding rainforests, and a third (Tsaratanana) is a puzzling omission from the nomination. Due to the extensive fragmentation of the rainforest by human activity, the remaining rainforests on and below the eastern escarpment, including at least some, but not all, of the nominated areas, have become critically important refugia for future evolutionary processes. Those areas containing continuous tracts of rainforest over the greatest altitudinal range will be of greatest significance. Of the nominated protected areas, those that appear to be of greatest significance for ongoing evolutionary processes are Marojejy, Zahamena, Andringitra, Andohahela and parts of Midongy.

Geographically, the eight nominated parks are widely separated. Notwithstanding, there remain substantial tracts of rainforest outside the nomination, including major habitat corridors between pairs of the nominated areas (North: Marojejy, Masoala; Central: Zahamena, Mantadia. South: Ranomafana, Andringitra. Far South: Midongy, Andohahela). There are significant discontinuities in habit between the northern and southern groups such that connectivity has essentially been permanently lost; however habitat connectivity still exists within the northern and southern groups, albeit not yet permanently protected.

Several of these larger tracts of forest have recently been given temporary protection and are being actively processed as future protected areas. However, it is reported that none of these areas are likely to be given national park status or added to the nominated national parks, and that proposed protection and management will only corre-

spond to IUCN Category III, V or VI protected areas. Further, they will not be managed by ANGAP. As such, none of these areas can at present be confidently considered as potential future addition to the nominated property. This reinforced the necessity for the evaluation to only consider the contribution of each component of the nominated property on its stand-alone merit.

3. COMPARISONS WITH OTHER AREAS

The one existing natural World Heritage property in Madagascar, Tsingy de Bemaraha Strict Nature Reserve, is located in the semi-arid western lowlands and features karst landscape. As such it is a totally different environment to that of the nominated property and does not warrant comparison.

The most biogeographically analogous of the existing World Heritage properties to the nominated property are the Central Eastern Rainforest Reserves of Australia. These Australian rainforests are associated with a well defined eastern escarpment which provided refugia for the mainly Gondwanan biota during the last ice age. The continuity of the eastern Australian rainforests had been broken into natural 'islands' by pre-historic climate change and was further truncated by modern human settlement. In contrast, the nominated property consists mostly of 'islands' of protected land in a still largely intact, albeit narrow continuous tract of relict rainforest along the eastern escarpment and into the northern highlands. The biological sieving and divergent evolution recognized between the protected land islands of the Australian rainforests is much less apparent in the nominated property, probably because of the much greater degree of connectivity maintained.

Whereas the serial Australian rainforest property and the serial Tropical Rainforest Heritage of Sumatra property include the greater part of the largest remaining rainforest tracts in Australia and Sumatra, most of the nominated property comprises only smaller parts of the extensive tracts of remaining rainforest in Madagascar. This made it difficult to establish the context and hence relative importance of the nominated areas; more so given the relatively poor documentation of the more extensive temporary reserves outside the nominated parks.

However, given the exceptional diversity and endemism of the biota of Madagascar, most native species of plants and animals in the nominated areas are clearly of global significance for science and conservation. In particular, the wholly endemic Malagasy primates, the lemurs, are clearly of outstanding universal value from the point of view of science and conservation. (The lemurs on the adjacent Comoros Islands are believed to have been introduced from Madagascar.) Future research can be expected to reveal many more new species of plants and animals. To illustrate, since 1994, at least 10 new species of lemur have been recognized in Madagascar (Mittermeier et al. 2006).

Table 1 below provides a comparison of biodiversity between the nominated property and some comparable existing World Heritage properties.

In summary, the features of the nominated property that make it globally and regionally distinct from other existing World Heritage properties in biodiversity terms are:

- Very high biodiversity, both in plants and animals, but especially primates;
- Exceptionally high level of endemism, both in plants and animals;
- Critically important habitat for many rare and threatened faunal species (e.g., of the 123 species of non-flying mammals in Madagascar, 72 of which are on the IUCN Red List of Threatened Species, 78 occur within the nomination), including at least 25 species of lemur; and
- Critically important climatic refugia for unique rainforest biota.

4. INTEGRITY

4.1 Legal status

All eight components of the nominated serial property are formally protected as national parks by the Government of Madagascar. The managing authority of all eight nominated areas is Parcs Nationaux Madagascar - Agence Nationale pour la Gestion des Aires Protégées (PNM-ANGAP).

Table 1: Comparison of biodiversity (species numbers) between the nominated property and some comparable existing World Heritage properties

Name and size of World Heritage property	Criteria	Mammals	Birds	Amphibians	Plants
Rainforests of the Atsinanana (Madagascar) 672,003 ha	**ix, x**	**78**	**173**	**160**	**2,984**
Central Eastern Rainforest Reserves (Australia) 370,000 ha	viii, ix, x	74	270	45	1,625
Noel Kempff Mercado National Park (Bolivia) 1,523,446 ha	ix, x	139	620	62	4,000 (1,500 in rainforest)
Tropical Rainforest Heritage of Sumatra (Indonesia) 2,595,124 ha	vii, ix, x	180	450	200	10,000

ANGAP is described as being a "private association recognized to be of public interest, operating under the supervision of the Ministry of Environment, Water and Forests in Madagascar".

4.2 Boundaries

A short assessment of the boundaries of each nominated park is provided below. This is based on the boundaries as proposed in the nomination. Subsequently, these boundaries were changed following IUCN communications with the State Party (see sections 5.2 and 7).

a) Marojejy National Park
Based on documentation and confirmed by aerial inspection, the boundaries of Marojejy, most of which are forest edges, appear well defined and stable. With one important exception, the forests of Marojejy are essentially surrounded by cleared agricultural land, the park being almost an 'island' in an agricultural landscape. The important exception is a well defined intact forest corridor to the west, a well studied, critically important corridor that links to the Anjanaharibe Sud Special Reserve, the only habitat connection between Marojejy and the much larger tract of rainforest that extends across the width of Madagascar from Masoala National Park on the east coast to Ambanja on the west coast.

b) Masoala National Park
Largest of the nominated protected areas, the main block of Masoala is relatively compact and most boundaries are marked, manageable and being managed. Of some concern is the inclusion in the nomination of several small outliers of the park, located on the east coast some distance from the park. Two of these small outliers, although small in area, are valued as relicts of littoral rainforest.

c) Zahamena National Park
The boundaries of Zahamena are relatively well defined. The north eastern and southern boundaries were inspected during an over-flight and found to be well respected by adjoining farming communities, at least in terms of farming activities.

d) Mantadia National Park
Most of the boundaries of Mantadia are adjoined by forest. Although boundaries could not be readily recognized from aerial inspection, threatening activities such as mining (existing and new) outside the park to the west were evident.

e) Ranomafana National Park
Most of the boundaries of Ranomafana are well defined and respected, at least in terms of agricultural encroachments. Aerial inspection revealed a major active encroachment and recent slash and burn activity in the northern section of the park.

f) Andringitra National Park
The western grassland boundary of Andringitra is not clearly defined. The eastern rainforest boundary, a river, has a history of encroachment which was evident from aerial inspections with significant encroachments remaining inside the park.

g) Midongy National Park
The very long and convoluted boundary of Midongy is in many places not evident from the air and there are many agricultural and grazing / burning encroachments. Some grazing / burning encroachments effectively extend the full width of the western arm of the park.

h) Andohahela National Park
Most of the eastern rainforest boundary of Andohahela is clearly defined and respected in terms of clearing and therefore appears stable. The western boundary of the main park block is ill-defined and problematic from a management perspective, especially with ongoing threats from grazing and associated burning.

4.3 Management

Madagascar has an interesting and apparently quite effective management system for protected areas including the nominated areas. The managing authority of all eight nominated areas is ANGAP, which is a "private association … under the supervision of the Ministry of Environment, Water and Forests" and as such appears to have some advantages over direct government management, such as being able to employ on a contract and performance basis. ANGAP appears as an efficient and professional organization. Strong support of ANGAP by NGO's is an important factor in its continued effectiveness.

ANGAP staff is stationed at all eight nominated parks. Overall the staff numbers assigned by ANGAP to manage the nominated parks is very modest, although indications are that this is adequate given the nature of their duties and the high motivation of staff. Motorised transport is of limited use for accessing many parts of the parks and boundaries, requiring commitment and concerted effort for staff to access park perimeters and remote communities. In Masoala National Park, the Wildlife Conservation Society is co-located with ANGAP to provide technical advice and assistance.

Overall management of protected areas in Madagascar is guided by the Madagascar Protected Area System Management Plan (2001). Management plans are in place for all eight nominated parks. The general structure and format of the management plans is appropriate and commendable. Threat maps contained in the management plans proved accurate and very helpful during the assessment. A short assessment of the management of each nominated park is provided below.

a) Marojejy National Park
Management of Marojejy is well established, organized, professional and with significant support from the local community.

b) Masoala National Park
Management of Masoala faces considerable difficulties, particularly given the remoteness and access difficulties of the eastern boundary. Notwithstanding, management is professional and appears to be effective in providing an adequate level of protection. The Wildlife Conservation Society is an official collaborator in relation to the management of the park.

c) Zahamena National Park
Conservation International actively participates in the management of Zahamena. Progress is being made in reducing encroachments and other threatening activities.

d) Mantadia National Park
Management of Mantadia is professional, however, threats in and around the park are considerable (mining, poaching, tourist pressure, invasive species, timber extraction) and require ongoing and effective management and control.

e) Ranomafana National Park
Management of Ranomafana is professional but the park still faces ongoing threats from agricultural encroachment, logging and hunting. There is significant tourism associated with the park and the park shares the income from entrance permits with local communities living adjacent to the park.

f) Andringitra National Park
Management of Andringitra is appropriate and strongly supported by local communities through a local "win-win" agreement: the park contains a "zone d'utilisation controlée" which gives a benefit to local communities (cattle grazing) in exchange for a voluntary based participation in the monitoring and protection of the park. However, the appropriateness in the long term of the grazing in the montane and alpine environments is questionable and should be assessed. There is some encroachment and associated hunting on the eastern rainforest boundary of the park which requires greater efforts to more effectively control. There is reportedly ongoing hunting inside the park.

g) Midongy National Park
Staff have only recently been deployed to Midongy and still face major challenges associated with agricultural encroachment (rice paddies and slash-burn), fire, grazing and poaching. The temporary forest reserve connecting the south-east section of Midongy with Andohahela National Park, taken in combination with the south eastern section of Midongy, appears to offer greater natural values and integrity than Midongy alone.

h) Andohahela National Park
This park faces significant threats from fire and grazing on the dry western side of the dividing range. The well defined topography of the dividing range provides some natural protection from fire from the west but there is evidence of some fires crossing the divide into the rainforest.

There seems to be relatively close cooperation between park managers and the national police (or Water and Forest Administration) that are responsible for law enforcement within protected areas. It appears that there is a high degree of compliance with the law and intercepted breaches are subject to the full force of the law, including gaoling of offenders. Joint patrols involving the police appear limited to several operations per year. Enforcement would be more efficient and effective if park rangers had greater delegated enforcement powers rather than rely on police alone.

ANGAP is financed in a range of ways (government funds, tourism taxes and fees, donors support). The level of autofinancing is low (around 5%), so to ensure the financing of protected areas in the long term, the Government of Madagascar has created a trust fund called Fondation Pour les Aires Protégées et la Biodiversité de Madagascar. A large part of the necessary funds have already been secured and it is planned that at least core funding of ANGAP's protected areas network will in the future be financed by interest from the trust fund. Priority will be given to the most important sites including the eight nominated parks and should therefore contribute to the long-term viability of those parks. However, the trust fund does not cover temporary protected areas (corridors) which are presently not proposed to be managed or financed by ANGAP. At present, financial resources are minimal but adequate for all nominated parks, albeit still strongly dependant on donors.

The Government of Madagascar has for some years received significant international assistance for its protected areas, particularly through the various NGOs active in the country. This often takes the form of management partnerships in the protected areas. Such partnerships are still in place for Masoala and Zahamena National Parks where the Wildlife Conservation Society and Conservation International respectively have been actively involved in day to day management as well as strategic planning of these parks. However, despite this continued and considerable support by international NGOs in the past, further investment by the international donor community is required to ensure the adequate protection and management of the nominated parks.

All of the parks in the nomination practice the policy of tourism revenue sharing with neighbouring communities, with ANGAP and local communities sharing 50:50 in the tourism income. The generally low level of tourism in most parks means, however, that the funding flow to communities from this source is relatively small. The policy is useful for developing partnerships with communities, but this should not be relied upon as the only flow of benefits to the community, given uncertainties associated with tourism. A more proactive community development programme needs to be developed, particularly for those parks that receive little tourism visitation.

4.4 Threats and human use

Most communities neighbouring the nominated parks are characterized by a high level of poverty. Agricultural productivity is often very low with the result that the increasing populations view the parks as sources of food (hunting), land (slash and burn) and marketable products (poaching and illegal logging). The main human threats to the nominated areas are agricultural encroachment, particularly by slash-and-burn, fire, grazing, hunting and poaching. There is also some illegal harvesting of precious woods such as rosewood and ebony, and widespread, small scale gem mining.

4.4.1 Encroachment
Encroachment into the nominated protected areas for agricultural purposes is a serious threat to the natural heritage values and integrity of the property. The threat often arises as sporadic encroachment of slash and burn activity but can also be of a more permanent nature unless there is management intervention. The incidence of new agricultural encroachment in the longer established parks appears low and there was evidence that old clearings were now regenerating with forest (e.g. Marojejy National Park). Some more recent incidents of slash and burn were noted within several of the protected areas (e.g. Midongy and Ranomafana National Parks).

4.4.2 Fire
Fire is used extensively in the agricultural landscapes adjoining many sections of the nominated protected areas,

particularly as an adjunct of cattle grazing. Fire is clearly allowed to escape, usually upslope into the parks. This is particularly apparent on the drier western approaches to Andohahela, Andringitra and Midongy National Parks. In the case of Midongy, where there is much less topographic protection, grassland well within the park is still maintained by fire. Fire induced invasive plant species such as Eucalypts are a potential problem on the higher altitude western side of Ranomafana National Park.

4.4.3 Hunting and poaching

Hunting is a definite threat to the wildlife in all the forests of Madagascar, especially for lemur species. Hunting of animals, particularly lemurs, for food is a widespread and a significant threat to the biodiversity of the nominated protected areas. The loss of two lemur species from the Special Reserve adjacent to Mantadia National Park is attributed by some to illegal hunting. Some park managers are confident that the threat from hunting is being reduced; some wildlife researchers are, however, much less optimistic. Madagascar in general, including the rainforests, is a target of poachers supplying the illegal global trade in fauna, in particular in reptiles. Chameleons are especially vulnerable to the collector trade. There are reports of tortoises being poached for supply of livers for the Oriental medicinal market.

4.4.4 Roads

Roads are presently not a serious threat to the nominated protected areas. Most of the nominated areas have the advantage of being closely associated with rugged mountainous terrain where there are few demands or opportunities for roads. A regional road traverses Ranomafana National Park but there appears to be good management of the roadside sections of the park. Some routes used for travelling of cattle across parks are a threat, particularly as a result of associated fire and hunting (e.g. western section of Midongy National Park). There are reports of a possible future road being constructed across the linking corridor of forest between Andringitra National Park and Pic d'Ivohibe Special Reserve.

4.4.5 Mining

Informal/illegal mining for gemstones is widespread and represents localized threats to most of the nominated protected areas. Small scale gem mining is difficult to detect and suppress. Existing graphite mining already impacts (water pollution) on Mantadia National Park and other mining (nickel to west of park) and mining related development (slurry pipeline between park and special reserve) could further impact on that park.

4.4.6 Illegal logging

Madagascar has been fortunate to date to have escaped the wholesale destruction of forest as a consequence of commercial logging which occurs in South East Asia. None of the nominated protected areas has ever been the subject of large scale commercial logging. Highly selective small scale logging of precious woods such as rosewood and ebony may occur at any time in the protected areas. Whilst such timber removal per se may not have a serious ecological impact overall, associated fire, hunting and poaching amplify the impacts.

Taking into consideration the boundary changes outlined in sections 5.2 and 7, IUCN considers that the nominated property meets the conditions of integrity as required under the Operational Guidelines.

5. ADDITIONAL COMMENTS

5.1 Justification for serial approach

When IUCN evaluates a serial nomination it asks the following questions:

a) What is the justification for the serial approach?

The protection and management of the rainforests in Madagascar are in process of comprehensive review, with a strong emphasis on additional protection, and major changes including major new protected areas are planned. This process is driven by the President's Durban Declaration, presented to the Vth IUCN World Parks Congress held in Durban, South Africa, in 2003, with a very commendable commitment to greatly extend the system of protected areas. This situation has however complicated the nomination and evaluation process and prompted the fundamental question: 'To what extent are the nominated protected areas truly the 'best of the best' of these rainforests, or are they 'artefacts of history', being the only areas already protected and available for nomination?'. Based on the nomination document and discussions held during the field visit, the nominated series of sites appears to be a combination of both processes, some being clearly recognizable as being biologically the 'best of the best' and others being more 'artefacts of history'. Further, the extent to which the nominated areas truly represent an 'integrated whole' to qualify as a serial nomination proved difficult to establish from the nomination document.

The main justification for the serial approach seems limited to the eight national parks simply being broadly 'representative' of a (single) biome of outstanding universal value. The nominated areas certainly provide a broadly representative geographic spread over almost the full latitudinal range of the rainforests of Madagascar. It proved more difficult, however, to establish whether each of the components is truly outstanding or is dependent on simply being part of the series, as the nomination does not strongly argue complementary nature of the components. There is also no claimed functional linkage between the individual sites although the existence of wildlife corridors between pairs of nominated areas is emphasized. These important corridors between the national parks, several of which are much more extensive than the nominated areas themselves, are in part poorly known and presently only temporarily protected; so their permanent protection for biodiversity conservation and/or addition to the national parks is not assured. The IUCN evaluation made no assumptions about potential future protection and took into account only the level of protection at present.

For example, Mantadia National Park, a small park of some 15,500 ha, represents perhaps only around 5% of a very much larger tract of rainforest of which it is an integral part. The probability is that this only temporarily protected large tract of rainforest, with Mantadia National Park at its southern end and Zahamena National Park at its northern end, is equally or more important for biodiversity conservation than Mantadia itself. It is therefore questionable if Mantadia, considered independently of the adjacent areas, represents

'the best of the best' and contains 'the most important and significant natural habitats' compared with other areas and considering its deficiencies in terms of integrity.

In conclusion, the main justification for the serial nomination of the eight protected areas appears to be that they offer outstanding and representative examples of Madagascar's distinctive rainforest biota and that together they include critically important habitat, especially for the unique primates.

b) Are the separate components of the property functionally linked?

The eight separate components of the nomination are functionally linked only to a limited extent. No substantive evidence is presented for seasonal wildlife migration (e.g. birds) between the components. Existing habitat connectivity between pairs of the nominated areas presently maintains the opportunity for wildlife movement but only between the respective pairs. Much of the connecting habitat is now temporarily protected and in process of being considered for permanent protection though not as additions to the nominated parks per se. For example, action is underway to protect the habitat corridor linking Marojejy National Park with Anjanaharibe Sud Special Reserve. In turn, the large tract of rainforest between Anjanaharibe Sud Special Reserve and Masoala National Park has reached the stage of temporary protection.

The future permanent protection of tracts of rainforests linking a number of the nominated protected areas raises the question of the relevance of those areas to the nomination given that they may be soon subsumed into much larger and probably more valuable protected areas. Concerns remain that, had the nomination been delayed a few years, it might well take on a somewhat different form to that now being evaluated, particularly if several of the larger tracts of rainforest are permanently protected and included. However, present indications are that the proposed new protected areas will neither be IUCN Category I or II protected areas nor be managed by ANGAP.

c) Is there an overall management framework for all the components?

The nominated areas do not presently constitute a single management entity. There is presently no overall coordinated management framework for the eight national parks per se but rather they are embedded in the national system of protected areas managed by ANGAP. As a World Heritage property, the sites would continue to be managed by ANGAP, and therefore management policies can at least be expected to be consistent throughout.

Greater cooperation and coordination between the components would be beneficial for effective management of each of the sites and to present them as a single integrated World Heritage property. What is equally or more important from a conservation perspective is that there be close cooperation, coordination and, ideally, integration in the planning and day to day management of the nominated areas and the adjacent and adjoining wildlife corridors and proposed new protected areas, some of which are likely to be of at least equal or greater conservation importance.

5.2 Changes to the boundaries of the nominated property

IUCN communicated with the State Party in relation to the potential for changing the boundaries of the nominated property. In this communication, IUCN noted that there are some important areas which would add significant value to the nominated area, but which are not currently included within the nomination. These could potentially be considered as part of a subsequent phase of a World Heritage nomination. IUCN further noted that some areas face integrity issues and could logically be excluded from the nominated area until these issues have been addressed. The reply from the State Party noted their agreement with the proposals from IUCN.

In particular it was agreed that the nominated property should be amended by exclusion of: (a) the marine extensions on the east coast of Masoala National Park; (b) the whole of Mantadia National Park (and associated Special Reserve) pending review of future protection of the adjoining more extensive tract of rainforest to the north; (c) the whole of Midongy National Park pending review of the western half of the park and the corridor linking to Andohahela National Park; and (d) the outlier semi-arid/arid zone parcels of Andohahela National Park (parcels 2 and 3).

Further it was agreed that a larger nomination would be brought forward for consideration by the World Heritage Committee in due course when conditions of integrity are adequately met, and that subsequent phases should be based on a review of potential future addition of appropriately protected areas of high nature conservation value to the property, with priority to those major tracts of land presently forming corridors of natural forest between existing reserves within the property.

Based on the information available, no less than four major tracts of rainforest not included in the nomination, well exceeding the total area of the nominated property, can be expected to be revealed as important habitat for rainforest species, being:

- Tsaratanana to Masoala, including Tsaratanana Integrated Reserve and the Makira Temporary Reserve, in the northern highlands. The Makira Forest of around 500,000 ha represents the largest remaining contiguous forest in eastern Madagascar;
- Zahamena-Ankeniheny, the large tract of forest between and much larger than Zahamena and Mantadia National Parks;
- Fandriano Vondrozo, the linking habitat corridor between Ranomafana and Andringitra; and
- Midongy to Andohahela linking habitat corridor.

6. APPLICATION OF CRITERIA / STATEMENT OF OUTSTANDING UNIVERSAL VALUE

The property has been nominated under criteria (ix) and (x). IUCN considers that the nominated property meets these criteria and proposes the following Statement of Outstanding Universal Value:

The Rainforests of the Atsinanana are a serial property comprising six components. They contain globally outstanding biodiversity and have an exceptional proportion of endemic plant and animal species. The level of endemism within the property is approximately 80 to 90 percent for all groups, and endemic families and genera are common. The serial property comprises a representative selection of the most important habitats of the unique rainforest biota of Madagascar, including many threatened and endemic plant and animal species.

Criterion (ix): Ecological and biological processes

The Rainforests of the Atsinanana are relict forests, largely associated with steeper terrain along the eastern escarpment and mountains of Madagascar. The protected areas included in this serial property have become critically important for maintaining ongoing ecological processes necessary for the survival of Madagascar's unique biodiversity. This biodiversity reflects the Madagascar's geological history and geographic placement. It is the world's fourth largest island and has been separated from all other land masses for at least 60-80 million years and thus most of its plant and animal life has evolved in isolation. These forests have also offered important refuge for species during past periods of climate change and will be essential for the adaptation and survival of species in the light of future climate change.

Criterion (x): Biodiversity and threatened species

The level of endemism within the property is approximately 80 to 90 percent for all groups, and endemic families and genera are common. Madagascar is one of the world's top "megadiversity" countries and features an extraordinary large number (circa 12,000) of endemic plant species. The property is also globally significant for fauna, especially primates, with all five families of Malagasy primates, all endemic lemur families, seven endemic genera of Rodentia, six endemic genera of Carnivora, as well as several species of Chiroptera represented. Of the 123 species of non-flying mammals in Madagascar (72 of which are on the IUCN Red List of Threatened Species), 78 occur within the property. The critical importance of the property is underlined by the fact that deforestation has left eastern Madagascar with only 8.5 percent of its original forests and the property protects key areas of this remaining habitat.

Conditions of Integrity, Protection and Management

All components of the serial property are formally protected as national parks and have management plans in place. Key management issues include effective control of agricultural encroachment and resource exploitation from logging, hunting, and gem mining. These issues require the implementation of clear and coordinated management strategies to manage the components of this serial property as a single entity. Also, coordinated planning and management of this serial property with adjacent protected areas and forest corridors is required, for which additional financial and human resources need to be obtained. There is potential for further extension of the property to include adjacent protected areas and forest corridors once they meet the conditions of integrity.

7. RECOMMENDATIONS

IUCN recommends that the World Heritage Committee **inscribe** the Rainforests of the Atsinanana, Madagascar, on the World Heritage List on the basis of natural criteria (ix) and (x).

IUCN recommends that the World Heritage Committee commends the State Party for its significant and encouraging efforts to protect the rainforests of Madagascar.

IUCN notes that a number of boundary changes have been proposed by IUCN on the basis of integrity issues and that the following boundary changes have been accepted by the State Party:

> Exclusion from the original nomination of: (a) the marine extensions on the east coast of Masoala National Park; (b) the whole of Mantadia National Park (and associated Special Reserve) pending review of future protection of the adjoining more extensive tract of rainforest to the north; (c) the whole of Midongy National Park pending review of the western half of the park and the corridor linking to Andohahela National Park; and (d) the outlier semi-arid/arid zone parcels of Andohahela National Park (parcels 2 and 3).

IUCN recommends that the State Party be requested to submit a detailed topographic map showing the revised boundary of the property following the exclusion of these components.

IUCN also recommends that the State Party be requested to:

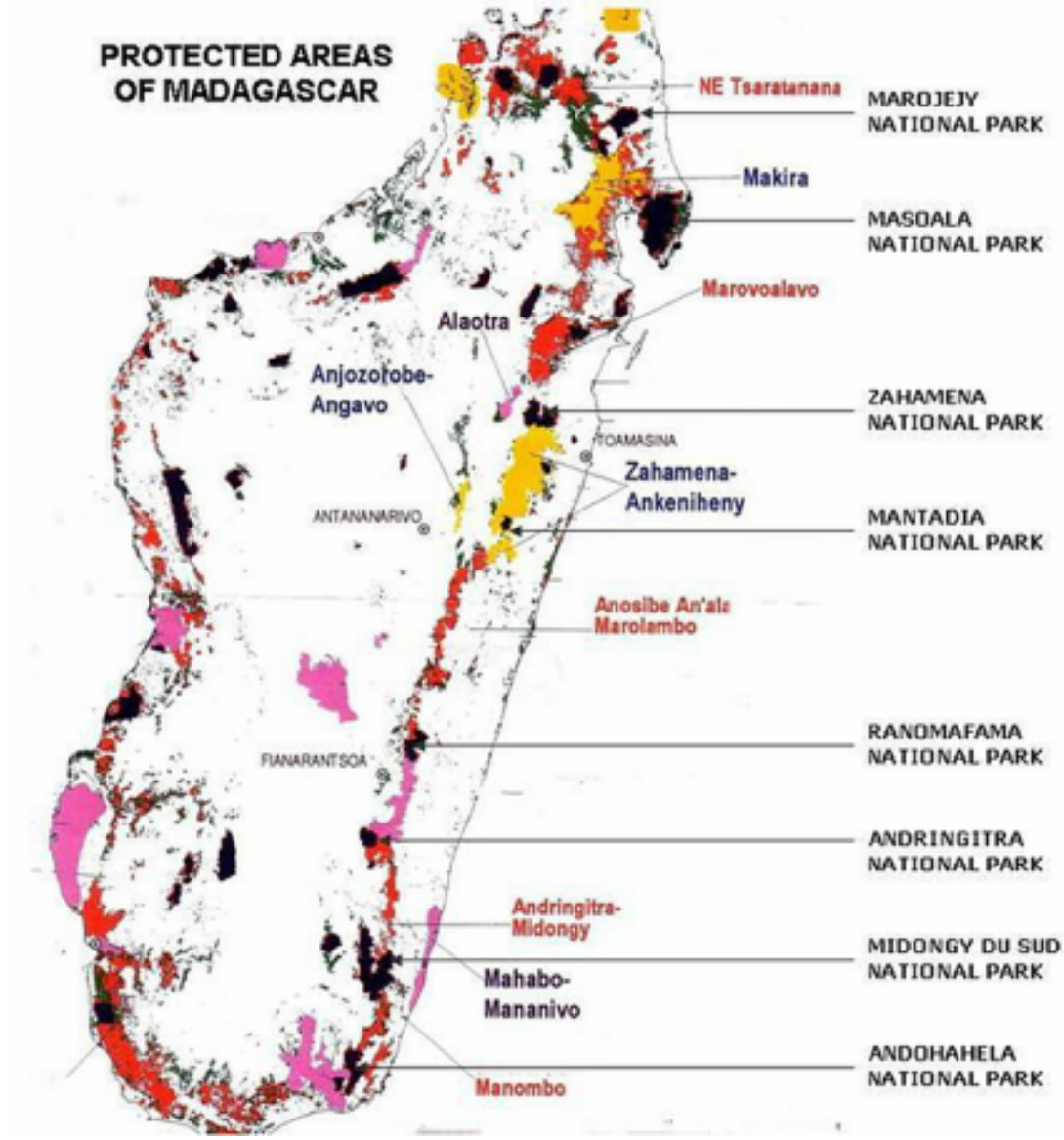
a) Consider this as Phase 1 of a larger World Heritage nomination which could be brought forward when conditions of integrity are adequately met. Subsequent phases should be based on a review of potential future addition of appropriately protected areas of high nature conservation value to the property, with priority to those major tracts of land presently forming corridors of natural forest between existing reserves within the property;

b) Progressively increase the level of staffing and resources within all reserves within the property and also develop a long term strategy for financing of all reserves within a larger World Heritage nomination, as well as adequate financing for management of corridors between existing reserves within the property;

c) Develop a proactive community development programme, which would support socio-economic activities outside of the existing reserves to reduce pressures for resource exploitation within the property; and

d) Develop and implement strategies to reduce the impact of illegal logging and small scale gem mining within the property.

Map 1: Location and boundaries of the nominated property



AFRICA

PRINCE EDWARD ISLANDS

SOUTH AFRICA

WORLD HERITAGE NOMINATION – IUCN TECHNICAL EVALUATION

PRINCE EDWARD ISLANDS (SOUTH AFRICA) – ID No. 1266

1. DOCUMENTATION

i) **Date nomination received by IUCN:** April 2006

ii) **Additional information officially requested from and provided by the State Party:** IUCN requested supplementary information on 14 December 2006 after the IUCN Evaluation Mission and the first IUCN World Heritage Panel Meeting. The State Party submitted on 12 December 2006 a revised comparative analysis as requested by the World Heritage Centre on 1 March 2006. The State Party response to IUCN's request for supplementary information was submitted on 15 February 2007, including responses to all the issues raised by IUCN, and the State Party informed IUCN that "we do not wish to pursue further grounds for inclusion on the basis of criteria vii and viii".

iii) **UNEP-WCMC Data Sheet:** 8 references (including nomination)

iv) **Additional literature consulted:** BirdLife International (2005). **BirdLife IBA Factsheet: Prince Edward Islands Special Nature Reserve.** BirdLife's Online World Bird Database: the Site for Bird Conservation. BirdLife International, Cambridge. Chown, S.L. et al. (2006). **Draft Prince Edward Islands Environmental Management Plan Version 0.1.** DST-NRF Centre of Excellence for Invasion Biology, University of Stellenbosch. Chown, S.L. et al. (2001). **World Heritage status and conservation of Southern Ocean Islands.** Conservation Biology 15, 3, 550-557. Chown, S.L. et al. (1998). **Ecological biogeography of Southern Ocean Islands: species-area relationships, human impacts, and conservation.** The American Naturalist 152, 4, 562-575. Clark, M.R. and Dingwall, P.R. (1985). **Conservation of Islands in the Southern Ocean: A Review of the Protected Areas of Insulantarctica**. IUCN. Gremmen, N.J.M. (1982). **The Vegetation of the Subantarctic Islands Marion and Prince Edward.** Dr. W. Junk, The Hague. Gremmen, N. and Smith, V. (2004). **The Flora of Marion and Prince Edward Islands.** CD. Data Analyse Ecologie, Diever, The Netherlands. Hänel, C. and Chown, S. (1998). **An Introductory Guide to the Marion and Prince Edward Island Special Nature Reserves 50 years after annexation.** Directorate: Antarctica and Islands, Department of Environmental Affairs and Tourism, Pretoria. IUCN 1992. **Report of the Working Group on Application of the Convention to Islands of the Southern Ocean.** IUCN. Lombard, A.T. et al. (2007). **Conserving pattern and process in the Southern Ocean: designing a Marine Protected Area for the Prince Edward Islands.** Antarctic Science 19, 1, 39-54. Shirihai, H. (2002). **A Complete Guide to Antarctic Wildlife: The Birds and Marine Mammals of the Antarctic Continent and Southern Ocean.** Alula Press. Helsinki. Stonehouse, B. (2000). **The Last Continent: Discovering Antarctica.** SCP Books, Norfolk. Udvardy, M.D.F. (1987). **The biogeographical realm Antarctica: a proposal.** Journal of the Royal Society of New Zealand 17, 2, 187-194. Van Zinderen Bakker, E.M. et al. (1971). **Marion and Prince Edward Islands: Report on the South African Biological and Geological Expedition 1965-66.** A. A. Balkema, Cape Town.

v) **Consultations:** 7 external reviewers. Extensive consultations were undertaken during the field visit including with representatives of the South African Department of Environmental Affairs and Tourism, its Directorate: Antarctica and Islands, staff at the research station on Marion Island, and a number of other experts.

vi) **Field visit:** Ronald Ian Lewis-Smith, November 2006

vii) **Date of IUCN approval of this report**: April 2007

2. SUMMARY OF NATURAL VALUES

The Prince Edward Islands (PEIs) are administered by the Western Cape Province, South Africa. They are of volcanic origin and comprise Marion Island (29,000 ha) and Prince Edward Island (4,500 ha), lying 21 km north-east of Marion. The total area of the nominated property, which includes the 12 nautical mile territorial waters around the islands, is 478,200 ha of which the terrestrial component comprises 7%. The islands are within the 200 nautical mile Exclusive Economic Zone.

The island group lies 1,770 km south-east of the nearest South African coast (Port Elizabeth) and. 2,300 km north of the Antarctic continent. The nearest land is Île aux Cochons (one of the French sub-Antarctic Îles Crozet) 950 km to the east. The islands experience a cool (sub-Antarctic) climate with an annual mean air temperature of 5.9°C (1.2°C higher than in the early 1970s), and only a small seasonal variation. Mean sea surface temperature has increased by 1.4°C since the 1950s. Precipitation, mainly as rain, is high (circa 2,500 mm per year, but decreasing since 1960) and snow is frequent in winter,

especially at higher altitudes. The prevailing westerly to north-westerly winds are strong and gales frequent (average 107 days per year).

The PEIs are located near the centre of the West Indian Ocean Ridge, and Marion Island represents the summit of a volcano of the Hawaiian type rising steeply >3,500 m from the ocean floor. The territorial waters include a shallow saddle (45-250 m depth) linking the two islands. The oldest lava flows on Marion are estimated at 450,000 years, but much of the various lava types are much younger. Marion is regarded as an active volcano, with the most recent minor eruption on the west side occurring in 1980. Prince Edward Island is believed to be a remnant of a closely-associated shield volcano.

Marion Island consists of a central highland area, reaching 1,231 m, surrounded by an undulating coastal plain. On the northern and eastern sides this plain is 4-5 km wide and up to 300 m high and rises gently to the plateau area; on the southern and western sides the plain is barely 1 km wide and circa 100 m high and rises steeply to the interior. Prince Edward Island rises to 672 m and consists of a central highland that slopes gently to the east and drops steeply to the western lowland in the form of a 400 m high escarpment. Both islands are characterised by many scoria (volcanic cinder) cones and other eruptive features. There are many streams and ponds on both islands. Marion exhibits many geomorphological features of past glacial epochs, and is notable for its small and rapidly diminishing ice cap, the only permanent ice on South African territory. The lower Prince Edward, however, appears to have never had an ice cap or, if it did, all glacial features have been eroded away.

The PEIs, while sharing many biological and ecological features with other sub-Antarctic islands, possess a distinctive terrestrial ecosystem. Typical of such islands, the PEIs have relatively low floral and faunal species diversity due to the conditions imposed primarily by geographic isolation and climate. However, within this category of islands, the PEIs possess 22 indigenous and currently 14 naturalised alien vascular plant species, 94 mosses, 42 liverworts and 116 lichens. Depending on habitat, different associations of these plants have developed six predominant community types, several of which are special to the islands, notably the fern-dominated fernbrake communities. Much of the lower flatter areas support bog and mire communities which have accumulated a thick mantle of peat up to 15 m in depth. The micro-fauna is poorly known. The known terrestrial macro-invertebrate fauna comprises some 111 indigenous species, mainly mites (63), springtails (12), spiders (4) and insects (18, including 8 beetles, 5 flies, 2 moths and 1 wasp); there is also a native snail. There are at least seven endemic invertebrate species (3 beetles, 2 springtails and 2 moths). At least 21 alien invertebrate species have become established.

The islands provide breeding habitat for 28 species of seabirds, all dependent wholly or mainly on the surrounding ocean for food, 13 of which are globally threatened or near threatened. The seabirds comprise penguins (4 species), albatrosses (5), petrels (14), terns (2), cormorant, gull and skua (1 each). Many of these exist in globally significant breeding populations, notably king penguin (total for both islands 221,000 pairs), macaroni penguin (417,000), rockhopper penguin (208,000), wandering albatross (3,000), grey-headed albatross (8,100), Salvin's prion (200,000), blue petrel (200,000). In total, the PEIs are estimated to support circa 2.5 million pairs of breeding seabirds and may support up to 8 million seabirds in total. There is one endemic land bird (a subspecies of the lesser sheathbill, on Marion Island currently in decline from competition for food from mice). Besides the introduced and well-established house mouse on Marion, there are no land mammals. There are large breeding colonies of three seal species: southern elephant (2,400 individuals), Antarctic fur (5,600) and sub-Antarctic fur (149,000). A number of species of cetaceans occur in the PEIs territorial waters, notably killer whales.

The offshore environment is biologically highly productive due to the proximity of two major oceanic frontal systems which create an upwelling of nutrients that supports a diverse and complex food chain. In recent years this has attracted an illegal fishing industry (notably for Patagonian toothfish), but this is currently under control by South African fishery patrol vessels. The shallow benthic plateau that surrounds the islands supports a wealth of invertebrate organisms, dominated by filter feeders. 70 species of fish are known from this area. As yet there is no formal list for the marine biota of the PEIs territorial waters. The littoral zone is exposed and unstable due to abrasive wave action, and consequently biological diversity and density are low. Nonetheless, there are four clearly demarcated zones, each dominated by different associations of marine algae (seaweeds), notably dense beds of kelp in the turbulent lower littoral zone.

3. COMPARISONS WITH OTHER AREAS

The PEIs are one of 22 major oceanic islands or island groups in the Southern Ocean around the Antarctic continent, which are administered by six different countries and form the Insulantarctic Biogeographic Province as defined by Udvardy in his global biogeographic classification. This classification provides the global context for this comparative analysis.

There are already four natural World Heritage properties (10 major islands in total) in this region: Gough and Inaccessible Islands (United Kingdom), New Zealand Sub-Antarctic Islands (NZSI, New Zealand), Heard and McDonald Islands, and Macquarie Island (both Australia). Two of these (Gough and the NZSI) are located in the cool-temperate sub-division of the Province and two are located in the sub-Antarctic sub-division of the Province as are the PEIs. All the islands share a similar geological history related to volcanism as well as many species, habitats and ecological processes. All are important sites for wildlife including marine mammals and seabirds. There are variations in the degree of human impact and numbers of introduced species. Despite these shared climatic, landscape, and biological characteristics shaped by the influence of the Southern Ocean, like all oceanic islands, each has some distinctive aspects that set it apart from the others.

The Insulantarctic Biogeographic Province has been further subdivided by Shirihai (2002) into several oceanic zones. There are only 3 sub-regions where relevant comparisons can be made:

Table 1: Comparison of indigenous and introduced biodiversity (species numbers) between the nominated property and some comparable existing World Heritage properties and other sub-Antarctic islands or island groups

Name and size of island or island group	Criteria	Indigenous vascular plant species	Introduced vascular plant species	Indigenous bird species	Introduced mammal species
PEIs 33,500 ha	***ix, x***	***22***	***14***	***29***	***1 (on Marion)***
Crozet 50,000 ha	-	19	Up to 101 (on Possession)	35	Up to 3 (on Cochons)
Kerguelen 700,000 ha	-	30	36	36	7
Heard and McDonald 38,600 ha	viii, ix	10	1	19	0
Macquarie 12,785 ha	vii, viii	40	5	23	3
New Zealand Sub-Antarctic 76,458 ha	ix, x	Up to 188	Up to 88 (on Campbell)	Up to 39	Up to 4 (on Auckland)
South Georgia 376,600 ha	-	25	53	28	3
Gough and Inaccessible 7,900 ha	vii, x	57	24	22	1

- The Antarctic Waters or the Periantarctic Zone. This zone includes the existing Heard and McDonald World Heritage property as well as South Georgia.
- The Cool Subantarctic Zone. This includes one portion of the NZSI World Heritage property (Campbell Island), Macquarie World Heritage property as well as the PEIs.
- The Temperate Subantarctic Zone. This includes the existing Gough and Inaccessible World Heritage property and a portion of the NZSI World Heritage property.

All three of these sub-regions of the Southern Ocean have existing World Heritage properties including two in the same sub-region where the PEIs are located. In another subdivision used by Stonehouse (2000), a variant of the above approach, again all three of the sub-regions have existing World Heritage properties including two in the same sub-region where the PEIs are located. Stonehouse also notes that as an ocean, the Southern Ocean (south of the Subtropical Convergence) can be viewed as a southern extension of the Pacific, Atlantic and Indian Oceans. In each of these ocean sectors the following World Heritage properties exist: Pacific: NZSI and Macquarie; Atlantic: Gough and Inaccessible (as well as South Georgia); and Indian: Heard and McDonald (as well as the PEIs). Once again, using this classification all sub-regions in Insulantarctica contain a World Heritage property with one in the same sector as the nominated property. The conclusion from the above classifications is that, from a biogeographic perspective, all the different sectors of the Southern Ocean are already represented on the World Heritage List.

For comparisons relating to criterion (x), several indicators on species diversity (see Table 1) compare the PEIs to other islands or island groups in the Biogeographic Province as follows:

- In terms of indigenous vascular plant species, PEIs totals (22) are greater than Heard and McDonald (10) but well-exceeded by the existing World Heritage properties of Macquarie (40), Gough and Inaccessible (57) and some islands in the NZSI (up to 188) as well as the nearby but larger Kerguelen (30).
- In terms of indigenous bird species, PEIs totals (29) are exceeded by nearby Crozet (35) and some islands in the NZSI (up to 39) but are greater than Heard and McDonald (19) and Gough and Inaccessible (22).
- In terms of human impact the PEIs, along with Heard and McDonald and several islands in the NZSI group, are regarded as the least affected. Marion Island, however, is not as pristine with 14 introduced vascular plant species and the introduced house mouse recorded there.

Although these broad comparisons mask certain attributes of biodiversity, the data do suggest that, for criterion (x), the PEIs are secondary in importance to other islands in the Biogeographic Province, including existing World Heritage properties.

While overall species diversity is lower than in some other islands in the region, population sizes of a number of key bird species in the PEIs are also significantly less than in

Table 2: Estimates (pairs) of seabirds breeding annually at the PEIs and other sub-Antarctic islands or island groups

Name and size of island or island group	King penguin	Gentoo penguin	Macaroni penguin	Rockhopper penguin	Wandering albatross	Grey-headed albatross
PEIs 33,500 ha	***221,000***	***1,543***	***417,000***	***208,000***	***3,000***	***8,100***
Crozet 50,000 ha	1,000,000	13,000	3,200,000	264,000	2,085	5,940
Kerguelen 700,000 ha	173,000	12,500	1,800,000	<200,000	1,455	7,860
Heard and McDonald 38,600 ha	25,000	16,000	1,000,000	10,000	-	-
Macquarie 12,785 ha	>100,000	4,000	-	<500,000	-	-
South Georgia 376,600 ha	400,000	102,000	5,400,000	-	4,000	80,000

many other islands in Insulantarctica. Table 2 shows population census data (taken mostly from the data sheets in Shirihai (2002)) on some of the common key bird species which are indicative of the overall importance of selected islands which share many of the same species as the PEIs. It is noted that census data come from different years and some estimates vary widely (midpoints are used in this case) but with these caveats (and not taking into account size of island) some clear conclusions can be made.

Although the PEIs support substantial numbers of three species of penguins, each species is much more numerous on one or more of the other islands in the region, and especially the nearby Crozet stands out. Macquarie Island, although not inscribed under biodiversity criteria, also provides habitat for almost one million Royal penguins.

The PEIs host a breeding population of some 3,000 pairs of wandering albatross, which is over 35% of the global annual breeding population of this globally threatened seabird (BirdLife 2005), while South Georgia and Crozet together host another 30%. The PEIs also host over 10% of the global annual breeding populations of four other globally threatened seabirds, however it appears that other islands such as South Georgia and Crozet are similarly important for certain species. It is also noted that the Gough and Inaccessible World Heritage property and NZSI World Heritage property are all of immense importance for albatrosses and other tube-nosed birds but they have a different suite of species. Also, the PEIs have a high number of sub-Antarctic fur seals but even larger numbers of these are found in the Gough and Inaccessible World Heritage property.

The conclusions on the above population census data are:

- As important as the PEIs (and indeed all Insulantarctic islands) are for the above sample of key species, populations on other islands in the region far exceed those of the nominated property. The only exception appears to be for the wandering albatross. The biological values (in terms of total population sizes) of the PEIs are thus secondary to other islands in the Biogeographic Province and thus considered to be at the regional rather than international level of significance.
- For many species of seabirds the importance of the island of South Georgia in terms of total population sizes stands out as being of particular significance. It is acknowledged however, that South Georgia is much larger in size and has been more disturbed, but the point is that it far surpasses the PEIs in terms of total population sizes of a number of key species.

Very little data on the diversity of the PEIs marine zone is provided in the nomination, but, it is unlikely to match that of several other island groups such as Gough and Inaccessible Islands where 250 species including 60 endemics have been recorded.

More specifically relating to criterion (ix), the PEIs terrestrial ecosystem and its component plant communities have probably remained relatively static for millennia, but subjected to periodic fluctuations in extent and dominance by certain species following volcanic activity and climate change. Likewise, Heard and McDonald Islands and Îles Kerguelen have experienced similar volcanic episodes, and all sub-Antarctic islands (indeed, any ecosystem globally) have been affected by climate change. Certainly, the relatively low altitude and regular topography of the PEIs and their strongly oceanic climate render the ecosystem particularly sensitive to changes in temperature and precipitation (as true for most other oceanic islands). This can result in a marked and possibly rapid response by the flora and fauna as their habitat conditions change.

With the environmental, biological and ecological processes of the PEIs currently in a state of flux, and with the long history of terrestrial ecosystem research undertaken by the South African National Antarctic

Programme since the 1970s, the islands are well-suited to monitor subsequent changes in these processes. The focus of research has been on understanding and modelling the biotic / abiotic interactions of the island's principal communities and their dominant species. It is noted that research stations are found on most of the island groups in the Insulantarctica and all contribute a share to scientific understanding of the islands.

The PEIs thus represent one component of an extremely disjunct and sensitive ecosystem on a global scale. The Southern Ocean, extending from 40° to 60°S, occupies about 10% of the Earth's surface but in which terrestrial habitats are extremely scarce. These occur on only 22 relatively small Insulantarctic islands or island groups (10 of which make up four existing World Heritage properties), all remote from any other landmass. Each has evolved its own distinct relatively species-poor flora and associated plant communities and invertebrate faunas, and is the breeding site of large populations of relatively few species of seabirds and seals. All these islands are important sites of high productivity, but each is distinctive in its own right. The PEIs are therefore one representative sample of this process but they do not stand out as exceptional in this context.

In conclusion, like all the islands in Insulantarctica, the PEIs support large populations of seabirds and marine mammals both with a strong interdependence between the land and the sea. The PEIs, also like several other islands in this region, remain relatively pristine and are of great value to science and conservation for study of ecological processes. It is thus a difficult task to provide a definitive conclusion as all islands contribute in specific ways to the natural heritage of the planet. It does appear, however, that the natural values of the PEIs are not as significant as those of the four existing World Heritage properties in Insulantarctica as well as of several other islands in the region.

Although criteria (vii) and (viii) were originally considered for the nomination, the State Party concluded they would no longer pursue these. Certainly, in terms of aesthetic importance and natural beauty, the landscape of the PEIs, while offering an interesting wild coastline with cliffs and caves and colourful volcanic features, is less spectacular than that seen in all four existing World Heritage properties in the region as well as South Georgia. The PEIs geological and geomorphological values are also interesting but do not stand out as outstanding as those that occur in other sites in the region.

4. INTEGRITY

4.1 Legal status

The PEIs are part of the national territory and are state-owned by the Government of the Republic of South Africa in terms of the *Prince Edward Islands Act, 1948* which formally annexed the islands as part of the then Union (now Republic) of South Africa. Administration is the responsibility of the Department of Environmental Affairs and Tourism (DEAT), Pretoria. The islands receive a high level of protection by a number of government acts.

The PEIs were declared a *Special Nature Reserve* under the *Environment Conservation Act, 1995*. This act was replaced by the *National Environmental Management: Protected Areas Act, 2003* which defines and sets regulations and guidelines for Special Nature Reserves. Creation of a marine protected area for the surrounding waters is currently being considered.

The PEIs fall within that part of the Southern Ocean subject to the Antarctic Treaty System's *Convention for the Conservation of Antarctic Marine Living Resources* (CCAMLR). Member states, of which South Africa is one, are obliged to regulate the harvesting of living resources and conduct research in the Southern Ocean, as well as to monitor populations of key species and also of related and/or dependent species, such as seabirds and marine mammals.

In addition to the above, the nomination lists 12 other conservation policies and acts which also contribute to the protection of the PEIs. It is noted that the PEIs are currently also being proposed as a site under the Ramsar Convention.

4.2 Boundaries

The entire surface of the islands to the low-water mark and the air space to a height of 500 m above ground level are included in the Special Nature Reserve, which applies equally to the World Heritage nomination. The nominated property includes a 12 nautical mile offshore territorial zone which links the two islands. The islands are further safeguarded by a 200 nautical mile Exclusive Economic Zone which is currently being considered for marine protected area status. The nominated property is 7% terrestrial with the remainder marine.

4.3 Management

Besides the protection afforded by the numerous government acts and international conventions to which the government subscribes, the PEIs are subject to a comprehensive Management Plan (1996). The Department of Environmental Affairs and Tourism (DEAT) manages the PEIs with the advice of the PEIs Management Committee. A revised and much more detailed Management Plan, which calls for the replacement of the Committee by a PEIs Management Authority, was still in preparation at the time of the field visit. The PEIs are managed according to the regulations and guidelines for Special Nature Reserves (e.g. onshore tourism is not permitted).

The present South African National Antarctic Programme (SANAP) allows for a team of about 10-15 overwintering scientists and support staff at the base on Marion Island, increasing to up to 64 persons during the annual relief period. A new base which is currently being constructed will accommodate up to 80 persons, presumably allowing for an expanded research programme. Science projects are conducted mainly by PhD students and post-doctoral researchers. The field research projects all have a strong emphasis on environmental conservation and response to climate change. Over the past 55 years, there have been more than 960 scientific publications devoted to the PEIs.

4.4 Threats and human use

Direct human impacts on the PEIs are minimal apart from within the immediate environs of the research station on Marion. The existing base will be completely removed in 2009-10, after the new base is commissioned in 2008, and the existing nine field huts will also be replaced. No further developments are envisaged. The new Management Plan provides for stringent control of activities at the station and around the island, and all activities will require an appropriate permit. Helicopter flights are not permitted within specified distances and below specified altitudes near any breeding colonies of seabirds and seals. There is no tourism permitted.

Several accidentally introduced plant species have become invasive by out-competing native species in certain habitats around the island. Three naturalised alien plant species are known on Prince Edward Island, in small quantity, and their eradication should be feasible, while 14 are known on Marion Island. Similarly, the establishment in recent years of a slug (human introduction) and the diamond-back moth (probably a natural introduction) on Marion are having a deleterious effect on certain native plant species, notably the Kerguelen cabbage. With the eradication of the significant feral cat population on Marion by 1991, the introduced house mouse population has soared. While the seabird populations have benefited, the mice have now increased their predation of invertebrates, some of which are now in decline, thus altering the soil decomposition and nutrient cycling. Thus, the balance of the natural ecosystem is being locally threatened by alien organisms pre-adapted to surviving in an environment more hostile than that where they originated. This is not a unique situation on the sub-Antarctic islands, but in the PEIs, the impact of alien species on the native biota is still comparably low and being closely monitored.

Illegal long-line fishing of the Patagonian toothfish is a threat to the PEIs ecosystems as it affects both the toothfish stocks and seabirds such as albatrosses and petrels. However, the situation has markedly improved with the commissioning at the end of 2005 of a deep-water fisheries protection vessel, which is able to patrol the PEIs waters. Also, the closure of all the PEIs' territorial waters to commercial fishing at the end of 2004 is expected to contribute to the recovery of the toothfish stocks, and reduce avian by-catch. The larger seabirds continue, however, to be threatened by long-line fishing (often illegal, unreported and unregulated) in the surrounding oceans, which has resulted in significant mortality of seabirds and also marine mammals. Oil and other marine pollution mainly associated with the fisheries also pose a threat to the PEIs ecosystems (two oil spills have been reported in recent years).

IUCN considers that the proposed extension meets the conditions of integrity as required under the Operational Guidelines.

5. ADDITIONAL COMMENTS

The PEIs have an interesting history of brief human occupation relating mainly to their role in the 19th and early 20th century sealing (and penguin oil) industry. However, much of the evidence is now hidden by vegetation and peat, but several sealer-occupied caves and sites of encampments are known. Also, many ships were wrecked around the islands and crews sometimes survived for many months ashore, before being rescued, but many died. Some artefacts exist and presumably numerous graves are associated with some sealers' sites.

A well-known controversy, not mentioned in the nomination, exists surrounding a possible nuclear test known as the "Vela Incident" which occurred in the Indian Ocean near the PEIs in 1979. No information is available as to how this possible nuclear test impacted on the PEIs ecosystems.

6. APPLICATION OF CRITERIA

The property has been nominated under all four natural criteria. However, in the letter from the State Party dated 15 February 2007, the Director-General of the Department of Environmental Affairs and Tourism noted "we do not wish to pursue further grounds for inclusion on the basis of criteria vii and viii". The following assessment therefore focuses on criteria (ix) and (x) only.

Criterion (ix): Ecological and biological processes

PEIs terrestrial ecosystem and its component plant communities have probably remained relatively static for millennia, but subjected to periodic fluctuations in extent and dominance by certain species following volcanic activity and climate change (as have all islands in Insulantarctica). However, the relatively low altitude and regular topography of the PEI, and their strongly oceanic climate, render the ecosystem particularly sensitive to changes in temperature and precipitation. This can result in a marked and possibly rapid response by the flora and fauna as their habitat conditions change. With the environmental, biological and ecological processes of the PEIs currently in a state of flux, and with the active terrestrial ecosystem functioning research undertaken by the South African National Antarctic Programme since the 1970s, the islands are well-suited to monitor subsequent changes in these processes. The focus of research has been on understanding and modelling the biotic/abiotic interactions of the island's principal communities and their dominant species. As for all other islands in Insulantarctica there is substantial interaction between marine and terrestrial communities and these processes have been well studied in the PEIs as well. Although the nomination and the supplementary information provided underline the importance of the PEIs for the study of ecological processes, similar research on other island groups in the region also can make this claim and the PEIs are considered by IUCN to be more at the regional rather than international level of significance.

IUCN considers that the nominated property does not meet this criterion.

Criterion (x): Biodiversity and threatened species

The PEIs represent one component of Insulantarctica, an extremely disjunct and sensitive ecosystem on a global scale. The Southern Ocean, extending from 40º to 60ºS, occupies about 10% of the Earth's surface but in which

terrestrial habitats are extremely scarce. These occur on only 21 relatively small Insulantarctic islands, all remote from any other landmass. Each has evolved its own distinct depauperate flora and associated plant communities and invertebrate faunas, and is the breeding site of immense populations of relatively few species of seabirds and seals. All islands in this region are extremely important sites of high productivity and each has related and distinctive features. The biodiversity of the PEIs are seen as secondary in importance to the 4 existing World Heritage properties (comprising 10 of the islands) and some other sites in the region and thus are also considered by IUCN to be more at the regional rather than international level of significance.

IUCN considers that the nominated property does not meet this criterion.

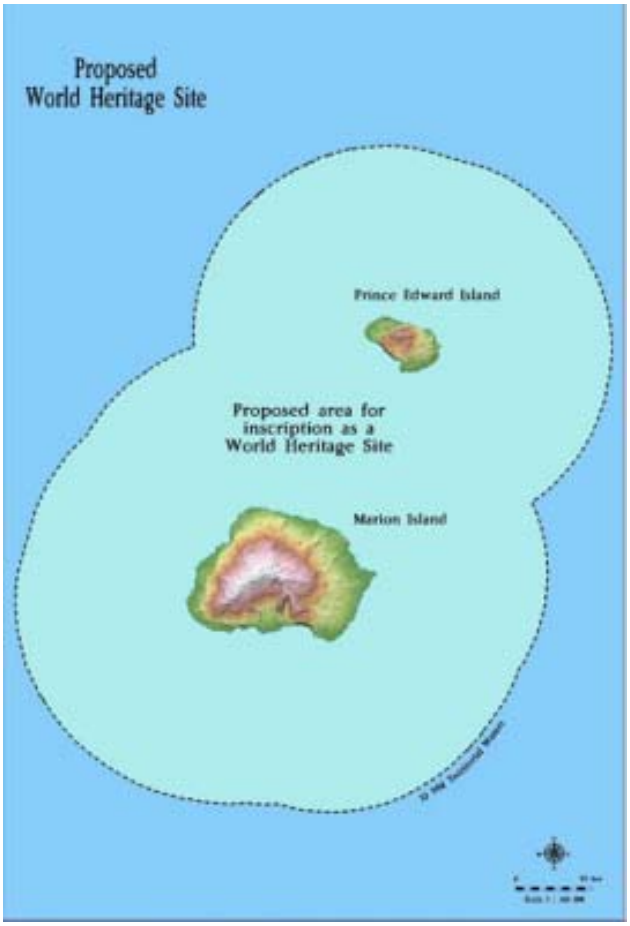
7. RECOMMENDATIONS

IUCN recommends the World Heritage Committee **not to inscribe** the Prince Edward Islands, South Africa, on the World Heritage List on the basis of natural criteria.

IUCN recommends that the World Heritage Committee recommends the State Party to consider the potential use of other international designations such as a Ramsar site in order to strengthen the international recognition of the property's values.

Map 1: Location of the nominated property

Map 2: Boundaries of the nominated property



ASIA / PACIFIC

SOUTH CHINA KARST

CHINA

WORLD HERITAGE NOMINATION – IUCN TECHNICAL EVALUATION

SOUTH CHINA KARST (CHINA) – ID No. 1248

Background note: The IUCN Technical Evaluation of the Lunan Scenic Area of the Stone Forest, nominated by China as a natural property in 1991, and now part of one of the three components of the current serial nomination (Shilin Karst), was not discussed at the 16th session of the World Heritage Committee (Santa Fe, 1992) because the State Party had requested that this nomination not be examined. IUCN's evaluation noted a number of deficiencies in the nomination including the lack of comparative analysis and demonstration of the outstanding universal value of the site. The State Party submitted on 16 January 2006 the current serial nomination of three clusters as Phase 1 (with two more to come) which is the subject of this evaluation.

1. DOCUMENTATION

i) **Date nomination received by IUCN:** April 2006

ii) **Dates on which any additional information was officially requested from and provided by the State Party:** IUCN requested supplementary information on 18 August 2006 before the IUCN Evaluation Mission. The State Party responses were received in October and December 2006, including responses to all the issues raised by IUCN.

iii) **UNEP-WCMC Data Sheet:** 3 references (including nomination)

iv) **Additional literature consulted:** IUCN (1997). **Guidelines for Cave and Karst Protection.** IUCN WCPA Working Group on Cave and Karst Protection. IUCN (2005). **Geological World Heritage: A Global Framework.** IUCN.

v) **Consultations:** 19 external reviewers. Extensive consultations were undertaken during the field visit with: representatives of the State Ministry of Construction and Ministry of Foreign Affairs in Beijing; Yunnan and Guizhou Provinces; Chongqing City; local government including local mayors; Chinese National Commission for UNESCO; Chinese Academy of Sciences and Kunming Technical University; and Communist Party of China.

vi) **Field visit:** Jim Thorsell, September 2006

vii) **Date of IUCN approval of this report:** April 2007

2. SUMMARY OF NATURAL VALUES

The South China Karst region extends over 500,000 km^2 – an area approximately 1,380 km from west to east, and 1,010 km from north to south, lying mainly in Yunnan, Guizhou and Guangxi Provinces, but also extending into parts of Chongqing, Sichuan, Hunan, Hubei and Guangdong. The South China Karst displays a series of karst landforms in a variety of humid, sub-humid, tropical and sub-tropical climate conditions, and geographical settings.

The nominated property contains a cross-section of key features of the regional geology of the area including the deposition of carbonates up to the Triassic period (250 million years ago) and the subsequent tectonic evolution of the area including three phases of evolution during the Quaternary period (about 2 million years). The geological histories of the mature karst landscapes of the present and the palaeokarst landscapes of the past are "intact" as they were little affected by glaciation. The great variety of karst landscapes in the South China Karst is attributed to 1) the age of the thick accumulations of limestone which has resulted in relatively hard limestone and, in turn, in more stable and massive landforms, and 2) the influence of several phases of tectonic uplift (including a major recent phase associated with the Himalayan orogeny, or mountain building, and associated with the uplift of the Tibetan plateau) causing folding and faulting of the rocks and, in turn, promoting the access of water to corrode and erode the limestone to the current karst forms.

The nominated property of the South China Karst comprises seven protected areas in three separate clusters: the Shilin Karst (2 sites), Libo Karst (2 sites) and Wulong Karst (3 sites) as shown in Table 1. The current serial nomination is intended to be the first phase of a comprehensive series comprising the most outstanding of the sites within the South China Karst (see section 5.2 below). Although the State Party considers

Table 1: Name and size of the nominated core zones and their surrounding buffer zones

Name of the site, county and province	Core zone (ha)	Buffer zone (ha)
Shilin Karst 1 (Naigu Stone Forest), Shilin Yi, Yunnan	1,746	4,586
Shilin Karst 2 (Central Stone Forest), Shilin Yi, Yunnan	10,324	18,344
Libo Karst 1 (Da-Xiao Qikong Cone Karst), Libo, Guizhou	7,834	8,479
Libo Karst 2 (Maolan Cone Karst), Libo, Guizhou	21,684	35,019
Wulong Karst 1 (Qingkou Giant Doline), Wulong, Chongqing City	1,246	3,000
Wulong Karst 2 (Three Natural Bridges), Wulong, Chongqing City	2,202	4,000
Wulong Karst 3 (Furong Cave System), Wulong, Chongqing City	2,552	25,000
Total area (ha)	**47,588**	**98,428**

each site of the series as worthy of World Heritage listing in its own right, the rationale for the series is that a serial approach appears to ensure that site selection is carried out within a coherent framework and that the landscape diversity across the South China Karst region as a whole is reflected in the nomination.

The nomination notes four landscape types as outstanding. These have considerable internal landscape diversity, but can be summarised as:

- Fengcong karst (cone karst) – characterised by linked conical hills and depressions, valleys and gorges;
- Fenglin karst (tower karst) – comprising isolated cones or towers on broad plains;
- Stone forests – with a wide diversity of closely spaced pinnacles and towers; and
- Tiankeng karst (giant dolines) – massive circular collapse structures often in close proximity to spectacular gorges, decorated caves and where cave/doline collapse can create natural rock bridges.

Each of the three clusters nominated in this first phase of the nomination has a different set of natural features, as follows:

Shilin Karst (Yunnan): The two core zones of this cluster, which share a single buffer zone, contain examples of “stone forest” karst landscapes noted for high limestone pinnacles and towers decorated with deep, sharp karren. They have been selected as classic examples of the variety of stone forests that are found within the South China Karst. The Shilin stone forests illustrate the episodic nature of the evolution of these karst features, which span 270 million years.

Libo Karst (Guizhou): The two core zones of this cluster, which share a single buffer zone, illustrate the geomorphological exchange and evolution between fengcong landscapes and fenglin landscapes. They provide classic examples of a diverse variety of cone and tower karst landscapes and contain a combination of numerous tall karst peaks, deep dolines, sinking streams, and long and large river caves. This cluster is also noted for its biodiversity values, which include the presence of over 314 vertebrate species, 1,532 plant species, including several endemic species and a number of plants and animals that are globally or nationally endangered.

Wulong Karst (Chongqing): The three core zones of this cluster, each with its own buffer zone, provide an example of a karst landscape that has evolved in areas where thick sequences of pure carbonate rocks have been subjected to tectonic uplift. The Qingkou Giant Doline, some 200-250 m in diameter, represents tiankeng karst. The Three Natural Bridges, which are 223, 235 and 281 m in height, illustrate the development of karst gorges and valleys. This area also includes further giant dolines. The Furong Cave System illustrates how tectonic processes lead to the formation of large caverns and chambers that subsequently become decorated by speleothems.

Minority peoples, including the Yi (Shilin) and the Shui, Yao and Buyi (Libo), comprise the majority of residents in two of the nominated areas and in others that are being considered for future nomination within the series. There is a strong relationship between karst and the cultural identity and traditions of these minority groups. In Shilin, the Yi people have developed a lifestyle adapted to the karst environment, and the stone forests are reflected in every aspect of their culture. In Libo, the Shui people have been given special recognition in the creation of the Maolan Biosphere Reserve. They have managed their lands for at least a thousand years and provide an exemplary example of sustainable forest management. It has been suggested

that they may be authors of a manuscript that may be the earliest written manual on sustainable forest management.

3. COMPARISONS WITH OTHER AREAS

The nomination is accompanied by a comprehensive global comparative analysis that has been developed with an extensive dialogue within the international karst community, and provides an exemplary standard for other nominations. It also includes a volume that can be regarded as a reference statement for karst areas in relation to the World Heritage List.

Karst areas cover an estimated 12% of global continental areas, mainly in the Mediterranean, Eastern Europe, Middle East, Southeast Asia, Southeast America, and Caribbean. With an area of about 500,000 km^2 the South China Karst is unrivalled in its area, depth, and diversity of karst forms. It can be considered as one of the two great karst regions of the world: the other is the 'classical karst' of the eastern Adriatic region of Europe, extending through Slovenia, Croatia, Bosnia-Herzegovina and Montenegro. This is the type site for temperate karst and its values are reflected on the World Heritage List by the Škocjan Caves, Slovenia and Plitvice Lakes, Croatia. It is therefore clear that the phenomenon of the South China Karst as a whole can be accepted, in principle, as providing a strong basis for identifying outstanding universal value. One area of reservation in relation to the current selection of properties across the three anticipated phases of the nomination is that the South China Karst region extends into Viet Nam, and that the significant karst landscape in North Viet Nam is coterminous with the Guangxi Karst. The State Party of China has confirmed its willingness to work with Viet Nam to examine possible transnational cooperation.

Comparisons are considered for each of the three clusters within this phase of the nomination. This is an appropriate approach as the stated intention is that each of the nominated clusters should be of sufficient significance to stand alone as a World Heritage property. It is also important as the series is proposed in a number of phases, and the relative merits of sites in Phase 1 need to be considered in the context of other sites that may be put forward in the future.

The Shilin Karst can be compared with stone forests already on the World Heritage List such as in Gunung Mulu National Park, Malaysia and Tsingy de Bemahara Strict Nature Reserve, Madagascar. Based on the evidence provided by the nomination and a number of experts, it can be concluded that the Shilin cluster is regarded as the world's best example of stone forests – it is considered the type site for this feature and is distinguished by having the longest geomorphological history, spanning 270 million years. It is the best example of this landform within South China. Reviewers have however noted that there is significantly greater human impact on this area than on either Gunung Mulu or Tsingy de Bemahara, and in particular that disturbance has resulted in a significant loss of biological values.

The Libo Karst is nominated because of its cone karst, and is also considered by reviewers to display unrivalled features, although exceptional karst cones are found in other humid tropical landscapes, the most famous ones being those of Gunung Sewu on Java. Cone karst is also a prominent feature in three existing World Heritage properties: Gunung Mulu National Park, Phong Nha-Ke Bang National Park, Viet Nam and Puerto-Princesa Subterranean River National Park, Philippines. On the other hand, Purnululu National Park, Australia is an outstanding example of cone karst formed in sandstone. Mulun Nature Reserve in Guangxi, which is adjacent to the Libo cluster and considered to be less disturbed and of complementary value to this cluster, is proposed for inclusion within the next phase of the nomination. Both the Libo Karst on its own, and in combination with the proposed future extension into Mulun, can be regarded as the world type site for cone karst. The Libo cluster is also nominated for its biodiversity values, although a number of large and rare mammals are either absent or very limited in their abundance. While the overall biodiversity of the Libo cluster is comparable with the forested karst regions of Southeast Asia, other World Heritage properties in Southeast Asia, being more tropical, generally contain a larger number of species (see Table 2).

The Wulong Karst is nominated because of its giant dolines, natural bridges and caves. However, the case for the outstanding universal value of the Wulong cluster is less convincing than for the other two nominated clusters, and there is no consensus amongst reviewers on the values put forward. It appears that all the features in this cluster are also found in other areas in China and/or in other World Heritage properties. The nomination claims that the giant collapsed dolines in Wulong are features generally not found in other World Heritage properties in Asia, but they are part of the values of Gunung Mulu, and extensive dolines can also be found at the Škocjan Caves as well as in other areas in China. Approximately 50 giant tiankeng dolines are known within China, many of which have greater dimensions than those found in Wulong. A number of reviewers have therefore questioned the selection of these dolines, as opposed to others such as the dolines in Leye (Guangxi). Giant natural bridges can also be found in the Chinese Wulingyuan World Heritage property – the height of the highest natural bridge in Wulingyuan (357 m) even exceeds that of Wulong (281 m). Wulingyuan's natural bridges, however, are considered pseudo-karst, are not composed of limestone, and are the result of a different geological process. Wulong's bridges thus appear to be the largest such bridges in a limestone karst. China has also a number of larger and scientifically more important caves than Furong cave. Although valuable in the study of the evolution of karst in the Yangtze basin, the Furong cave does not have the extensive dimensions or decorations found in the caves of other World Heritage properties (Gunung Mulu, Škocjan Caves, Caves of Aggtelek Karst and Slovak Karst in Hungary and Slovakia, and Carlsbad Caverns and Mammoth Caves in the USA).

In summary, comparative analysis provides clear support for the outstanding universal value of the Shilin and Libo clusters, however the case for the Wulong cluster is not convincing at this time, and it is noted in particular that many reviewers have suggested that other Chinese sites exceed it in value.

Table 2: Comparison of biodiversity (species numbers) between the nominated property and some comparable existing World Heritage properties

Name and size of World Heritage property	Criteria	Plants	Mammals	Birds	Reptiles and Amphibians	Fish
Shilin Karst (China) 12,070 ha	*vii, viii*	*889*	*42*	*87*	*44*	*12*
Libo Karst (China) 29,518 ha	*viii, ix, x*	*1,532*	*59*	*137*	*75*	*43*
Wulong Karst (China) 6,000 ha	*viii*	*558*	*46*	*174*	*48*	*64*
Huanglong (China) 70,000 ha	vii	1,500	59	155	10	2
Wulingyuan (China) 26,400 ha	vii	3,000	34	53	29	?
Gunung Mulu (Malaysia) 52,864 ha	vii, viii, ix, x	3,500	81	270	131	48
Dong Phayayen-Khao Yai (Thailand) 615,500 ha	x	2,500	112	392	200	?
Thungyai-Huai Kha Khaeng (Thailand) 622,200 ha	vii, ix, x	?	120	400	139	113
Phong Nha-Ke Bang (Viet Nam) 85,754 ha	viii	876	113	302	81	72

4. INTEGRITY

4.1 Legal status

The nomination clearly identifies the provisions and relevant articles that govern the legal status of the nominated property. The laws and regulations of the People's Republic of China provide the legal basis for conservation and management planning of heritage areas. Legal provisions for protection are written into the Constitution of the People's Republic of China, and there are national laws for environmental protection, wildlife protection, forestry and water. There are also provisional regulations concerning management of scenic and historic areas, and regulations on nature reserves. The Shilin, Libo and Wulong karsts have protective designations dating back to 1982, including National Scenic and Historic Areas, National Geological Parks, National Nature Reserve, UNESCO Geopark and UNESCO Biosphere Reserve. Each nominated cluster has formulated relevant regulations and management measures.

Supplementing these national and provincial legal measures, there are basic protective regulations at the village level in Shilin (e.g. the Mizhishan Culture tradition of protecting natural vegetation among the Yi people) and Libo (e.g., rules of the Laqiao Group, Raolan Village, Yongkang Town). In Libo, for example, poaching of protected species is punishable by group leaders or by fines ranging from 10 to 500 Yuan (US$ 1 to 65). Serious cases are reported to the reserve administration. Such village rules are beneficial because they not only raise local conservation awareness, but also help to inspire a sense of autonomous stewardship on South China Karst's natural resources.

4.2 Boundaries

The boundaries of the nominated core zones generally follow accepted boundaries of previously established legal entities (although the original Biosphere Reserve boundary in Libo was modified to define a more manageable core zone for World Heritage purposes). Also in Libo, a 20 km stretch of cone karst covered with primary forest extends beyond Guizhou into the Mulun Nature Reserve in Guangxi. The planned inclusion of Mulun in Phase 2 of this nomination as an extension of the Libo cluster will address this issue. In Libo and Shilin, each pair of separate core zones is connected by its surrounding buffer zone, with the buffer zones providing a certain level of catchment protection. In Wulong, each of the three separate core zones is small (although sufficient to encompass the main feature), and the three surrounding buffer zones are not connected. The importance of appropriate buffer zones is further discussed in section 4.4 below.

4.3 Management

The State Ministry of Construction has the overall responsibility for the management of the South China Karst, with assistance from the Ministry of Land Resources and State Forestry Bureau, and the provinces concerned have also set up their own management departments. A total of 20 agencies have management responsibilities in the South China Karst. This is a fairly large group of

stakeholders and during the nomination process regular dialogues were held between them to ensure a coordinated approach.

Protocols for conservation and management planning, site management, monitoring, and preserving local traditions are outlined in the nomination. Management plans are in place for those municipalities, counties and regions in which the South China Karst is located. These include 5-year and longer term Social and Economic Plans, Environmental Protection Plans, Integrated Tourism and Historic Area Plans, Ecological Construction and Demonstration Area Plans. Site management plans have been developed for all nominated clusters, and all clusters appear to have sufficient financial resources to ensure effective implementation of these management plans.

Traditional management by minority peoples is an important feature of the nominated areas. IUCN welcomes the clear recognition of the rights of minority groups to retain control over their traditional lands at the outset of the nomination, and the clear recognition of their contribution to the values of the nominated areas. For management to be effective, minority groups in the South China Karst, including the Yi and Shui people, need to continue to be empowered as stakeholders and involved in site management, especially as they have managed their forests successfully as protected areas for thousands of years. IUCN understands that some villages within the Libo cluster have been relocated recently with compensation provided. IUCN notes the sensitivity of such issues, and in general considers that relocation for conservation should always be carried out with the consent of the population concerned. This is particularly the case where traditional management is an essential part of the maintenance of the forest system, such as at Libo.

4.4 Threats and human and use

Three issues have the potential to affect the long term integrity of the property: downstream effects of upstream runoff, local human impact and tourism growth.

One of the major problems associated with karst regions is the potential downstream effects of runoff from upstream regions, which can transport pollution from those regions into and through the karst. Such problems occur at Libo and to a lesser extent at Wulong and Shilin (as well as in many other karst regions around the world). At Libo, the catchment area is difficult to manage because of the large size of some of the river basins involved, and the Zhangjiang River for example passes through Libo City before entering the buffer zone of the Libo cluster, so management for water quality is crucial. At Shilin, there is a problem of waste water disposal from the tourist township. Waste water from villages and livestock in the buffer zone also requires attention, because it disperses into the groundwater. At Wulong, domestic waste has been observed in an underground stream, emphasizing the need for stricter waste disposal enforcement in the catchment area. Enlargement of buffer zones to include entire small catchments is desirable but may be impracticable in the case of the larger catchments. To reduce the danger that water pollution poses to the nominated property it will be essential to strictly enforce effective water quality management in the catchments of streams and rivers flowing into the protected karst. Untreated waste water from cities, towns and industries should not be allowed to enter waterways that ultimately drain into the South China Karst, especially their core zones. High water quality standards must be set and regular monitoring (as is underway and explained in the nomination) must be undertaken.

In all of the areas nominated in Phase 1 there are clear signs of local human impact. These are most evident in parts of Shilin, less in Wulong and least in Libo, and are even more evident in the buffer zones. Current population levels in the core zones of the nominated areas are 961 residents in Shilin; 5,751 in Libo, and 3,940 in Wulong. Annual population increases of between 1.8-6.7% have been recorded over the past five years. Management plans for each of the sites note that much agricultural land, especially on steep slopes, is being reverted to natural vegetation. In Wulong, the Environmental Restoration Plan calls for relocation of most residents outside the core zones. Economic activities by residents are mostly traditional agriculture with some cash crops (e.g. tobacco), small-scale food processing, and handicrafts. As part of the policy for promotion of “ecological farming”, chemical fertilizer and pesticide use is very limited and discouraged.

This human impact in the South China Karst makes it difficult to find large areas with essentially intact ecosystems both above and below ground. Consequently, the best conservation option is to save the least damaged sites and to actively encourage the existing plans for environmental restoration. This will provide bridges between secondary forest and scattered patches of primary forest, improving wildlife habitat and providing corridors for wildlife movement. In order to promote environmental restoration in nominated areas, special attention is being given by regional authorities to retiring land from agriculture (especially in rocky areas) and to planting shrubs along riparian zones, particularly along river banks. As well as providing habitat, thickly vegetated riparian zones will also be very important for shading streams and treating diffuse runoff from farmed land. The Chinese authorities should be commended on recognizing the impact of water pollution on the property and encouraged in their efforts.

Experience has shown that substantial increases in tourism levels occur at all natural and mixed World Heritage properties in China following their inscription. The large numbers of visitors to Shilin are already a management issue, while in Libo and Wulong tourism numbers are still low. One response to this has been the provision of well-equipped and informative visitor centres in the cluster, and the development of tourism management plans to control the impact of future growth in tourism (e.g. using zoning, monitoring and access control). Measures are also in place to increase indigenous resident and community participation in the tourism sector.

IUCN considers that the nominated property meets the conditions of integrity as required under the Operational Guidelines.

5. ADDITIONAL COMMENTS

5.1 Justification for serial approach

When IUCN evaluates a serial nomination it asks the following questions:

a) What is the justification for the serial approach?

The South China Karst is a coherent region, universally recognized by science as significant, and with a wealth of nationally, regionally and internationally significant karst sites. A serial approach at this stage is justified as the South China Karst is too large (over 500,000 km^2) to identify a single site that would be fully representative of the evolution and diverse variety of its karst landforms. Although the State Party considers each site of the series as worthy of World Heritage listing in its own right, the rationale for the series is that a serial approach appears to ensure that site selection is carried out within a coherent framework and that the landscape diversity across the South China Karst region as a whole is reflected in the nomination.

b) Are the separate components of the property functionally linked?

Although the nominated areas provide a range of separate and contrasting landscapes and landforms, they are united in their tectonic and regional geological setting, and, crucially, they all contribute to the representation of a region that is renowned for its distinctive and exceptionally diverse karst features of global importance. The inclusion of a variety of sites within the series is supposed to demonstrate the range of landscapes and landforms of the South China Karst, and although the separate clusters of the nomination are not connected, they can therefore be considered as functionally linked. Moreover, in Libo and Shilin, each pair of separate core zones is connected by its surrounding buffer zone, providing landscape connectivity at the cluster level. In Wulong, however, such landscape connectivity does not exist among the three separate core zones and buffer zones.

c) Is there an overall management framework for all the components?

This is the first trans-provincial serial property that China has proposed, and a major effort in coordinating the preparation of the nomination was required. As noted in section 4.3 above, there are 20 agencies involved in the management of the sites though the umbrella is provided by the State Ministry of Construction (with assistance from the State Forestry Bureau in Libo). There is some variation in regulations between the three nominated clusters in Phase 1 but a general consistency in management plans and activities does exist. There is no overall South China Karst management agency or administrative framework but once the next phase(s) of the nomination are submitted the need for this will be considered. IUCN considers that there is a need to strengthen the overall coordination of management of the South China Karst as part of any further phase(s) of the nomination, but that there are sufficient arrangements to support the serial nomination of three clusters at the present time.

5.2 Next phases of the nomination

The State Party intends to submit two more phases to complete the nomination of the South China Karst:

- Phase 2 (planned in 2008 or 2009): Yangshuo Karst (Guangxi), Xingyi Karst (Guizhou), Jinfeshan Karst (Chongqing), Mulun Karst (Guangxi); and
- Phase 3 (planned in 2011 or 2012): Zhijin Cave (Guizhou), Fengjie Karst (Chongqing), Xingwen Karst (Sichuan), Nonggang Karst (Guangxi).

IUCN suggests that sites chosen to complete the serial nomination should between them illustrate 1) the various natural features and landforms (above and below ground) that are integral elements of karst in South China; 2) the history of evolution of karst in southern China; and 3) the ongoing natural processes that have led to the development of the physical and biological attributes of the karst. The ecosystem as a whole should be considered, above and below ground, and not just the physical aspects. Noting the concerns regarding Wulong in the current nomination, IUCN considers that further work is required to confirm whether the scale of the serial nomination currently contemplated by the State Party is justified, as IUCN considers that there may be a case for a reduced scale to the future plans with a total of 4-5 clusters being sufficient to present a 'complete' property. The State Party may therefore wish to consider whether the extent of subsequent phases of the entire series could be rationalized into a smaller number of sites and a single phase of nomination rather than two phases. As the South China Karst region extends across the border into Viet Nam, the Chinese authorities have indicated their intentions to will consider transboundary cooperation in future.

6. APPLICATION OF CRITERIA / STATEMENT OF OUTSTANDING UNIVERSAL VALUE

The property has been nominated under all four natural criteria; however each of the three clusters of the serial property has been nominated under different criteria. All have been nominated under criterion (viii), while the Shilin cluster is also nominated under criterion (vii) and the Libo cluster is also nominated under criteria (ix) and (x). However, IUCN considers that the same criteria should be applied across the entire series of sites of serial nominations and has made the following assessment.

IUCN considers that the **Shilin and Libo clusters** of the nominated property meet criteria (vii) and (viii) and proposes the following Statement of Outstanding Universal Value:

South China is unrivalled for the diversity of its karst features and landscapes. The property includes specifically selected areas that are of outstanding universal value to protect and present the best examples of these karst features and landscapes. South China Karst is a coherent serial property comprising two clusters, Libo Karst and Shilin Karst, and each cluster comprises two components.

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

South China Karst represents one of the world's most spectacular examples of humid tropical to sub-tropical karst landscapes. The stone forests of Shilin are considered superlative natural phenomena and the world reference site for this type of feature. The cluster includes the Naigu stone forest occurring on dolomitic limestone and the Suyishan stone forest arising from a lake. Shilin contains a wider range of pinnacle shapes than other karst landscapes with pinnacles, and a higher diversity of shapes and colours that change with different weather and light conditions. The cone and tower karsts of Libo, also considered the world reference site for these types of karsts, form a distinctive and beautiful landscape.

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

Both Shilin and Libo are global reference areas for the karst features and landscapes that they exhibit. Major developments in the stone forests of Shilin occurred over some 270 million years during four major geological time periods from the Permian to present, illustrating the episodic nature of the evolution of these karst features. Libo contains carbonate outcrops of different ages that erosive processes shaped over millions of years into impressive fengcong (cone) and fenglin (tower) karsts. It contains a combination of numerous tall karst peaks, deep dolines, sinking streams and long river caves.

Conditions of Integrity, Protection and Management

The property is well managed, with clear management plans in place and the effective involvement of various stakeholders. There are strong international networks in place to support continued research and management. Continued efforts are required to expand and refine buffer zones to protect upstream catchments, and in particular to ensure the necessary long-term protection and management of the catchments. Traditional management by minority peoples is an important feature of both clusters, and the relationship between karst and the cultural identity and traditions of minority groups including the Yi (Shilin) and the Shui, Yao and Buyi (Libo) requires continued recognition and respect in site management. Potential for further extension of the property requires development of a management framework for effective coordination between the different clusters.

IUCN considers, however, that the **Wulong cluster** of the nominated property does not meet criteria (vii) and (viii) at this time, and that none of the clusters of the nominated property meets criteria (ix) and (x) at this time based on the following assessment.

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

In Wulong, neither Furong cave nor the Tiankeng landscapes appear to meet this criterion, although further consideration of Tiankeng landscapes is anticipated in later stages of the nomination. The three natural rock bridges could be considered as superlative; however in the context of the rather small size of the area, the further consideration needed of Tiankeng landscapes, and the number of other rock arch sites, IUCN considers it would be premature to inscribe them as part of the series at this stage.

IUCN considers that the **Wulong cluster** of the nominated property does not meet this criterion. IUCN acknowledges, however, that the **Wulong cluster**, or parts thereof, might have the potential to meet this criterion.

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

The case for this criterion is not as strong for Wulong as for Shilin and Libo, and at present there are significant questions over the inclusion of parts of this cluster, such as Furong cave, and also the relative values compared to other parts of the South China Karst that are considered by many reviewers to be superior. The features in this area are also rather more specialized than in Libo and Shilin, and there are concerns regarding its integrity due to both the small size of the area and the discontinuous nature of the cluster.

IUCN considers that the **Wulong cluster** of the nominated property does not meet this criterion.

Criterion (ix): Ecological and biological processes

Libo is the only one of the three clusters nominated under this criterion. South China Karst contains an outstanding example of a continental tropical / sub-tropical karst ecosystem that evolved due to climatic and edaphic gradients. For example, the karst forests of Libo demonstrate a progression from evergreen broadleaf forest to evergreen mixed broadleaf-conifer forest. Ecological and biological processes are evident in the adaptation of plants to drought, rocky terrain, and calcium-rich soils. Once the adjacent area to Libo, Mulun Natural Reserve in Guangxi, is nominated in Phase 2 of the nomination considerably more justification could be given to this criterion. Moreover, inasmuch as karst is not just a physical process but a holistic merging of dynamic biological processes, this criterion could well be justified for the South China Karst as a whole if restoration efforts are successful.

IUCN considers that none of the clusters of the nominated property meets this criterion. IUCN considers, however, that the **Libo cluster**, in combination with the future proposed extension to include the Mulun Natural Reserve, has the potential to meet this criterion.

Criterion (x): Biodiversity and threatened species

Libo is the only one of the three clusters nominated under this criterion. Due to its climatic conditions, karst landscapes and altitude, the biotic communities in Libo generally exhibit high diversity and endemism. Some 41 plant species and 48 animal species are endemic to the karst landscapes of Libo, while around 17 species are endemic to karst caves. The karst forests of Libo were also formerly suitable habitats for a number of threatened species, but populations are either non-existent or small and thus no longer considered viable. While Libo's biodiversity compares favourably to other sub-tropical karst regions and is comparable with the forested karst regions of Southeast Asia, it cannot compete with other

more tropical karst regions. Despite the high biodiversity values of the forests of Libo, its karst features and processes are thus the predominant ones that stand out at the global level and are consistent with the values of the other clusters in the nomination.

IUCN considers that none of the clusters of the nominated property meets this criterion.

7. RECOMMENDATIONS

IUCN recommends that the World Heritage Committee **inscribe** the **Shilin and Libo clusters** of the South China Karst, China, on the World Heritage List on the basis of criteria (vii) and (viii).

IUCN recommends that the State Party be requested to consider this as Phase 1 of a larger World Heritage nomination, and to consider whether the extent of subsequent phases of the entire series could be rationalized into a smaller number of sites and a single phase of nomination rather than two phases (see section 5.2). The potential application of criterion (ix) should be considered in relation to the entire series that is eventually proposed.

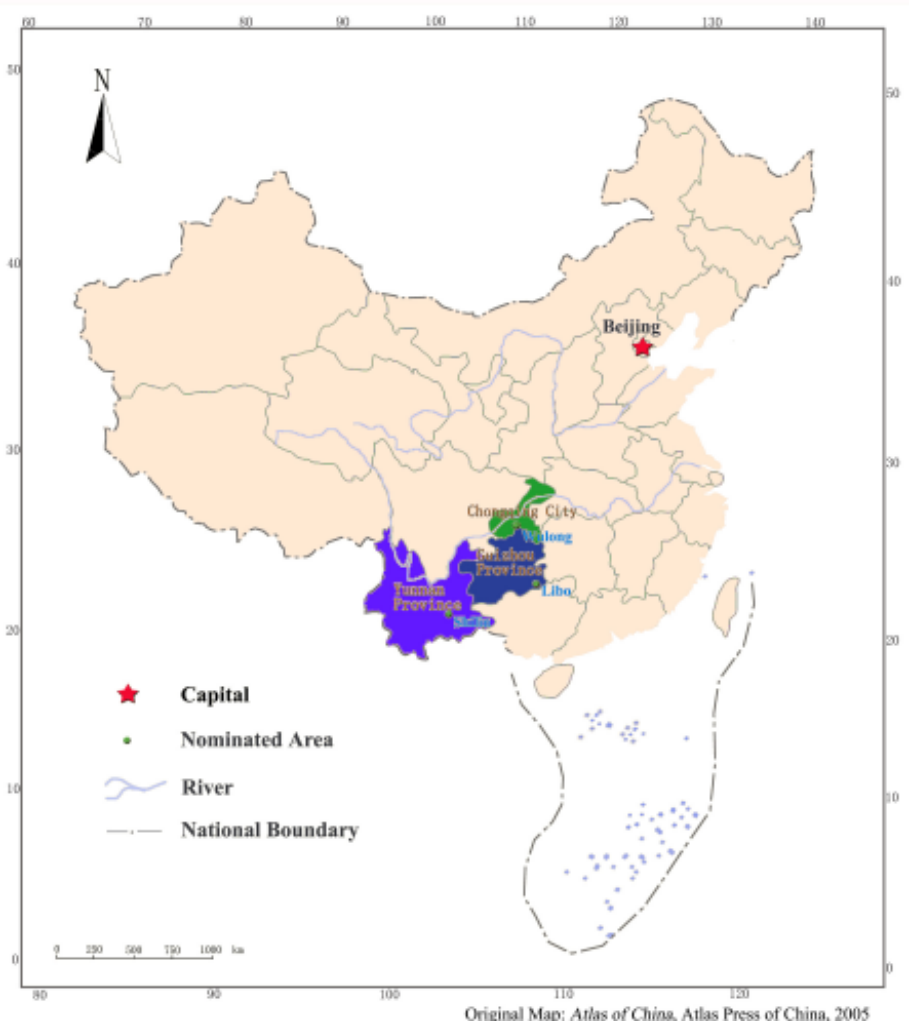
IUCN recommends that the World Heritage Committee **defer** the examination of the nomination of the **Wulong cluster** of the South China Karst, China, to the World Heritage List on the basis of criteria (vii) and (viii) to Phase 2 of the nomination to allow the State Party to further consider whether it is of sufficient significance relative to other future extensions and – if so – to reconsider its boundaries.

IUCN also recommends that the World Heritage Committee urges the State Party to continue its efforts to expand and refine buffer zones to protect catchments upstream of the nominated property, and in particular to ensure that the necessary long-term protection and management of catchments be put in place.

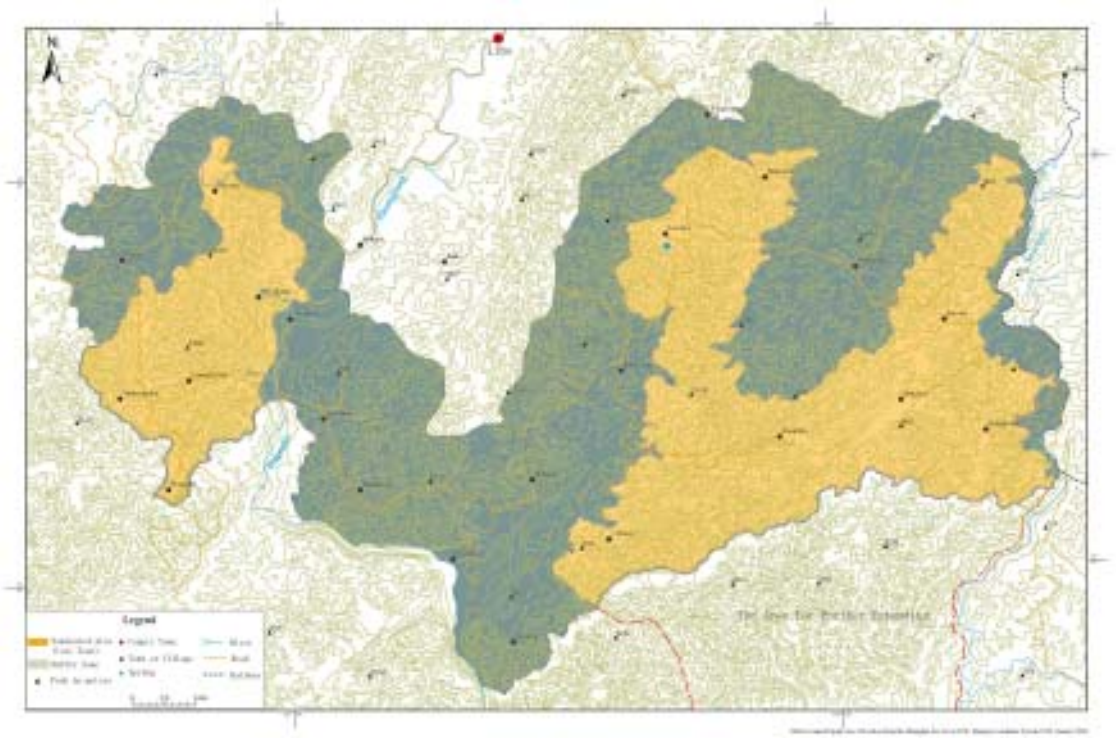
IUCN further recommends that the World Heritage Committee welcomes the recognition of the importance of the meaningful involvement of local people in the management of the nominated property, and requests that particular consideration and attention is given in developing Phase 2 of the nomination to the further involvement of local people and the maintenance of the traditional practices of the indigenous communities concerned.

IUCN finally recommends that the World Heritage Committee welcomes the intention of the State Party of China to discuss transnational aspects of the nomination with the State Party of Viet Nam, and urges the States Parties to ensure that this is considered prior to any further phase of nominations.

Map 1: Location of nominated property

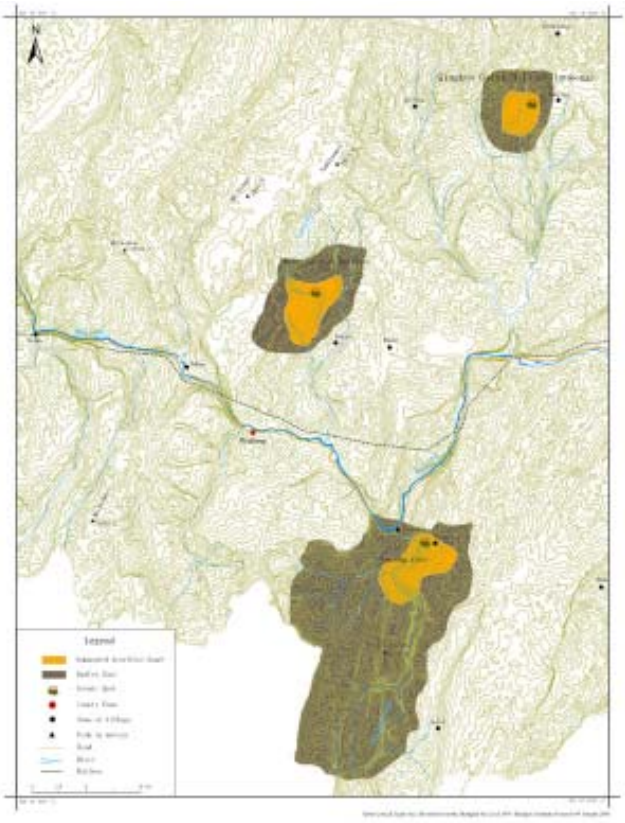


Map 2: Details of the nominated Libo cluster



Map 3: Details of the nominated Shilin cluster

Map 4: Details of the nominated Wulong cluster



ASIA / PACIFIC

JEJU VOLCANIC ISLAND AND LAVA TUBES

REPUBLIC OF KOREA

WORLD HERITAGE NOMINATION – IUCN TECHNICAL EVALUATION

JEJU VOLCANIC ISLAND AND LAVA TUBES (REPUBLIC OF KOREA) – ID No. 1264

1. DOCUMENTATION

i) **Date nomination received by IUCN**: April 2006

ii) **Additional information officially requested from and provided by the State Party**: IUCN requested supplementary information on 1 November 2006 after the IUCN Evaluation Mission. The State Party responses were submitted on 20 November 2006 and 6 December 2006, including a revised comparative analysis, revised management plan and responses to all the issues raised by IUCN.

iii) **UNEP-WCMC Data Sheet**: 1 reference (nomination)

iv) **Additional literature consulted**: Bloom, A.L. (1998). **Geomorphology: a Systematic Analysis of Late Cenozoic Landforms**. Prentice Hall, Upper Saddle River. Forti, P. (2005). **Genetic processes of cave minerals in volcanic environments: An overview**. Journal of Cave and Karst Studies, 67, 1, 3-13. Gray, M. (2003). **Geodiversity: Valuing and Conserving Abiotic Nature.** Wiley, Chichester. Gunn, J. (ed.) (2003). **Encyclopedia of Cave and Karst Science.** Fitzroy Dearborn, New York. IUCN (2005). **Geological World Heritage: A Global Framework**. IUCN. Jeju Provincial Government (2005). **Field Guide for the Jeju Island Biosphere Reserve**. Republic of Korea. Jeju Provincial Government (2005). **Jeju Biosphere Reserve Management Plan**. Republic of Korea. Research Institute of Cultural Assets of Jeju Cultural and Art Foundation (2003). **Report of Academic Project on the Natural Heritage of Jeju Island**. Republic of Korea. Report of the Samcheok International Cave Expo, Samcheok, Korea 2002. Reprints of **"Caves in Jeju Island, Korea"** from the 14th International Congress of Speleology, Athens, Greece 2005. Simkin, T. and Siebert, L. (1994). **Volcanoes of the World**. 2nd Edition, Geoscience Press, Tucson. Smithsonian National Museum of Natural History (2007). **Global Volcanism Program**. Accessed online: www.volcano.si.edu/index.cfm. Son, In-Seok (2005). **The Underground World of Jeju Volcanic Island in Korea**. (ISBN 89-957284-0-X). Woo, Kyung Sik (2005). **Caves: A Wonderful Underground**. Hollym, Seoul.

v) **Consultations**: 10 external reviewers. Extensive consultations were undertaken during the field visit with: representatives of the Korean National Assembly; Cultural Heritage Administration of Korea; Jeju Special Self-Governing Province; Jeju Culture, Tourism and Sports Bureau; Manjanggul District; Hallasan National Park, Research Institute for Mt Halla, Manjanggul Lava Tube Management and Seongsan Ilchulbong Tuff Cone Management; Cave Research Institute of Korea, Korean Institute of Biospeleology, Korean Institute of Geoscience and Mineral Resources, Kangwon National University and Catholic University of Korea; Korean National Commission for UNESCO; Korean UNESCO MAB National Committee; IUCN National Committee for Korea; and Korean conservation NGOs.

vi) **Field visit**: Paul Dingwall, October 2006

vii) **Date of IUCN approval of this report**: April 2007

2. SUMMARY OF NATURAL VALUES

Jeju Island (Jeju-do), located in the Yellow Sea at N 33° 21´, E 126º 32´, is the southernmost territory of the Republic of Korea. Volcanic in origin, the island is elliptical in shape, 183,160 ha in area and rises to an altitude of 1,950 m at the summit of Mt Hallasan, Korea's highest peak. The nominated Jeju Volcanic Island and Lava Tubes property covers a total area of 18,846 ha, or 10.3% of the island. It is a serial property comprising the core zones of three sites, each of which is surrounded by a buffer zone, as shown in Table 1.

In terms of its legal status and management regime the nominated property is equivalent to a mix of IUCN Category I and II protected areas. Hallasan Natural Reserve also forms the core of the Jeju Island Biosphere Reserve, which was established in 2002, covering 83,094 ha of Udvardy's subtropical and temperate rainforest / woodland biome in East Asia.

Jeju Island is a shield volcano about 1.2 million years in age, characterized by a thick sequence of basalt lava flows forming a gently sloping plateau, or shield, surmounted by a trachyte dome. The island originated as underwater hydromagmatic eruptions on the continental shelf, which were then overlain by basalt lavas erupting from about 360

Table 1: Name and size of the nominated core zones and their surrounding buffer zones

Name of the site	Core zone (ha)	Buffer zone (ha)
Hallasan Natural Reserve	9,093.1	7,347.4
Geomunoreum Lava Tube System	330.3	1,906.4
Seongsan Ilchulbong Tuff Cone	51.8	117.0

subsidiary cones, mostly scoria cones with tuff cones on the coast. The basalt flows were tube fed, forming extensive lava tube caves of which 120 are known today.

The Hallasan Natural Reserve comprises a substantial part of the summit area of the primary volcano. The diverse volcanic landscape includes a 1.6 ha lake-filled crater, 550 m in diameter and 108 m deep, a younger (circa 25,000 years in age) intruded trachyte dome, and a series of columnar jointed basalts forming prominent cliffs. The vegetation cover ranges from sub-alpine evergreen coniferous forest, dominated by the endemic Korean fir, to temperate deciduous hardwood forest, in which Mongolian oak predominates. The flora includes some species endemic to Jeju Island and Korea, and species at their northern and southern distributional limits. Most of the island's 20 mammal species (four endemics) inhabit the reserve.

The Geomunoreum Lava Tube System contains five lava tubes in lavas that erupted from the Geomunoreum scoria cone 300,000 to 100,000 years ago. Formed by differential cooling within the lava field, the lava tubes are elongated tubular cave structures varying in length, configuration and composition, as shown in Table 2.

The Seongsan Ilchulbong Tuff Cone is a hydroclastic volcanic feature on the coastal flank of the Jeju volcano. Composed of a mix of breccia, lapilli tuff, stratified tuff and bedded tuff, it was formed by a Surtseyan-type (Icelandic) eruption from a shallow sea bed in the Late Pleistocene Epoch (120,000-40,000 years ago). It is a 179 m high castle-like feature with a bowl-shaped summit crater 570 m in diameter. Wave erosion has exposed the internal sedimentary structures and stratification.

Collectively, the three sites in the nominated serial property are representative of the key landforms that fully illustrate the origin and evolution of a mono-genetic basalt shield volcano at a continental tectonic plate hot spot.

3. COMPARISONS WITH OTHER AREAS

A comprehensive global comparative analysis is presented in the nomination considering both comparable World Heritage properties (inscribed both under criterion (viii) and other criteria), and other comparable sites not included on the World Heritage List.

Most of the world's 10,000 volcanoes are either shield volcanoes formed from lava flows, or stratovolcanoes com-

Table 2: Length, topography and distinctive features of the lava tubes in the Geomunoreum system

Lava tube	Length (m)	Topography and distinctive features
Manjang	7,416	Two-storied cave in single meandering passage up to 30 m high and 23 m wide; diverse series of lava speleothems - stalagtites, stalagmites, 7.6m-high column, flowstone, blisters, helictites, bridges, benches, rafts, striations and ropy lavas. Fauna includes Korea's largest known colony of long-winged bats.
Bengdwi	4,481	Complex labyrinth of irregularly braided caves on several levels: diverse microtopography of lava stalagmites, pillars, bridges, ledges and chambers. Relatively rich cave fauna including endemic Jeju millipede and spider.
Yongcheon	2,470	Single passage, 1.5-20 m high and 7-15 m wide with arched ceiling and vertical walls; diverse lava features - stalactites, shelves, terraces, rolls, falls, wall and ceiling pockets; diverse array of secondary carbonate speleothems, originating from solution of overlying carbonate sand dunes, including stalactites, stalagmites, pillars, cave corals, cave pearls, curtains, flowstone, and rimstone pools.
Gimnyeong	705	S-shaped passage in three parts with openings; wide variety of tube structures - lava stalactites, shelves and falls, cave corals and carbonate sediments.
Dangcheomul	110	Single tube, 0.3-2.7 m high and 5.5-18.4 m wide. Lava features include stalactites, helictites, grooved and ropy lava and gutters. Spectacular display of secondary carbonate speleothems, many of them formed as coatings around tree roots and irregularly shaped.

posed of a mix of explosive material and lavas. Shield volcanoes are mostly composed of basalt and are dome-shaped, such as those comprising the Hawaiian Islands. Stratovolcanoes are usually composed of andesite and tend to have a more classical steep cone shape, such as Mt Fuji in Japan. Of the two types, shield volcanoes are much less common, making up only 10% of the 1,500 volcanoes that have erupted in the past 10,000 years. The greatest majority of shield volcanoes are formed on the ocean floor, in island arcs or in other deep subduction zones of the earth's crust. Shield volcanoes located on continental tectonic plates are relatively rare.

Jeju Island is an example of a large shield volcano built on a continental plate, and can be distinguished as unusual in its formation over a mantle plume (hot spot) in a marine environment on a stable continental plate margin. Among the world's other major shield volcanoes: the Hawaiian Islands are oceanic hot spot volcanoes; Iceland and the Galapagos Islands are oceanic plate margin volcanoes; the Kamchatka Peninsula has island arc volcanoes; and those in continental Africa, America and the Red Sea region are non-marine volcanoes. In its tectonic and environmental setting the Jeju volcano is therefore globally rare. This technical level of distinction is clearly of significance to volcanology, but does not necessarily provide sufficient justification for a claim of outstanding universal value.

Tuff cones such as Seongsan Ilchulbong are relatively common features of basaltic volcanoes, and – taken alone – are not a sufficiently significant feature to provide sufficient justification for a claim of outstanding universal value. They are a type of volcano formed by violent explosive eruption where magma interacts with water. Jeju Island has many such (phreatomagmatic) volcanoes and has become internationally important for the study of them. Ilchulbong is distinctive because almost all of its outer structures have been eroded by wave action leaving cliffed sections that expose its internal structures and stratification. This enables the eruptive process be understood in ways not possible elsewhere. The type locality, Surtsey Island in Iceland, does not demonstrate these features because it is very young (40 years old) and not yet dissected to expose its core. Nor does the well-known Diamond Head tuff cone in Hawaii have cross-section exposures. Other world-important tuff cones in Japan, Kenya, Mexico and the Philippines are still active, while those in the USA, Saudi Arabia and Italy have suffered from substantial natural or human-induced degradation.

The most significant and distinctive feature of Jeju Island, as emphasized by the majority of reviewers, is the lava tube system. Such tubes form where, on cessation of vent activity, parts of the liquid lava continue to drain downslope leaving elongated voids or lava tube caves. Such caves are like those in limestone karst in scale, shape and internal decoration, but they are completely different in origin. Lava tube caves are known from basaltic terrain in most of the world's volcanic regions (they have also been observed on the Moon and planets such as Mars, Mercury and Venus). The lava tube caves of the Geomunoreum system are, however, regarded as internationally important due to their length, massive volume, intricate passage configuration, well preserved internal lava features, abundant and spectacular secondary carbonate formations, ease of access, and their scientific and educational values. There are other lava caves in the world that are longer and equally voluminous, but they are either unprotected, inaccessible, damaged or not as well formed or preserved as those of the Geomunoreum system. For example, the much celebrated Kazamura cave on Kilauea volcano in Hawaii is the world's longest at 65 km, but it is in private hands and undergoing real estate development, and parts of it are used for waste disposal. It is not included within the existing Hawaii Volcanoes National Park World Heritage property. The 7.4 km long Manjang cave in the nominated property is one of only 12 known lava tube caves in the world longer than 7 km (the longer caves are located in Hawaii, Spain (Tenerife and Lanzarote), Kenya (Chyulu)). Together with its related Gimnyeong and Yongcheon caves it forms a single cave passage more than 13 km long.

The other feature making the Geomunoreum system globally significant and distinctive is the presence of carbonate deposits and decorations. Very small deposits of calcite are common in lava tube caves, and are more significantly developed as speleothems in Duck Creek cave in Utah, USA. However, in abundance, density and diversity they are far less impressive than those of Jeju's Yoncheong and Dangcheomul caves, and the scale of these decorations within the lava caves of Jeju Island far exceeds any other comparable examples. The nomination is supported by the Commission on Volcanic Caves of the International Union of Speleology – the world's most authoritative scientific body on volcanic caves, which regards Jeju's lava caves as being of the highest international ranking. Further, a 1995 global review regarded Dangcheomul cave as the "best display of different calcite speleothems within a volcanic cave." Yongcheong cave has been discovered subsequently and is of equivalent value.

At least 26 of the 830 properties on the World Heritage List are located in volcanic terrain. Many of these were inscribed, either primarily of secondarily, for their biological or other values, including cultural values. Thirteen properties have been inscribed on the basis of their volcanic features and processes including Yellowstone National Park (USA), Volcanoes of Kamchatka (Russian Federation), Virunga National Park (Democratic Republic of the Congo), Tongariro National Park (New Zealand), Sangay National Park (Ecuador), Hawaii Volcanoes National Park (USA), Heard and McDonald Islands (Australia), Galapagos Islands (Ecuador) and Aeolian Islands (Italy). The volcanoes of Virunga National Park are the most comparable of existing World Heritage properties, being shield volcanoes located on a continental plate; however their origin is related to rifting of the African continent, not to mantle plume (hot spot) activity like Jeju Island. Lava tubes are present in Hawaii Volcanoes National Park, but none ranks in overall size, quality and ease of access with those in the nominated property. The smaller shield volcanoes of Kamchatka and the Galapagos Islands do not display the range of subsidiary landforms, including lava tube caves. The few known lava tube caves in the Galapagos Islands and Heard and MacDonald Islands are relatively short and less significant. Lava caves are also known from some cultural World Heritage properties in volcanic terrain such as Rapa Nui / Easter Island (Chile), where they have not been mapped or described, and from the lavas outside the World Heritage property of Pico Island in the Azores (Portugal).

4. INTEGRITY

4.1 Legal status

There is a strong statutory and regulatory basis providing for strict legal protection of all sites in the nominated property. The principal statute applying is the Cultural Properties Protection Act administered by the central government Cultural Properties Administration. Under this legislation the core zones within the property are designated as Natural Monument (except one cave which is a Jeju Monument), which provides for absolute protection. Buffer zones allow for some very restricted development provided there is no impact on the values of the core zones. Hallasan Natural Reserve was declared as a National Park in 1970, under the Natural Parks Act, and the Highlands Management Act, for sustainable forest conservation and use, also applies to this area. At the provincial level, the Jeju Provincial Cultural Heritage Protection Ordinance and the Jeju Province Regulation on Promotion for Inscription on the World Heritage List contain the necessary provisions for management planning and operations, and for establishment of a World Heritage Promotions Committee. If Jeju is inscribed on the World Heritage List then it is intended to pass, under the Cultural Properties Protection Act, a Conservation and Management of World Natural Heritage Ordinance allowing for protection, management and promotion of the World Heritage property. Management regulations include Guidelines for Conservation and Management of Natural Caves, Guidelines for Conservation and Management of Natural Reserves and Rules for Facilities Inside Parks.

Land tenure overall in the nominated property is 84% (15,785 ha) government owned and 16% (3,060 ha) privately owned, virtually all of the latter being in the Geomunoreum system. Private lands in the core zones will be progressively purchased in the period 2006 to 2013, with an investment of US$ 12.5 million, 70% of which will come from central government.

4.2 Boundaries

The lower boundary of the Mt Hallasan site, at 800-1,300 m above sea level, follows the legal protected area boundary. Its core and buffer zones encompass a large area of state-owned land (8% of Jeju Island), including the summit and upper slopes of the volcano and substantial representation of the local biota. The boundary of the core zone at Ilchulbong essentially covers the terrestrial part of the tuff cone, while the buffer zone extends as much as 200 m landward and 500 m seaward from the core zone. For the Geomunoreum system, the core zone boundary is 50 m each side of the lava tubes, and the buffer zone extends 500 m beyond the core zone, sufficient to isolate the lava tubes from any damaging external influences. Determined by a mix of tenure and natural resource considerations, the boundaries of the nominated property overall include all key natural values and present no problems for site management or integrity.

A number of reviewers noted the potential for further areas to be included within the nominated property, including a greater range of tuff cones and a wider range of the lava caves. IUCN understands that during preparation of the nomination the boundaries went through several stages – at one stage the entire Jeju Island was included, then this was reduced to a large wedge of the island, and eventually the proposal was limited to the three sites in the final serial nomination. The reasons for the restricted number of sites were primarily considerations of management integrity, including land tenure, attitude of owners and condition of the site. All the potential additions present some management problems at present. For example, Bilemot Cave, which is the longest cave on the island with a magnificent three-dimensional structure, is protected by law but is substantially under private ownership and has suffered from damage in the past. Three other caves at Hyeopjae – Ssangnyong, Hwanggeum and Socheongul – are in Hallim Park whose private owners are not currently sympathetic to World Heritage inscription. They are also lime-decorated lava tubes, but the consensus of expert opinion is that they are not as spectacular as the caves in the nominated Geomunoreum system. Other volcanic sites and features mentioned as having potential for future addition to the nominated property are the scoria cones – Sangumburi, Saraoreum and Eoseungsaengak; the tuff cones – Songaksan and Dangsanbong; and the volcanic dome of Mt Sanbangsan.

In summary, the three areas provide sufficient recognition of the key features of the Jeju volcanic system that is the basis of the present nomination. It can, however, be regarded as a minimum solution and capable of extension. IUCN recommends that the State Party undertakes an active investigation of the potential for future addition of further sites in an extended serial property.

Other reviewers noted that the nominated property may have significant biodiversity values. IUCN considers these to be of local and regional significance, and they are not rated as being of outstanding universal value. Most of the important flora are in the Hallasan Natural Reserve, and include species endemic to Jeju Island and Korea, and species at their northern and southern distributional limits. Four of the 20 species of mammals and 24 of the 1,600 species of insects in the park are Jeju endemics. Some rare and unusual animals such as cave spiders are restricted to the lava tube habitats. These values are recognised within the Jeju Island Biosphere Reserve, and their protection would be further enhanced if managed within the context of a World Heritage property. In terms of its biogeographical representation, the Hallasan Natural Reserve is however less significant than protected areas on the continent and in Japan.

4.3 Management

Management policies and provisions for the nominated property have been assessed as exemplary and equivalent to international standards of practice for protected areas. The Jeju World Natural Heritage Management Plan provides for consolidated and integrated conservation management of the property's three sites – Hallasan Natural Reserve, Geomunoreum Lava Tube System and Seongsan Ilchulbong Tuff Cone. This government-approved plan has its statutory basis in the Jeju Provincial Ordinance and is legally binding on the Korean national and provincial governments and all administering authorities. During its 3-year preparation, the plan was comprehensively consulted and it reflects the consensus view of national and local institutions and communities. It spans the 5-year period until 2010 and is renewable following revision at that time. There is also a management plan for

the Jeju Biosphere Reserve, focused on the Hallasan Natural Reserve, which is operated under the direction of the Jeju Provincial Government.

The administrative framework for the property is comprehensive at both national and local levels. There are five major management and advisory agencies:

- Cultural Heritage Administration of Korea – the country's lead agency for conservation management of heritage properties has the primary role for legal, policy and regulatory functions associated with the property.
- Jeju Provincial Government – oversees and controls conservation of the property in accordance with the relevant laws.
- Jeju World Natural Heritage Management Committee – a representative body that has a co-ordinating function for developing and promoting management strategies and plans, monitoring and research, and training and education.
- Scientific Advisory Committee – with members drawn from the Korean and Jeju Cultural Properties Committee and from research institutions.
- Jeju World Natural Heritage Local Committee – a body representative of local government, NGOs, museums, universities, local community groups etc. for developing management priorities, processes and recommendations in the execution of site management and development plans.

Day-to-day management is conducted through the Management Service established at the three sites within the property, each of which has in-house management units devoted respectively to planning, public relations and education; resource conservation and management; and visitor facilities management. These units are replicated in the Heritage Division of the Jeju Provincial Government. Current numbers of permanently employed staff and projected numbers in 2010 at the sites are: Hallasan Natural Reserve 23 current (50 projected); Geomunoreum system 13 (30); and Ilchulbong 8 (12). Each office also hires numerous heritage guides, interpreters and supporters, and encourages local residents to volunteer for roles in heritage management and the education of visitors and residents. Substantial increases in numbers of volunteers and supporters are planned over the next five years.

The overall budget for management of the property in 2006 is approximately US$ 10 million. A substantial increase in funding is projected over the next five years, providing for an estimated total investment budget of US$ 76.5 million, which allocates US$ 16.7 million to Hallasan Natural Reserve, US$ 17.5 million to Geomunoreum system, US$ 11.2 million to Ilchulbong and US$ 31.1 million to a common fund.

Visitors to Hallasan Natural Reserve exceeded 700,000 in 2005 and are projected to reach 1 million in 2007. Manjang cave received 400,000 visitors in 2005. That year a total of 1.2 million visited Ilchulbong, which is the most popular visitor attraction on Jeju Island, but most come here for scenic viewing and are readily controlled on a single trail system that is under camera surveillance. Although visitor numbers to the nominated property are already substantial and increasing rapidly, with planned improvements in facilities and increased staffing and funding, the considerable investment in visitor management appears adequate to maintain visitation within the carrying capacity of the nominated areas. IUCN notes that this is the most significant challenge for the State Party in managing the property, and it will be essential that capacity and funding is retained in the long term.

A new visitor centre has been built at Mt Hallasan, which on completion in 2008 will provide 1,500 m² of floor space for exhibitions, conferences and management offices. Construction of new visitor centres at Manjang cave and Ilchulbong will begin in 2008. There are also plans to construct a special Jeju World Natural Heritage Centre. IUCN suggests the State Party might wish to review whether it is necessary to build this exhibition centre, as the basis for it already exists in the Jeju Stone Park on the outskirts of Jeju City, devoted to displaying and explaining the geology of Jeju Island. The park, which is already operating to the highest world class standard, is not yet completed and it could readily accommodate exhibitions to highlight the World Heritage property.

Each site has scientific services provided by advisory boards and the quasi-autonomous Research Institute for Mt Halla. Considerable research has already been undertaken, and a comprehensive 5-year research plan exists for each site, with an overall budget of approximately US$ 1.2 million. Site monitoring, which is particularly sophisticated for the lava tubes, is based on a wide range of atmospheric, hydrologic, marine, geologic, biological and visitor impact indicators, and is supported by an estimated budget of US$ 350,000 per year.

4.4 Threats and human use

There are no significant external threats to the nominated property at present or in the foreseeable future. Within the property some extensive rehabilitation and restoration has been undertaken to remove or ameliorate detrimental elements and avoid potential impacts on the property's values. Many roads have been removed from core zones, or closed and/or converted into trails. Some roads have been upgraded and new improved roading is planned and budgeted, especially to minimize any vibration from traffic that might affect the lava tubes. All telegraph poles and transmission towers are being removed. Old and out-dated facilities have been removed, including a large hotel which was intruding on the natural scenery at Ilchulbong. At Mt Hallasan, US$ 5.4 million has been invested to date in repairing 42 km of trails, and by 2006 US$ 1.0 million had been spent on trail improvement at Ilchulbong. Steel pathways have been constructed over sensitive cave floor surfaces in Manjang cave and a special lighting system installed to prevent growth of lampenflora (green pollution). To avoid damage and vandalism, access to all lava tube caves, except part of Manjang cave, is prohibited without special permission for research and monitoring, and cave entrances are guarded by steel gates or covers, some with fitted alarm systems. There are no people living in the core zones of the property and in 2004 there were only 433 permanent residents in the buffer zones, primarily on small farm-holdings in the Geomunoreum system.

The potential for impacts of fertilizer seepage into the lava tube caves was raised during the field visit. There are no

known impacts at present and only about 15% of the land above the caves is in private ownership and not all this is being used for gardening and farming purposes. The private lands will all be progressively purchased up to 2013, retired from such uses and restored to natural vegetation cover – so the problem is likely to be a short-term one only. Meanwhile, fertiliser runoff impacts will be included in the intensive monitoring programme within the caves. There is a need to implement a programme to restore natural vegetation cover on formerly farmed or otherwise cleared areas.

IUCN considers that the nominated property meets the conditions of integrity as required under the Operational Guidelines.

5. ADDITIONAL COMMENTS

There is a high degree of public awareness of the World Heritage programme and support for the Jeju nomination within Jeju Province. A survey of Jeju school pupils and parents and of visitors to heritage parks, in September 2005, revealed that 50% of people were aware of the World Heritage Convention and the intention to nominate a World Heritage property. Some 85% supported the nomination and 27% offered voluntary support to management, while only 12% expressed some concerns over the possibility of stricter regulations. This result reflects in part the efforts of a national World Heritage awareness-raising and promotional campaign in recent years. The campaign was run by a 25-member promotions committee, chaired by a former Prime Minister and including government officials, ambassadors, media presidents, and business people including tourism operators. It provides an excellent example of the involvement of civil society in the World Heritage Convention.

5.1 Justification for serial approach

When IUCN evaluates a serial nomination it asks the following questions:

a) What is the justification for the serial approach?

The serial approach to the nomination is justified in that it identifies distinctive features that correspond to the different stages of the evolution of Mt Halla and the Jeju volcanic system. A serial approach can be justified as a practical solution to the selection of different features on separate parts of Jeju Island to achieve the objective of demonstrating the key features of the system. As noted above there is some debate regarding the possibility of including further areas in the series; however, IUCN concludes that the series selected is a sufficient initial selection to demonstrate the key features of the Jeju volcanic system.

b) Are the separate components of the property functionally linked?

The nomination focuses on three key inter-related elements of volcanism on Jeju Island: the central vent of the primary volcano, at the summit area of Mt Halla; the best example of a tuff cone, Seongsan Ilchulbong, illustrative of emergent volcanic activity in a marine setting; and the most outstanding representative of the hundreds of secondary volcanic vents with its associated lava flows and lava tube caves formed in the massive lava fields during shield formation, the Geomunoreum scoria cone and lava tube system. In combination, these sites fully reveal the origin and evolutionary history of the Jeju volcano, and form a single coherent and functionally linked series.

c) Is there an overall management framework for all the components?

A single management plan and administrative framework has been developed for the nominated serial property, covering all of its elements on a consistent and integrated basis.

5.2 Nominations of volcanic properties

IUCN notes that volcanic systems are relatively well represented on the World Heritage List, including several properties whose inscription was justified on the basis of arguments that are considered by a number of experts to be rather narrow. There are a large number of volcanoes worldwide and at a detailed level every one of these can assert that it is in some way unique.

In 1996 IUCN noted that the World Heritage Committee had already asked “how many volcanoes should there be on the World Heritage List?” In the interests of maintaining the credibility of the World Heritage List, IUCN considers that there is increasingly limited scope to recommend further volcanic nominations for inclusion on the World Heritage List. In particular, IUCN recommends that the World Heritage Committee should consider indicating clearly to States Parties that further volcanic nominations should only be promoted where:

- There is a very clear basis for identifying major and distinctive features of outstanding universal value that has been verified by a thorough global comparative analysis;
- The basis for claiming outstanding universal value is a significant and distinctive feature of demonstrable and widespread significance, and not one of many narrow and specialized features that are exhibited within volcanic terrains.

IUCN recommends that States Parties considering volcanic nominations carry out an initial global comparative analysis ***prior*** to proceeding with the development of a full nomination, in order to minimize the possibilities of promoting a nomination that will not meet the requirements of the World Heritage Convention, including those concerning the conditions of integrity.

IUCN considers that the present nomination is a good example that conforms to these principles, but also is at the limit of acceptability in terms of the narrow and specialized nature of some of the features identified.

6. APPLICATION OF CRITERIA / STATEMENT OF OUTSTANDING UNIVERSAL VALUE

The property has been nominated under criteria (vii) and (viii). IUCN considers that the nominated property meets these criteria and proposes the following Statement of Outstanding Universal Value:

Jeju Volcanic Island and Lava Tubes is a coherent serial property comprising three components. The unequalled quality of the Geomunoreum lava tube system and the exhibition of diverse and accessible volcanic features in the other two components demonstrate a distinctive and important contribution to the understanding of global volcanism.

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

The Geomunoreum lava tube system, which is regarded as the finest such cave system in the world, has an outstanding visual impact even for those experienced with such phenomena. It displays the unique spectacle of multi-coloured carbonate decorations adorning the roofs and floors, and dark-coloured lava walls, partially covered by a mural of carbonate deposits. The fortress-like Seongsan Ilchulbong tuff cone, with its walls rising out of the ocean, is a dramatic landscape feature, and Mount Hallasan, with its array of textures and colours through the changing seasons, waterfalls, display of multi-shaped rock formations and columnar-jointed cliffs, and the towering summit with its lake-filled crater, further adds to the scenic and aesthetic appeal.

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

Jeju has a distinctive value as one of the few large shield volcanoes in the world built over a hot spot on a stationary continental crust plate. It is distinguished by the Geomunoreum lava tube system, which is the most impressive and significant series of protected lava tube caves in the world and includes a spectacular array of secondary carbonate speleothems (stalactites and other decorations), with an abundance and diversity unknown elsewhere within a lava cave. The Seongsan Ilchulbong tuff cone has exceptional exposures of its structural and sedimentological characteristics, making it a world-class location for understanding Surtseyan-type volcanic eruptions.

Conditions of Integrity, Protection and Management

The property is well managed and resourced, with a management plan in place for the period 2006-2010 and resources for its implementation. Key management issues include avoiding potential agricultural impact on the underground environment and managing the high number of visitors to the property. There is potential for further extension of the property to include other significant lava tube systems and volcanic features of Jeju.

7. RECOMMENDATIONS

IUCN recommends that the World Heritage Committee **inscribes** the Jeju Volcanic Island and Lava Tubes, Republic of Korea, on the World Heritage List on the basis of criteria (vii) and (viii).

IUCN recommends that the World Heritage Committee commends the State Party for the quality of the comparative studies carried out in support of the nomination and for obtaining widespread support and commitment for the nomination from all key stakeholders including international expert organisations.

The World Heritage Committee may further commend the State Party for establishing the Jeju Biosphere Reserve under the UNESCO MAB Programme; and urge the State Party to manage the World Heritage property in close collaboration with this Biosphere Reserve.

IUCN also recommends that the State Party be requested to:

a) Complete at the earliest opportunity the purchase of private land within the nominated property;

b) Ensure effective management of the high number of visitors to the nominated property and any commercial activities associated with it;

c) Implement strict measures in the buffer zone of the Geomunoreum Lava Tube System to prevent agricultural practices on the surface impacting the underground environment;

d) Give further consideration and attention to the management of the significant volcanic features in the wider area of Jeju, and to the management of the biodiversity values of Jeju; and

e) Consider the potential for extension of the nominated property to include other significant lava tube systems and volcanic features on Jeju.

Finally, and in the interests of maintaining the credibility of the World Heritage List, IUCN recommends that the World Heritage Committee notes that volcanic systems are relatively well represented on the World Heritage List and that there is increasingly limited potential for further inscriptions of volcanic sites on the World Heritage List. The Committee may therefore recommend States Parties considering further nominations of volcanic sites to consider the principles suggested in section 5.2 of this IUCN evaluation.

Map 1: Location and boundaries of nominated property

ASIA / PACIFIC

BA BE NATIONAL PARK

VIET NAM

WORLD HERITAGE NOMINATION – IUCN TECHNICAL EVALUATION

BA BE NATIONAL PARK (VIET NAM) – ID No. 1249

1. DOCUMENTATION

i) **Date nomination received by IUCN:** April 2006

ii) **Additional information officially requested from and provided by the State Party:** IUCN requested supplementary information on 27 September 2006 before the IUCN Evaluation Mission and on 31 October 2006 after the IUCN Evaluation Mission. The State Party response was submitted on 28 November 2006, including a revised nomination and responses to the issues raised by IUCN.

iii) **UNEP-WCMC Data Sheet:** 2 references (including nomination)

iv) **Additional Literature Consulted:** IUCN (2005). **Geological World Heritage: A Global Framework.** IUCN. Le Trong Trai et al. (2004**). Biodiversity Report on the Ba Be / Na Hang Conservation Complex including Ba Be National Park, Na Hang Nature Reserve, and South Xuan Lac Species and Habitat Conservation Area.** PARC Project, Hanoi. Various other documentation from the **Creating Protected Areas for Resource Conservation Using Landscape Ecology (PARC)** Project.

v) **Consultations:** 9 external reviewers. Extensive consultations were undertaken during the field visit with: representatives of the State Party at Ministerial, Provincial, District and Commune level; the management authorities of Ba Be National Park; community members living in the core area of the nominated property; and national experts on geology, biodiversity and other conservation matters.

vi) **Field visit:** Tim Badman and Elery Hamilton-Smith, October 2006

vii) **Date of IUCN approval of this report:** April 2007

2. SUMMARY OF NATURAL VALUES

The nominated property, Ba Be National Park (BBNP), is located in Bac Kan Province in the northern part of Viet Nam, 254 km north of the capital, Hanoi. It comprises an area of 10,048 ha. The proposed buffer zone for the nominated property encompasses an area of 34,702 ha surrounding the core area (and lies partly in the adjacent Tuyen Quang Province).

BBNP is located within a mountainous forested karst landscape (up to 900-1000 m above sea level), and is centred on Ba Be Lake, the largest natural freshwater lake in Viet Nam, with a total circumference of 22 km and a surface area of about 450 ha. The area has a long and complex geological history dating back to Archaean times. The rocks in the area mainly formed in the Devonian period (408-387 million years ago), when limestones were laid down in a tectonic depression in the area that is now BBNP, and were subsequently altered to dolomite. Uplift of the limestone block took place from 65 million years ago until the present, with seven stages of uplift recognised within the region, during which time caves and karst formed through dissolution of the limestone. BBNP is noted for its location at the intersection of the four major fault systems that have developed in the northern part of Viet Nam.

The nomination emphasises a range of geomorphological features, highlighting the diversity of karst and non-karst landforms. The centrepiece is Ba Be Lake formed about 10,000 years ago following rockfalls, which blocked the water's exit and now form the 53 m high Dau Dang waterfall, lying within the Nang River Canyon. The lake flooded the pre-existing karst landscape, and a number of small karst islands emerge from its waters. A diversity of different karst features are found throughout BBNP, and within the buffer zone. Amongst these are caves developed at a number of different levels including the navigable Dong Puong cave that marks the entrance to the Nang River Canyon.

According to Udvardy's classification, BBNP lies within the Indochinese Rainforest Biogeographic Province of the Indomalayan Realm, an area which encompasses northern Viet Nam, southern China, Lao P.D.R., Cambodia, northern Thailand and parts of Myanmar. In terms of its biodiversity, BBNP forms part of an area which has been termed the Ba Be / Na Hang Conservation Complex, based around BBNP and the nearby Na Hang Nature Reserve (NHNR). In general, the topography of the Ba Be / Na Hang Conservation Complex is characterised by steep limestone hills, interspersed with non-limestone areas of more gently undulating topography. This area supports significant levels of botanical diversity and the global populations of three threatened primates including the Tonkin Snub-nosed

Monkey (*Pygathrix avunculus*) and Francois' Langur (*Semnopithecus francoisi francoisi*), although the former is only present in NHNR. The *Biodiversity Action Plan for Viet Nam* lists the Ba Be / Na Hang Conservation Complex among the 12 highest priority sites for biodiversity conservation in the country.

Around 75% of BBNP is forested; over 40% of the area is primary moist evergreen forest on limestone, whilst the remaining forest has been degraded due to past human activities. The park is rich in biodiversity, with a number of threatened species and significant levels of endemism. The nomination reports 1,268 species of plants (21 globally and 37 nationally threatened), and 470 species of vertebrates (26 globally and 51 nationally threatened). Within the vertebrate fauna surveys have inventoried some 81 mammal species; 234 bird species (accounting for 28% of the total bird species in Viet Nam); 48 species of reptiles and amphibians; and 107 species of fish. Specific investigation of the park's butterfly diversity revealed 466 species comprising over 50% of the total of butterfly species known in Viet Nam with 20 species and subspecies new to science. The diversity of fish in Ba Be Lake, 106 species, is the richest of any natural lake in Viet Nam.

However, the wider Ba Be / Na Hang Conservation Complex, which was surveyed in considerable depth as part of the recent Creating Protected Areas for Resource Conservation Using Landscape Ecology (PARC) Project (see Le Trong Trai et al. 2004), contains different and complementary values of equivalent or greater significance than those in the nominated property alone.

BBNP is inhabited by native people from the Tay (56.9%), H'Mong (37.5%), Dao (5.4%) and Kinh (0.2%) ethnic groups. 3,730 people live in the core zone – 44% are Tay people who live around the lake and river shore, and 54% are H'Mong people who live in the mountainous areas. The Tay people traditionally live in stilt houses, and the "Doc Moc", a timber canoe, is still used by them to travel on the lake. Sustainable economic development is a key objective of park management, and in recent years a road was constructed to link the communities around the south of the Lake, whilst mains electricity has also been connected to the villages in this area. A further 15,984 people live in the buffer zone.

3. COMPARISONS WITH OTHER AREAS

Ba Be is an attractive landscape and certainly warrants its national status within Viet Nam. However, in relation to its aesthetic values, a comparison with other World Heritage properties does not indicate that its landscape values are of outstanding universal value. Within Viet Nam, the site does not have the iconic status of the Ha Long Bay World Heritage property, and although there are important local traditions and some songs, legends and poetry that are based on its landscape there is no evidence that the recognition of BBNP has been significantly more than national. The natural phenomena within BBNP are of a scale and significance that is equivalent to the values that are recognised in many national parks, but do not have the distinctive scale, significance or global recognition that sets them apart.

BBNP clearly does have important earth science values, and it is in a geological setting that contributes to the story of regional geology beyond national level. There are, however, already nine World Heritage properties that have been inscribed on the basis of their karst features, whilst a substantial number of other properties also include significant karst features. In the tropics and subtropics, the closest similar karst landscapes on the World Heritage List are Ha Long Bay and Phong Nha-Ke Bang National Park, both in Viet Nam, the Dong Phayayen-Khao Yai Forest Complex and Thung Yai-Huai Kha Khaeng Wildlife Sanctuaries, both in Thailand, and Gunung Mulu National Park in Malaysia. The Puerto Princesa Subterranean River National Park in the Philippines is also a notable karst site but is largely an underground estuary. In the temperate zone, similar karst landscapes are the Juizhaigou, Huanglong and Wulingyuan Scenic and Historic Interest Areas in China; the Canadian Rocky Mountain Parks and Nahanni National Park in Canada; and in Europe, Plitvice Lakes National Park in Croatia, Skocjan Caves in Slovenia, Durmitor National Park in Montenegro, Pirin National Park in Bulgaria. The vast outstanding cave complexes of Carlsbad and Mammoth in the U.S.A. and Aggtelek Karst and Slovak Karst in Hungary and Slovakia have related forms but are barely comparable, especially since the Ba Be caves are not completely described in the nomination.

IUCN notes that BBNP is smaller than most other areas that have been inscribed as karst sites, with the exception of Skocjan. IUCN considers that the nomination does not demonstrate the distinctive values of previous karst site nominations, nor is there the level of past study or scientific interest that could demonstrate its outstanding universal value. The most comparable sites of tropical karst, Phong Nha-Ke Bang and Gunung Mulu are both much larger than BBNP and appear to demonstrate a much greater diversity and scale of karstic features. From virtually any perspective, the most comparable sites are contained in the nomination of the South China Karst (China) which is also currently under consideration by the World Heritage Committee. These sites have very similar ecological characteristics and also have much more diverse and distinctive karst landscapes.

Many of the features demonstrated in BBNP, such as stepped landscapes or river gorges, are found in many other locations around the world. The nominated property is important in demonstrating crustal collision zone geomorphology features comparable to a number of other sites, however, such values are too narrow to be considered an adequate basis for outstanding universal value, and even taking these as a basis of comparison, such features are demonstrated more completely at the Jenolan Caves in the Greater Blue Mountains World Heritage property in Australia. Ba Be Lake appears to be the most distinctive natural feature of BBNP in terms of size and scale at the national level – being the largest freshwater lake in Viet Nam. However, the high lakes of the Andes, Rockies and Pyrenees, with a diversity of scale ranging from much smaller to much larger all diminish the distinctiveness claimed for Ba Be Lake at a global level. The great Lake Titicaca of the Andes is much larger, being 8,372 square kilometres in area and with a shoreline of 1,125 km. At the same time, it has a high level of biodiversity.

Regarding biodiversity values it is noted that BBNP is in the same Indochinese Rainforest Biogeographic Province as Phong Nha-Ke Bang and Thung Yai-Huai Kha Khaeng. The geological history and biodiversity of Phong Nha are of equal interest and richness to BBNP but its complex of cave systems is far more extensive and various than the 20 caves in Ba Be. The size, scenery, topographic and biotic richness of Thung Yai is also superior. To Ba Be's 470 recorded vertebrate species, Thung Yai has 772, and Dong Phayayen has 800. However, both these are much larger and more varied sites. The more tropical Gunung Mulu has a wealth of outstanding karst forms, 295 km of caves, 3,500 vascular plant species and a fauna of 530 species with a high degree of endemism. The temperate forested karst sites of China are nearer in size to Ba Be, possess many small lakes and are as rich or richer in plants, Juizhaigou having 2,576 and Huanglong 1,500 plant species, though they have fewer animal species.

4. INTEGRITY

4.1 Legal status

The whole area of BBNP is owned by the State and protected under a series of Government decisions, the key being the decision to establish BBNP with an area of 7,610 ha in 1992. The current organisation of management responsibilities was established in 2002, when responsibility for BBNP was transferred to Bac Kan Province. In 2004, the Ba Be National Park Management Board coordinated a review of BBNP, and based on this plan the park boundary was revised to the current configuration, and with a new total area of 10,048 ha.

Responsibility for the management of BBNP is vested in this management board, reporting to the Bac Kan Party Peoples Committee (PPC). Responsibility for the management of the buffer zone lies directly with the PPC. There is close co-operation and continuing liaison between the National Park Management Board and PPC.

The Government of Viet Nam is preparing a new comprehensive Biodiversity Law which will incorporate progressive protected area provisions. The new law will strengthen management of BBNP and is due to be enacted in 2008.

4.2 Boundaries

The boundary of BBNP was defined through community participation and has been identified clearly in the field by a series of landmarks and notices. It is recognised by the relevant local authorities at commune, district and provincial levels.

In relation to the values identified in the nomination, the boundaries appear to be reasonable in relation to the protection of Ba Be Lake. The core and buffer zone do not include a substantial area of the watershed, but given the scale of the catchment it would not be practical to cover the entire area with a buffer zone.

The geological/geomorphological values of the core area of BBNP provide a reasonable representation of the evidence for the long-term evolution of the wider region. However, it should be noted that some of the key geological localities, such as the talus fans at Quang Khe and the publicly accessible Hua Ma cave noted in the nomination lie outside the nominated core area of BBNP, and should ideally be included within it.

The biodiversity values of BBNP represent only part of the values of the wider Ba Be / Na Hang Conservation Complex and other areas within the conservation complex contain different and complementary values of equivalent or greater significance than those in BBNP. The boundaries of the nominated property are therefore not adequate to represent the biodiversity values of the area, and significant extension to include the Na Hang Nature Reserve and other protected areas would be required in order to do so.

4.3 Management

BBNP benefits from the presence of an effective management authority which has evident provincial backing, and enjoys good relations with the communities in the core and buffer zones. The nominated property is also supported by a network of scientific expertise, and has benefited greatly from the investment in surveying, monitoring, management planning and policy development that has resulted from the Creating Protected Areas for Resource Conservation Using Landscape Ecology (PARC) Project.

The total staff of BBNP is 73 with key posts being qualified in forestry or natural sciences. The staff includes a Forest Protection Bureau of 36 with 11 field stations and a mobile unit, and 12 staff in the science and technology division. Considerable effort is put into enforcement of laws including forest and species protection. Management planning and monitoring appear to be key areas where capacity is more limited, and where future enhancements could be made. Implementation of community development, sustainable tourism and management programmes within the buffer zone are other areas where further enhancements would be justified.

BBNP is mainly funded through Government budgets under phased investment plans, with additional income arising from visitor income. IUCN concludes that the sources and level of funding are adequate to the principal requirements of park management, but also notes that there are a range of enhancements that could be made which would require an increased level of funding.

A management plan was developed at the time of park establishment in 1992 and is supplemented by a series of other planning instruments covering a range of issues such as investment, tourism, resource use and buffer zone socio-economic development. Management systems appear adequate for the core zone, although there is considerable scope to produce a simpler and more streamlined management framework for the park. The park would also benefit from a greater level of detail in both its spatial planning and programming of work. Management systems for the buffer zone appear to be inadequately developed due to the fragmentation of responsibilities, and there is little evidence of interaction between Bac Kan Province and the adjacent province where a significant portion of the buffer zone and the other components of the Ba Be / Na Hang Conservation Complex are located.

Strong, positive and respectful relationships are evident between the management authorities of BBNP and the communities within the core and buffer zones, which is an important source of strength in the current and future management of the area. However, IUCN noted a need for greater integration between park and community based planning particularly with respect to development.

4.4 Threats and human use

It is clear that past pressures have had a significant impact on the biodiversity of the area, notably in the fact that only 40% of the area retains primary forest, and with evident losses of some key species. The BBNP authorities have taken a positive approach to addressing the management needs of the park through fostering good relations with communities and investing in sustainable livelihood strategies. Forest cover in the park has increased from 63% in 1990 to 73% in 2004. The nomination also reports success in tackling wildlife trade and hunting, and there is evidence of a successful programme to trade guns for livestock. The park authorities are also supportive of ecotourism development within both the core and buffer zones of the park.

Nevertheless there are ongoing issues and a range of threats that will require increased attention. Some of these are listed in the nomination, and IUCN notes the following comments:

- There is a lack of data available to understand species conservation status and recovery trends.
- Invasive species are a further potential issue, and it is noted that the nomination reports the presence of six alien fish species in Ba Be Lake, including the Mozambique Tilapia, considered one of the world's "100 worst invaders". Lack of data also means it is not possible to confirm the situation with regard to invasive species.
- Significant numbers of goats have potentially destructive impact on undergrowth and soil stability.
- Disturbance to caves is reported in the nomination, and during the field visit IUCN noted that visitor access to caves with bat colonies is currently permitted. This is of concern due to both disturbance of the bat colonies and possible health risks to visitors.
- The use of internal combustion engine for road and boat based transport within BBNP has potential impacts on the tranquillity of the park and lake, and reported polluting impacts within the waters of the lake. Traffic management has restricted access through the lakeside road to light vehicles and mopeds, but these are still subject to fuel leaks or spillage.
- Whilst IUCN acknowledges the necessity for roads and power supply infrastructure to support community needs these developments have inevitably fragmented and impacted the integrity of the park through poor planning, building and/or unsympathetic design. Despite State Party efforts to regulate development it is likely that continued pressures for development will increase the need for improved land use planning, building and design standards.

In conclusion, IUCN is concerned about a number of issues which together threaten the integrity of the property, including the small size of BBNP; fragmentation caused by road construction; traffic congestion and pollution from motorcycles and motorized boats; inappropriate development within villages; invasive species, in particular goats, and alien fish species; and forest degradation, noting that some 50% of the area's forests are in some state of degradation.

Therefore, IUCN considers that the nominated property does not meet the conditions of integrity in relation to the aesthetic values due to the level of human activity and associated impacts.

IUCN considers that the nominated property meets the conditions of integrity in relation to the relatively robust earth science values, although with the reservation that some features cited as being of importance lie within the buffer zone rather than the core zone.

IUCN considers that the nominated property does not meet the conditions of integrity in relation to the biodiversity values due to the small size of BBNP, and the omission of key components of the Ba Be / Na Hang Conservation Complex. There is not yet sufficient information available to assess the degree to which the conditions of integrity in relation to a range of key species and the broad scale recovery of degraded forest areas are being met. Also, the effectiveness of the buffer zone in relation to the long-term protection of biodiversity has not been properly documented.

5. ADDITIONAL COMMENTS

None.

6. APPLICATION OF CRITERIA

The property has been nominated under criteria (vii), (viii) and (x).

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

Ba Be National Park is an attractive landscape with natural features of national, and possibly regional importance, however it does not demonstrate clear values of global significance. In particular it does not have an iconic status that is demonstrated by other properties inscribed under this criterion – most notably perhaps Ha Long Bay, a coastal karst site in Viet Nam. The aesthetic values of the property are currently compromised by some human uses, most notably some infrastructure and access developments and the use of the internal combustion engine. Human use is significant within the park, and whilst there is a significant degree of harmony between the traditional community lifestyles and the park's values, there remains a slow but noticeable increase in development around the southern part of the lake resulting in adverse impacts.

IUCN considers that the nominated property does not meet this criterion.

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

Ba Be National Park displays a diversity of geological features that illustrate the tectonic history of the region. However, many of these features are better represented within other tropical karst landscapes across the world, and comparable properties already inscribed on the World Heritage List. The values of the nominated property as a tropical karst site in tectonically altered dolomite are significant, but this is both a rather narrow basis for justifying outstanding universal value, and there is at least one other property, Jenolan Caves in the Greater Blue Mountains World Heritage property in Australia, which demonstrates a significantly wider set of such values than Ba Be National Park. The nominated property is also significantly smaller than other karst landscapes that have been nominated to the World Heritage List, and some of the key geological features noted in the nomination lie outside the nominated property.

IUCN considers that the nominated property does not meet this criterion.

Criterion (x): Biodiversity and threatened species

Ba Be National Park contains significant biodiversity values that are certainly of regional importance. However, the property has suffered significant past degradation and at present is in recovery from past forest extraction. The property is small in relation to the requirements for long-term biodiversity conservation, and it contains only some of the biodiversity values in the wider region (particularly the Ba Be / Na Hang Conservation Complex), with other adjacent protected areas having equivalent or greater value in relation to the protection of key species. There is also insufficient information available to be able to draw firm conclusions regarding the status of a range of key species (or the impact of a number of known invasive species). Human activity and disturbance is significant within much of the nominated property and its buffer zone.

IUCN considers that the nominated property does not meet this criterion. IUCN acknowledges, however, that a future nomination of a much larger area that includes the full range of biodiversity values of the Ba Be / Na Hang Conservation Complex might have greater potential to meet this criterion.

In conclusion, IUCN considers that it is unlikely that future nomination under criterion (vii), and possibly criterion (viii), will be successful even with a significantly larger area, so any future nomination should focus primarily on criterion (x). Such an approach should draw upon the recommendations of the Creating Protected Areas for Resource Conservation Using Landscape Ecology (PARC) Project which advocates for a Ba Be National Park – Na Hang Nature Reserve Conservation Complex.

7. RECOMMENDATIONS

IUCN recommends the World Heritage Committee **not to inscribe** the Ba Be National Park, Viet Nam, on the World Heritage List on the basis of criteria (vii), (viii) and (x).

IUCN recommends that the World Heritage Committee commends the State Party and Bac Kan Province for the clear commitment that has been made to the protection of Ba Be National Park and the efforts to improve research and understanding of park values, management planning, community participation and awareness raising in collaboration with international organisations.

The World Heritage Committee may wish to recommend the State Party to:

a) Enhance the management capacity of the park (and the adjoining protected areas) in relation to management planning, community development and monitoring;

b) Enhance the management arrangements for the buffer zone and develop clearer plans, including on ecotourism development, that are supportive of the protection requirements of the core zone of the park (and the adjoining protected areas);

c) Establish effective programmes of habitat management and ecological monitoring, in order to confirm the status of key species and habitats of conservation importance; and

d) Maintain strong programmes to regulate development within the core zone of the park to both protect the natural environment and maintain the traditional architectural character and appearance of the settlements.

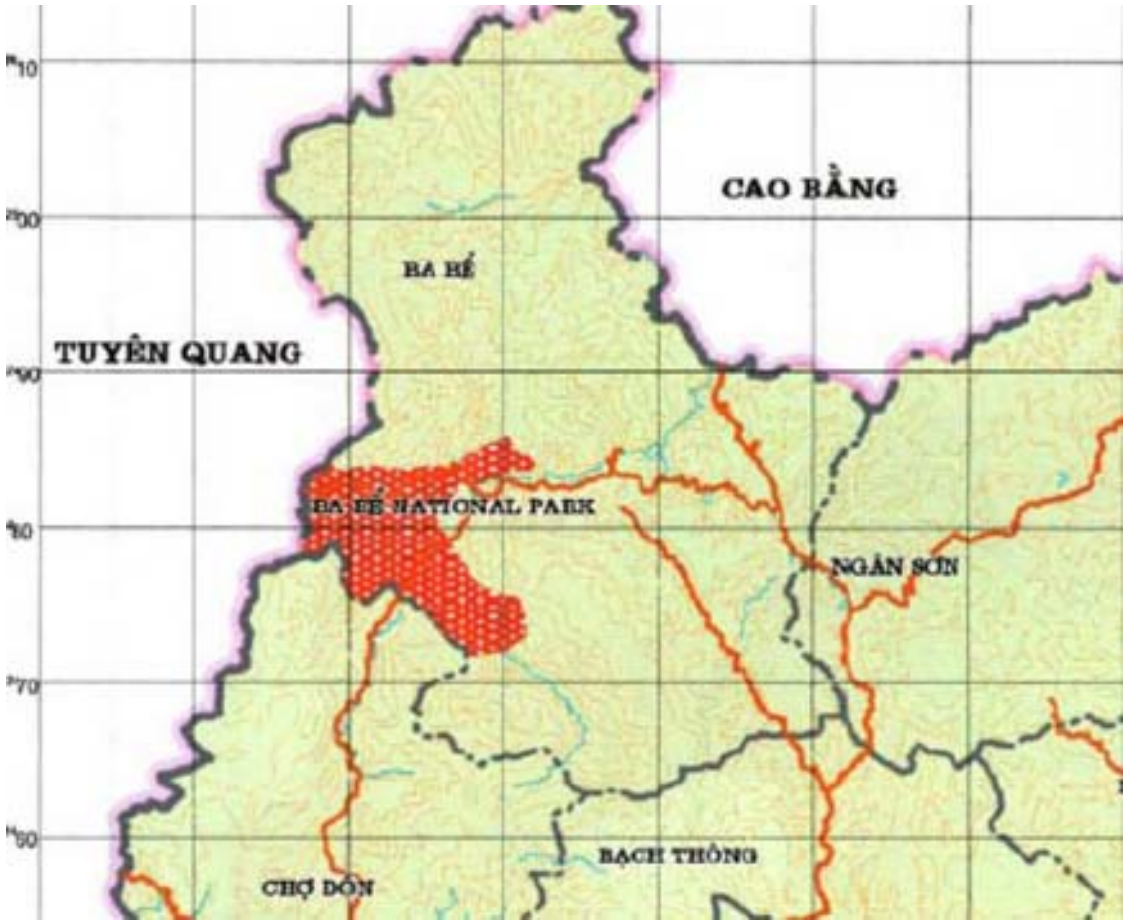
The World Heritage Committee may further recommend the State Party to consider, once the recommendations above are addressed, the potential for future nomination of a much larger area that includes the full range of biodiversity values of the region and meets the conditions of integrity.

The World Heritage Committee may also wish to recommend the State Party to consider the potential use of other international designations such as a UNESCO Biosphere Reserve and/or UNESCO Global Geopark in order to strengthen the international recognition of the property's values and balance protection of natural and cultural heritage.

The combination of regionally significant geology and human use in Ba Be National Park would appear to lend itself particularly well to the objectives of the Global Geoparks Network, while recognition of the Ba Be National Park – Na Hang Nature Reserve Conservation Complex under the Man and Biosphere Programme would help to integrate management of the protected areas and their buffer zones as well as provide the means to further explore the potential for further international recognition of a much larger area.

Map 1: Location of nominated property

Map 2: Boundaries of nominated property



EUROPE / NORTH AMERICA

SPELEOTHEMS OF FRENCH LIMESTONE CAVES, OUTSTANDING RECORDS OF KARST PROCESSES AND ARCHIVES OF PALAEO - CLIMATES

FRANCE

WORLD HERITAGE NOMINATION – IUCN TECHNICAL EVALUATION

SPELEOTHEMS OF FRENCH LIMESTONE CAVES, OUTSTANDING RECORDS OF KARST PROCESSES AND ARCHIVES OF PALAEO-CLIMATES (FRANCE) – ID No. 1045

Background note: The IUCN Technical Evaluation of the *Ensemble de grottes à concretions du Sud de la France*, nominated by France as a serial natural property in 2000, was neither discussed at the 25th session of the World Heritage Bureau (Paris, 2001) nor at the 25th session of the World Heritage Committee (Helsinki, 2001) because the State Party had requested that this nomination not be examined. The nomination was based primarily on the natural values of the same 18 caves/cave groups within the present nomination. IUCN's evaluation recommended not to inscribe the property, and concluded that "the Operational Guidelines, and previous decisions of the World Heritage Committee, do not support the inclusion of sites on the World Heritage List whose claim to be of outstanding universal value is based on very specific features, such as speleothems".

1. DOCUMENTATION

i) **Date nomination received by IUCN:** April 2006

ii) **Additional information officially requested from and provided by the State Party:** IUCN requested supplementary information on 19 September 2006 before the IUCN Evaluation Mission, on 17 November 2006 after the IUCN Evaluation Mission and on 19 December 2006 after the first IUCN World Heritage Panel Meeting. The State Party responses were submitted on 28 November 2006 and 28 February 2007, including responses to all the issues raised by IUCN.

iii) **UNEP-WCMC Data Sheet:** 10 references (including nomination)

iv) **Additional literature consulted:** Sources include Culver D.C. and White W.B. (eds.) (2004). **Encyclopedia of Caves.** Elsevier Academic Press, Amsterdam. Goudie, A.S. (ed.) (2004). **Encyclopedia of Geomorphology.** Routledge, London. Gunn, J. (ed.) (2003). **Encyclopedia of Caves and Karst Science.** Fitzroy Dearborn, New York. Hill, C.A. and Forti, P. (1997). **Cave Minerals of the World.** 2nd Edition. National Speleological Society, Huntsville. Klimchouk, A.B. et al. (eds.) (2000). **Speleogenesis: Evolution of Karst Aquifers.** National Speleological Society, Huntsville. Mangin, A. et al. (1999). **La dynamique du milieu souterrain, concept de base servant à la conservation des grottes.** In: B. Andreo et al. (eds.). Contribucion del estudio cientifico de las cavidades karsticas al conocimiento geologico. Patronato de la Cueva de Nerja, Nerja: 299-303. Perette, Y. and Delannoy, J.J. (2003). **Les stalagmites: des archives karstiques multi paramètres continentales et continues.** In: P. Allée and L. Lespez (eds.). L'érosion, entre Société, Climat et Paléoenvironnement. Presses Universitaires Blaise Pascal, Clermont-Ferrand. Self, C.A. and Hill, C.A. (2003). **How speleothems grow: An introduction to the ontogeny of cave minerals.** Journal of Cave and Karst Studies, 65, 2, 130-151.

v) **Consultations:** 10 external reviewers. Extensive consultations were undertaken during the field visit with: representatives of national and local governments and authorities including the French Ministry of Ecology and Sustainable Development, Sub-Prefecture of Lodève, and local Mayors; all the authorities responsible for the management of the caves; technical staff involved in the management of the caves; karst and cave experts including from the CNRS Subterranean Laboratory of Moulis and the Speleological Society of France; and a local caving club.

vi) **Field visit:** Paolo Forti, September 2006

vii) **Date of IUCN approval of this report:** April 2007

2. SUMMARY OF NATURAL VALUES

Les Concrétions des Grottes Françaises, Témoins Exceptionnels du Fonctionnement du Karst et Archives de Paléoclimats (Speleothems of French Limestone Caves, Outstanding Records of Karst Processes and Archives of Palaeo-climates) are nominated as a national serial property of 18 different cave areas in France stretching from the Alps to the central Pyrenees. The present nomination is based (as was the previous nomination) on the presence of speleothems within the selected caves/cave groups (speleothems is the technical name for the group of natural decorations of caves by mineral deposits – stalactites and stalagmites are the most

widely known of these, however the group includes a wide range of other types of decoration). According to the nomination: *"The speleothems of the 18 sites in Southern France (caves, group of cavities), owing to the exceptional variety of morphologies and crystal forms, constitute a unique set which represents all the variety of transfer processes (present and ancient) and crystallization deposits in karst cavities. Because of the localisation of the different sites, this group also represents an exceptional opportunity for scientific studies of these phenomena and constitutes a precious record of palaeo-climates. Besides, this group illustrates, on a limited territory, a subterranean patrimony of an exceptional beauty the aesthetic quality of which is unanimously recognized."*

Of the 18 nominated clusters in the series, 16 comprise a single cave and two include a group of caves that are treated as an individual hydrological system. Of the cave groups, one (Réseau de Cabrespine-Lastours) includes five caves and the other (Réseau du Rautely) includes three caves. In totality, the nomination includes 24 individual caves and over 135 km of presently known cave passages. Each cluster is surrounded by a buffer zone. According to supplementary information provided by the State Party on 28 November 2006, the total area of the 18 nominated core zones is 423.23 ha, with seven core zones being smaller than one hectare each, and the total area of their surrounding buffer zones is 1,798.63 ha (see Table 1).

The sites are situated within three regions in southern France: Midì-Pyrenees (3 sites), Languedoc-Roussillon (13 sites) and Rhone-Alpes (2 sites). Five of the sites are in limestone of Jurassic age, two in dolomites of Jurassic age, and the remainder in Cambro-Ordovician-Devonian meta-dolostones. The nomination notes that the territory includes caves within three different geologic ensembles: the southern Central Massif of France, the Pyrenees and the Alps. The caves are thus also located in a range of different hydrological settings.

The karst cycle may be subdivided in two main parts: the first dealing with the development of karst by erosion/ dissolution (i.e. the evolution of karst voids) and the second dealing with the deposition occurring within caves (i.e. the development of speleothems and cave minerals). Chemical cave deposits provide direct information on the evolution of karst voids (speleogenesis) of the cave in which they developed. In this respect speleothems are considered by karst scientists to be an important feature of karst, and their forms and chemistry generally also allow

Table 1: Area of the core and buffer zones of the nominated property

Name of the cave/cave group	Core zone (ha)	Buffer zone (ha)
Grotte Amélineau	0.29	18.72
Grotte de Choranche	69.84	424.44
Aven Armand	0.58	5.56
Grottes des Demoiselles	0.73	3.81
Balme del Pastre	0.76	3.87
Grotte de l'Aguzou	9.52	84.69
Grotte du Lauzinas	9.56	24.38
Grotte du TM 71	20.08	98.54
Réseau de Cabrespine-Lastours	86.36	276.19
Gouffre d'Esparros	2.13	19.41
Grotte de Pousselières	0.99	13.82
Grotte de Clamouse	5.70	42.52
Réseau Lachambre	137.94	366.13
Réseau du Rautely	8.90	54.96
Aven du Mont Marcou	0.41	15.89
Grotte de la Cigalère	46.81	198.38
Aven d'Orgnac	22.44	141.86
Barrencs de Fournes	0.19	5.46
Total area (ha)	**423.23**	**1,798.63**

for detailed environmental and climatic reconstruction over a large span of time.

Cave genesis can be subdivided according to the type of water that formed the cave, the four most important of which are: a) meteoric (generated by seepage of precipitation), b) thermal (generated by uplifting of hot water from within the Earth's crust), c) hypogenic (generated by uplifting of old groundwater) and d) sea caves (generated by the mixing of meteoric and sea waters). The cluster of caves of the nominated property has been chosen from within caves in France to include the widest range of types of speleothems formed in cave systems created by meteoric water.

All the selected caves of the nominated property are characterized by a widespread presence of speleothems, although the extent of mineralization varies. In some of them, speleothems cover up to 90-95% of the cave walls (Grottes des Demoiselles, Grotte Amélineau, Balme del Pastre), while most of the caves have a speleothem cover of about 65-85% and only two of them (Aven du Mont Marcou and Grotte de Choranche) have a speleothem cover of less than 40%. An estimated 15-25% of the cave passages display uncommon and rare speleothems. Several different types of minerals form the speleothems, most notably calcite, aragonite, hydromagnesite and gypsum.

The calcite speleothems within the selected caves include all the most common types of speleothems derived by all kind of water flow (dripping, flowing, pool, capillary water, condensation) resulting in many different forms that are differentiated by speleothem specialists including the well known stalactites and stalagmites, and a range of other forms including cups, rafts, cave pearls and helictites. There are also examples of more unusual calcite speleothems including triangular and rectangular monocrystalline stalagmites and columns, plate stalagmites, black, blue and red stalactites and/or flowstones, shields, welts, trays, tower corals, monocrystalline cups and blisters. A green calcite flowstone in Réseau du Rautely is currently the only known occurrence of such a coloured formation.

The aragonite speleothems include forms that have been described from other areas of the world and several rarer forms, particularly those with blue and green colour, and varieties of frostwork and spatites (a variety of tubular stalactites composed primarily of aragonite). Notable are the green aragonite from the Aven du Mont Marcou and the blue aragonite of the Blue Cave in Barrencs de Fournes. The forms and specific examples of aragonite speleothems in the Grotte du TM 71 and the Grotte de l'Asperge of the Réseau du Rautely are currently the only known occurrences globally of these very specific features.

The hydromagnesite speleothems within the Réseau Lachambre are important both for their length and variety. One cave of the nominated property, the Grotte de la Cigalère, is notable for its gypsum mineralization, some of which is extremely rare. It is highly probable that in the near future the known mineralogical interest of the caves will grow considerably. In addition to the chemical precipitates, several of the caves contain unusual clastic (mud and sand) sediments. Vermiculations are found in several caves, but one of the most unusual formations is found in the Grotte du Lauzinas which includes large (up to 1 m high) and extremely rare mud "mushrooms".

The nomination reflects this range and depth of variation in speleothem forms and chemistry; however it is also based on advancing the aesthetic values of the speleothems. These vary in scale within the caves from small-scale features and delicate crystals (millimetres to centimetres in size) to larger scale features (metres to tens of metres in size). The natural beauty of the speleothems results from the slow processes of crystallisation that can take place over many thousands of years – or longer. The speleothems within the nominated property certainly include examples of features that are spectacular and unusual due to combinations of their scale, shape, crystal forms and colour, and some of the forms are additionally notable due to their rarity. However, the nomination also makes clear that the aesthetic values are considered secondary to the scientific aspects, and are regarded as applying to the whole series and not the individual elements within it.

Although not a main reason for nomination, it should also be noted here that the karst landscapes in which the nominated property occurs is of ecological and geomorphological interest. Moreover, the morphology of the caves and clastic sediments they contain provide additional evidence and data of the earth's history and ongoing geological processes in the development of karst landforms which may be cross-references to speleothems.

3. COMPARISONS WITH OTHER AREAS

The nominated serial property is a karst site and so primary comparisons are required both with other karst World Heritage properties and with other karst sites worldwide. No global comparative analysis has been completed within the nomination, either at the general level of karst systems, or specifically in relation to the speleothems that are advanced as the basis for inscription.

Global comparison regarding karst systems

In its global theme study on Geological World Heritage completed in 2005, IUCN has proposed a series of thirteen themes to guide the preparation and comparison of geological World Heritage nominations, and the present nomination is considered within the theme on caves and karst systems. IUCN notes that karst is a global phenomenon, and caves are a ubiquitous part of karst systems and are very numerous (for example the State Party notes that there are 80-100,000 caves in France alone). Speleothems are found in virtually all karst caves throughout the world, and by their nature speleothems are potential resources for the study of climatic and environmental change. There is no doubt that cave minerals and their forms are scientifically important within cave systems, and, looked at in detail, some specific forms in some locations may be unique. Nevertheless, any group of speleothems within a single karst cave is, in essence, representative of mineral assemblages found in almost all karst caves. It is therefore difficult, in principle, to regard a nomination based on the recognition of speleothems as being of 'outstanding universal value'.

Nine existing World Heritage properties (Plitvice Lakes National Park (Croatia); Desembarco del Granma National Park (Cuba); Caves of Aggtelek and Slovak Karst (Hungary and Slovakia); Gunung Mulu National Park (Malaysia); Puerto Princesa Subterranean River National Park (Philippines); Škocjan Caves (Slovenia); Carlsbad Caverns National Park and Mammoth Cave National Park (USA); and Ha Long Bay (Vietnam)) have been inscribed on the basis of their karst features, whilst a substantial number of other properties also include significant karst features. Karst sites inscribed on the World Heritage List to date have considered the totality of the karst system, whilst the present nomination is based primarily on the identification of the natural values of the very specific, discrete features within the nominated caves, rather than the karst systems as a whole. In summary, the present nomination is advanced on a much narrower basis than has been taken for other nominations that have been accepted previously for World Heritage listing, which have also been coherent and contiguous karst systems. IUCN noted its concerns over this narrow approach in its previous evaluation in 2001. These concerns remain and are discussed again below.

The most comparable areas are in the Czech Republic, Hungary and Slovakia, and at Jenolan and neighbouring sites within the Greater Blue Mountains Area World Heritage property in Australia (Jenolan was however not a principal reason for inscription in this case). The distinctive feature of these sites is that they have all been subject to multiple stages and processes of karstification. World Heritage listing already recognises the broad values put forward within the present nomination as seen by the 712 caves inscribed within the Caves of the Aggtelek Karst and Slovak Karst World Heritage property, whose inscription noted the representation of the geologic history of millions of years and an unusual combination of climatic effects amongst the features of significance within the karst landscapes that were inscribed. This property comprises a coherent karst area identified within two adjacent protected areas (Aggtelek Karst National Park and Biosphere Reserve, and Slovak Karst Protected Landscape Areas). In addition to existing World Heritage properties, there are many other spectacular show caves in the world of great quality, with Grotte de Han (Belgium), Catellana Grotto (Italy), Jeita Grotto (Lebanon), Postonja Caves (Slovenia) and Luray Caverns (USA) amongst those mentioned by reviewers. In terms of scale, the Mammoth Cave is the world's longest cave system, and the top ten longest caves are in the USA (5), Ukraine (2), Switzerland (2) and Mexico.

Global comparison regarding speleothems

Notwithstanding the overall point that it considers speleothems represent too narrow a focus for World Heritage listing, IUCN reviewed the relative level of recognition of the features in the nominated property.

In relation to the four most important categories of cave genesis, meteoric caves are by far the largest known group, although knowledge of thermal and hypogenic caves is growing. The variety and chemical composition of the hosted speleothems is normally highest in thermal and/or hypogenic caves as a direct consequence of the chemical complexity and relative high temperature of their waters. But the processes that lead to the deposition of chemical deposits (speleothems and cave minerals) in meteoric caves are different. The properties already inscribed on the World Heritage List may be subdivided into the four different cave categories as follows:

- Meteoric: Plitvice Lakes; Caves of Aggtelek and Slovak Karst; Gunung Mulu; Škocjan Caves; Mammoth Cave; Ha Long Bay; and Jenolan (within the Greater Blue Mountains Area, Australia);
- Thermal and hypogenic: Carlsbad Caverns; and
- Sea caves: Desembarco del Granma and Puerto Princesa.

Two of these (Plitvice Lakes and Desembarco del Granma) have no speleothems at all, whilst the majority of the other caves are meteoric in origin and display speleothems that are of the more common types found in many karst sites.

Carlsbad Caverns National Park includes the Lechuguilla Cave, which is globally renowned for its speleothems, among which there are distinctive widespread gypsum flowers and needles, sometimes of huge dimensions, some rare minerals and uncommon calcite speleothems. It should be noted, however, that these caves and speleothems are of hydrothermal origin and so of a different type of origin than the nominated property. When added together across the 18 individual clusters, the variety of different types of calcite and white aragonite speleothems present in the nominated serial property is higher than that of the Carlsbad caves, while that of gypsum is comparable. However, it must be stressed that the Carlsbad Caverns National Park is a single, coherent site whose value in representing karst systems is greater than each of the individual caves/cave groups in the nominated property. A few of the uncommon speleothem types in the nomination are present in the Carlsbad caves but most of them are presently known only from one of two other caves in the world.

The position regarding global comparisons on mineralised caves as a whole is problematic. The fullest review to date was carried out in 1997 by Hill and Forti in the only worldwide monograph on this specialised field. They selected a 'top ten' of the world's most interesting mineralised caves. The Blue Cave in Barrencs de Fournes is the only cave within the 18 clusters in the present nomination included in this selection – on the basis of being 'calcite and aragonite brilliantly coloured by transition metal ions, mainly copper'. Lechuguilla is also included in this selection on the basis of being a sulfuric acid cave with some of the most spectacular speleothems ever discovered. The monograph also considered very specific speleothems from the following nominated caves: Grotte Amélineau, Balme del Pastre, Grotte de l'Aguzou, Grotte du Lauzinas, Grotte du TM 71, Réseau de Cabrespine-Lastours and Aven d'Orgnac. In terms of specific forms, the green aragonite from the Aven du Mont Marcou is presently the only known global occurrence of green aragonite speleothems. Other specialised forms that are currently only known from caves within the nominated property include the aragonite straw stalactites in the Grotte du TM 71, and the unique form of blue aragonite speleothems in the Grotte de l'Asperge. The Aven Armand has the greatest known number and concentration of plate stalagmites. However, all of these features, whilst important, are highly specialised, and other

caves worldwide display different types of mineralization that are also locally unique.

Great caution is however needed in drawing even these conclusions as the State Party has acknowledged in its supplementary information that speleothem mineralogy is a field of very recent scientific advance and where there is a lack of scientific knowledge available on a global basis. The State Party notes that scientists consulted on the nomination make the assumption that 'exceptional values will undoubtedly be soon discovered in other countries where speleological practice is developed still little'. Given this position there is clearly a likelihood that sites that surpass the specialised values of the nominated sites could be discovered, and so establishment of a sound framework for comparison is problematic for the foreseeable future. Whilst uncertainty of future discoveries is always a feature of comparative analysis for all natural properties, the highly specialised features that are the basis of this nomination and rapidly developing studies mean that the likelihood of comparative judgements changing is particularly high.

In summary, given the current state of scientific knowledge, it can be concluded that the nominated series includes caves that are of important scientific interest to karst specialists, and especially those working on cave minerals. However, the values of the series are focussed on the speleothems in a number of caves of which only one features in the 'top ten' of the world's most interesting mineralised caves. Leaving aside the concern over the narrowness of focussing on speleothems, IUCN therefore considers that it does not appear that there is a basis for accepting the claim that the 18 nominated caves/cave groups are the best global selection of examples of mineralised/decorated meteoric caves. IUCN notes that a further fundamental weakness is that the comparative analysis leading to site selection has, from the outset, been primarily limited to considering only caves/cave groups within France. IUCN has further comments on the serial approach adopted below (see section 5.1).

Conclusions of comparative analysis

In conclusion, IUCN acknowledges that whilst the nominated caves are amongst those of importance to international specialists, global comparative analysis indicates it is not possible to regard these as being of outstanding universal value. IUCN's comparative analysis does not support inscription of the nominated serial property on the World Heritage List for the following reasons:

1. In relation to existing World Heritage properties, the nominated serial property is advanced on a narrower basis than past nominations of natural karst properties, and only considers one part of the overall natural values of the karst systems concerned. In the view of IUCN, the basis of this nomination is too narrow to justify a case for outstanding universal value.
2. The nominated property, as a series of 18 geographically distinct cave areas, is less coherent than existing karst/cave World Heritage properties which have been of single sites, or groups of sites within coherent and well-recognised karst systems. The values of properties already inscribed exceed those of the nominated property.
3. Only one existing World Heritage property is inscribed with the significance of its cave decoration as a specifically noted part of the justification for inscription (Lechuguilla within the 81 caves of the Carlsbad Caverns). Unlike the nominated serial property, this cave forms part of a single protected area, whose nomination put forward the values of the karst system as a whole as a basis for inscription. Lechuguilla is one of the world's 'top ten' decorated caves according to the fullest review to date. Only one of the caves in the present nomination is included in these 'top ten'.
4. As acknowledged by the State Party, the level of comparative analysis is weak due to the lack of scientific information available. There is a near certainty of comparable discoveries elsewhere in the near future that would lead to different judgements on outstanding universal value.

These points are in addition to the concerns discussed in detail below regarding the application of the concept of outstanding universal value and corresponding conditions of integrity.

4. INTEGRITY

4.1 Principles on the application of the concept of outstanding universal value and corresponding conditions of integrity

IUCN normally reports on four headings in relation to integrity (see sections 4.2-4.5), however in this case the nomination raises an issue of principle in relation to the concept of outstanding universal value and corresponding conditions of integrity that is best discussed under the heading of integrity. IUCN therefore makes the following in principle observations.

The State Party in its supplementary information suggests that it should not be necessary to consider the whole of the karst system as the basis of identifying World Heritage properties, and that "speleothems should be regarded as a new concept of World Heritage property". The response of the State Party also draws parallels between the speleothems as distinct entities and prehistoric cave paintings, which are discrete cultural features within caves. Such an approach regards each group of speleothems (or even each individual speleothem) as a natural feature that is capable of being isolated from the surrounding natural system that it is a part of, within which it formed and which continues to shape its future evolution.

IUCN regards this approach as being contrary to the conditions of integrity required of a World Heritage property under the Operational Guidelines which clearly emphasise integrity as a measure of "wholeness". The Operational Guidelines make clear that the expectation is that each property must include "all elements necessary to express its outstanding universal value" and that it should be of "adequate size to ensure the complete representation of the features and processes which convey the property's significance" (paragraph 88). The concept is further elaborated in relation to each of the criteria in the subsequent paragraphs of the Operational Guidelines,

which make clear the different frameworks that apply to cultural and natural properties – and to each of the different criteria.

IUCN therefore reiterates the comments it made when evaluating this nomination previously (and based on previous World Heritage Committee decisions) to support the clear theoretical and practical reasons why the World Heritage Convention takes this approach to integrity:

- If a case is made for World Heritage listing based on very specific, narrow features within a class of natural sites, the number of potential World Heritage properties is almost infinite;
- Conservation is based on identifying and safeguarding the complex interactions of natural systems rather than focussing only on the protection of very specific individual features – i.e. it is comprehensive rather than reductionist; and
- Sites based on single features (e.g. only a single species or a very specific, narrow geological or geomorphological feature) are vulnerable to removal or damage; in effect these features are almost 'movable' – and therefore by definition lie outside the framework of the Convention.

IUCN therefore considers that the prospect of inscribing speleothems as a 'new concept' is contrary to the Convention as such a concept does not meet the conditions of integrity as required under the Operational Guidelines. IUCN notes that this does not represent an argument against the recognition of speleothems within World Heritage properties, as they are clearly fundamentally important features within karst systems. It does however mean that their inclusion needs to be considered in the context of the potential outstanding universal value and integrity of the karst system as a whole.

IUCN recommends that the World Heritage Committee reminds States Parties of these principles and the importance of nominations meeting the conditions of integrity set out in the Operational Guidelines (see section 7).

4.2 Legal status

The present nomination includes a series of vulnerable sites that are protected under a range of regulations, which vary from cave to cave because they are adapted to the peculiar characteristics of each area. 11 of the 18 individual clusters have legal protection and a management committee, while the process leading to legal protection of the other seven has been started together with a management committee for each cave. All these procedures will conclude between 2006 and 2008.

According with the French law, within both the "Réserves naturelles" and the "Sites classés", the sites are fully protected. In fact any proposed change in land use needs to be directly authorized by the Ministry of the Environment in Paris. The authorization may be given only if it has been proven that the proposed new land use is consistent with the protection of protected sites both above and below ground. In the buffer zones, permission to construct new buildings or to change the use of already existing ones is given under the direct control of the Prefecture, and in any case must conform to the general regulations that ensure the protection of the "Réserves naturelles" and/or "Sites classés".

4.3 Boundaries

The boundaries of both the nominated caves/cave groups and their surrounding buffer zones have been clarified during the course of the nomination. The boundaries of the nominated sites are clearly defined to include the caves within which the speleothems are found. The boundaries of the buffer zones are adequate to ensure protection against possible pollution hazard to the nominated areas. Thus the boundaries encompass the wider areas of the caves/cave groups and are not limited to the speleothems; however it is only the values associated to the speleothems within these nominated areas that are put forward as the basis for World Heritage listing.

4.4 Management

A variety of site specific management arrangements are in place in each of the 18 clusters within the nominated series. Seven of the caves in the present nomination are show caves where the access is regulated according to their carrying capacity for visitation. These show caves are well managed and together accommodate more than 700,000 visitors per year. They are in particular important for promoting environmental protection to the general public. Other caves are closed and have a very restricted access, giving a good balance in the series between promoted and protected sites.

French cavers and the local inhabitants have a deep awareness and commitment to the preservation of the nominated sites and France has also contributed the first complete manual on practical protection of speleothems. Seven of the 18 clusters have a museum and/or an information area close to the entrance of the cave, and 14 have dedicated documentation areas within museums and/or other public structures. Only one site (Barrencs de Fournes) does not yet have any kind of information or documentation area but a museum for this site is currently in preparation.

Finally, the Ministry of the Environment of France has announced that it plans to set up a "Comité National du Patrimoine Souterrain" within the Ministry, which will specifically coordinate and monitor the management of the nominated property. As noted below, the effectiveness of such a structure cannot yet be assessed, and it would, of necessity, have a complex task.

In summary, there is adequate management in place for each of the nominated sites within the series, however the overall management framework foreseen has not yet been set up or its effectiveness assessed.

4.5 Threats and human use

Almost all the caves of the nominated property are in original conditions according to both the nomination document and the feedback from the field visit and reviewers. According to the nomination no relevant potential threats seem to exist to the sites included in the series.

The 18 sites of the nominated property have only small resident populations living adjacent to the cave areas and the future human pressure is expected to remain very low. Moreover, the local inhabitants are aware of the environmental values of the caves and the hosted speleothems, and represent one of the best tools for the protection of the sites. Most of the areas are within woodlands and/or grasslands, while in some parts there are small and not intensive agricultural settlements. No active quarrying, or other impacting industry, exists over the caves and their hydrogeological basins.

Seismic hazard is low for the whole area, and flooding potential is significant in only a few of the karst systems included in the nominated property (only those with large active rivers inside). The locations of the speleothems within these karst systems are always in the upper areas, away from the lower area most likely to be flooded. This threat is therefore regarded as insignificant.

Anthropogenic threats within the show caves included in the nominated property are avoided because of the correct management of each show cave, which completely avoids the possibility of direct contact between visitors and speleothems and also strictly controls the environment for indirect effects to prevent damaging changes to the cave environment.

In conclusion, and as discussed in detail above (see section 4.1), IUCN considers that the nominated property does not meet the conditions of integrity as required under the Operational Guidelines which clearly emphasise integrity as a measure of "wholeness" rather than a narrow focus on maintaining features such as speleothems.

5. ADDITIONAL COMMENTS

5.1 Justification for serial approach

When IUCN evaluates a serial nomination it asks the following questions:

a) What is the justification for the serial approach?

IUCN notes that in principle serial approaches can be justified in relation to the inscription of karst features, such as those within the South China Karst, and they may also be appropriate in recognising coherent groups of caves that together convey outstanding universal value. The basis of the serial selection in the present nomination is that one cave is not sufficient to demonstrate the full range of decorations within meteoric caves. As noted above IUCN considers that this objective (inscription of speleothems as a World Heritage property) is too narrow to justify World Heritage listing and the serial approach is therefore considered not to be justified in this case.

IUCN further notes that the basis for site selection has been to develop a listing of significant cave sites within France and to make the selection on a national basis. Since karst features transcend national borders it appears inappropriate to consider only one country in the selection of sites for a serial nomination that is supposed to be representative of a wide range of these features. IUCN therefore considers that a global framework is required in order to justify the selection of sites for a serial nomination, otherwise it is difficult to assess whether one particular selection is justified either on its own merits, or in relation to any other selections that could be proposed.

b) Are the separate components of the property functionally linked?

The 18 caves/cave groups in the nominated serial property are situated in a range of different geological and hydrological settings and so are not all functionally linked. IUCN considers this poses a further fundamental problem in relation to the serial approach because speleothems, or caves with speleothems, are very numerous and a ubiquitous feature of karst systems worldwide. Accepting a serial approach that is not functionally linked creates the potential for an unworkably large and open-ended series that would not be appropriate to World Heritage listing.

c) Is there an overall management framework for all the components?

An overall management framework has been set up recently with the specific task to coordinate the overall management of all the sites within the serial nomination. There is therefore a management framework in place, although it is not yet possible to assess its effectiveness. The large number of sites and their dispersed nature means that the task of coordination and monitoring (by the State Party and the World Heritage Committee) is large and complex, and IUCN is concerned that it may be overambitious.

6. APPLICATION OF CRITERIA

The property has been nominated under criteria (vii) and (viii).

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

IUCN recognises that the speleothems within the nominated serial property are features of significant natural beauty, some of whose specific forms or chemistry may be unique. However, they are only one facet of the totality of the caves and wider karst systems that they lie within and are too narrow a basis to be regarded alone as being of outstanding universal value under this criterion. There are also very many caves across the world which display speleothems of equivalent and/or greater natural beauty as key elements of their overall natural values which are of distinctive and natural beauty. The values ascribed to the nominated series are not supported by an effective global comparative analysis, and given the enormous number of speleothems worldwide it is probably impossible for such an analysis to be conclusive.

IUCN considers that the nominated property does not meet this criterion.

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

The nominated serial property is advanced on a narrower basis than past nominations of natural karst properties, and only considers one part of the overall natural values of the karst systems concerned. In the view of IUCN, the basis of this nomination is too narrow to justify a case for outstanding universal value, as a series of 18 geographically distinct cave areas is less coherent than existing karst/cave World Heritage properties which have been of single sites, or groups of sites within coherent and well-recognised karst systems. The values of properties already inscribed including Mammoth Cave, Carlsbad Caverns and the Caves of the Slovak Karst and Aggtelek Karst World Heritage property exceed those of the nominated property, recognising substantial karst systems of outstanding universal value located within coherent protected areas.

The Operational Guidelines clearly imply that speleothems must be considered as part of an overall consideration of the karst features in question, and that only by considering the totality of a karst system can a safe judgement on outstanding universal value be reached, and the required conditions of integrity be met. The narrow focus of the nomination on speleothems as the features of significance does not meet the required conditions of integrity for a natural World Heritage property.

The nomination has established that, individually, each of the caves within this nomination is a notable natural feature that provides a significant display of speleothems that are of international scientific importance, but is not of sufficient value alone to be regarded as being at the level of outstanding universal value. Global comparative analysis on these specific features is lacking within the nomination and limited by the current state of scientific knowledge, but it is noted that only one of the 18 caves/cave groups within the nominated series is included in a 1997 list of the world's 'top ten' mineralised caves. Further work in this rapidly developing area of karst science is considered to be certain to lead to new discoveries of equal or greater importance to the caves in the nominated series within other countries.

The series seeks to advance a case for outstanding universal value based on adding together the values in a relatively large number of individual sites, which are unified by their location within France, but do not have coherence due to their location in a number of separate and different geological, hydrological and landscape settings. IUCN considers that this is not a sound basis for producing a serial nomination as it is focused on national borders rather than natural distribution and therefore creates the potential for an open-ended selection of additional sites. It does not consider the possibility of other more coherent configurations, which could be based on a single, or a smaller number of individual sites, and with a full consideration of alternatives on a global basis.

IUCN considers that there may be potential for further geologically and geographically coherent nominations of the most important and/or spectacular meteoric karst caves and systems to be considered for World Heritage listing. However, for the reasons outline above, IUCN considers that the nominated property does not meet this criterion.

7. RECOMMENDATIONS

IUCN recommends the World Heritage Committee **not to inscribe** the Speleothems of French Limestone Caves, Outstanding Records of Karst Processes and Archives of Palaeo-climates, France, on the World Heritage List on the basis of criteria (vii) and (viii).

IUCN recommends that the World Heritage Committee commends the State Party for its promotion of coordinated management between the major caves on its territory and the evident quality of its management of both the publicly accessible caves and those that are restricted in access.

The World Heritage Committee may wish to recommend the State Party to:

a) Consider in the future management of the sites the full range of natural values of the cave systems including the geological and geomorphological history, hydrology, flora and fauna (surface and subterranean); and

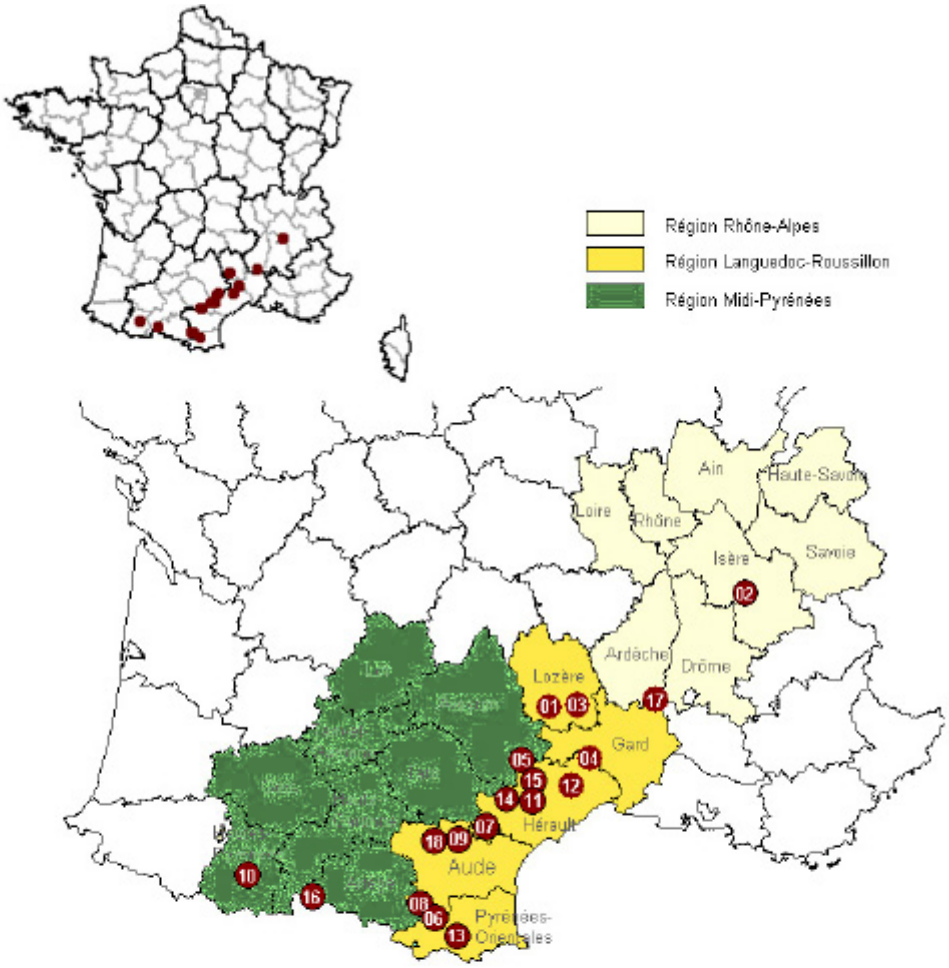
b) Consider the potential use of alternative means of recognition of these sites through national and regional systems of protection and promotion.

IUCN recommends that the World Heritage Committee reiterates the importance of nominations meeting the conditions of integrity set out in the Operational Guidelines, and that nominations based on the recognition of only parts of a natural system as a 'property' are not a sound basis for inclusion on the World Heritage List.

IUCN also recommends that the World Heritage Committee notes that where serial properties are nominated it is essential that they have a demonstrable coherence and that site selection is carried out with reference to a thorough global comparative analysis. This is particularly important where a nomination involves selection from a large number of potential sites. States Parties are reminded that selection on a national basis without such a global analysis is unlikely to provide a sound basis for a serial approach.

IUCN recommends that the World Heritage Committee also notes that karst systems are relatively well represented on the World Heritage List and that further guidance to States Parties would be beneficial to indicate the increasingly limited potential for further inscriptions of karst sites on the World Heritage List.

Map 1: Location of nominated property



01 Grotte d'Aménineau	07 Grotte de Lauzinas	13 Réseau André Lachambre
02 Grotte de Choranche	08 Grotte du TM 71	14 Réseau du Rautely
03 Aven Armand	09 Réseau Cabrespine-Lastours	15 Aven du Mont Marcou
04 Grotte des Demoiselles	10 Gouffre d'Esparros	16 Grotte de la Cigalère
05 Balme del Pastre	11 Grotte de Pousselières	17 Aven d'Orgnac
06 Grotte de l'Aguzou	12 Grotte de Clamouse	18 Barrencs de Fournes

EUROPE / NORTH AMERICA

THE DOLOMITES

ITALY

WORLD HERITAGE NOMINATION – IUCN TECHNICAL EVALUATION

THE DOLOMITES (ITALY) – ID No. 1237

1. DOCUMENTATION

i) **Date nomination received by IUCN:** April 2006

ii) **Additional information officially requested from and provided by the State Party:** IUCN requested supplementary information on 19 September 2006 before the IUCN Evaluation Mission and on 1 November 2006 after the IUCN Evaluation Mission. On 2 February 2007 IUCN requested supplementary information and provided clarification on the issues previously raised to assist the State Party in the preparation of this supplementary information. The State Party responses were submitted on 27 November 2006 and 27 February 2007, including a revised nomination, revised management plan, revised boundaries and responses to all the issues raised by IUCN.

iii) **UNEP-WCMC Data Sheet:** 1 reference (nomination)

iv) **Additional literature consulted:** Embleton, C. (ed.) (1984). **Geomorphology of Europe.** Macmillan, London. Hancock, P.L. and Skinner, B.J. (eds.) (2000). **The Oxford Companion to the Earth.** Oxford University Press. IUCN (2005). **Geological World Heritage: A Global Framework.** IUCN. Thorsell, J. and Hamilton, L. (2002). **A Global Overview of Mountain Protected Areas on the World Heritage List.** IUCN. Weidert, W.K. (ed.) (2001). **Klassische Fundstellen der Paläontologie.** Goldschneck Verlag, Korb.

v) **Consultations:** 9 external reviewers. Extensive consultations were undertaken during the field visit with: representatives of local governments and authorities; technical staff working in the different nature parks and reserves; geology and landscape experts; researchers; and with other stakeholders.

vi) **Field visit:** Gerard Heiss, September 2006

vii) **Date of IUCN approval of this report:** April 2007

2. SUMMARY OF NATURAL VALUES

The Dolomites are a mountain range in the northern Italian Alps, including 18 peaks which rise to above 3,050 m. The characteristic rock type of the range is dolomite (also called dolostone or dolomitic limestone), a carbonate rock formed from the mineral dolomite (Calcium Magnesium Carbonate). The rock type, mineral and the mountain range itself is named after the 18th century French mineralogist Déodat de Dolomieu, who was the first to describe dolomite from this area.

The nominated property comprises a series of sites that together are regarded by the State Party as encompassing the most significant natural values of the mountain range as a whole. The nomination as originally submitted comprised 27 sites in 22 clusters and covered an area of 126,735.45 ha. A substantially revised nomination document, still based on this configuration, was submitted on 27 November 2006. In its discussion with the State Party during the evaluation process, IUCN recommended however that the number of sites within the series be reduced to focus on the key natural features of the Dolomites, and suggested, as an option, the selection of two larger core areas – one focussed on the more accessible and more visited areas, or 'tourist zones' (e.g. Fanes / Dolomiti di Sesto / Cristallo / Pelmo-Nuvolau), and another one focussed on the more remote wilderness-like areas (e.g. Dolomiti Friuliane). IUCN suggested that two larger core areas would also have a greater potential to meet the necessary conditions of integrity. The State Party subsequently submitted a further fully revised nomination document including major boundary revisions on 27 February 2007. This latest version of the nomination proposes a series of 13 sites of varying sizes (see Table 1).

Important natural features of the nominated property include:

- The landscape and geomorphology of the Dolomites is characterised by vertical walls, with sheer cliffs over 1500 m in height, and a high density of extremely narrow, deep and long incisions. The density of the pinnacles, peaks and towers, almost always reaching hundreds of metres in height, is another important feature. The combination of different types of terrain with varying erodibility and geo-mechanical characteristics, horizontal and vertical, makes the Dolomites a natural geomorphology laboratory.
- The Dolomites represent a large part of the Mesozoic Era in a continuous manner; in particular they are an important reference area for the

Table 1: Area of the core and buffer zones of the nominated property

Name of the site	Core zone (ha)	Buffer zone (ha)
Civetta-Moiazza	2,489.14	1,987.30
Pelmo - Nuvolau	4,581.76	4,049.88
Sett Sass	268.00	144.37
Marmolada	1,601.63	992.83
Pale di S. Martino - S. Lucano	9,080.90	6,811.45
Dolomiti Bellunesi - Vette Feltrine	15,545.02	19,554.57
Dolomiti Friulane (Dolomitis Furlanis) e d'Oltre Piave	19,233.97	27,843.43
Cadini, Dolomiti di Sesto, Dolomiti di Ampezzo, Dolomiti di Fanes, Senes and Braies / Cadini, Sextner Dolomiten, Ampezzaner Dolomiten, Fanes Dolomiten, Sennes, Prags	43,145.26	17,699.92
Dolomiti Cadorine	8,309.32	9,175.90
Puez - Odle/Puez-Geisler/Pöz - Odles	7,834.94	2,896.89
Sciliar/Schlern - Catinaccio/Rosengarten - Latemar	8,231.70	5,405.35
Rio delle Foglie/Bletterbach	271.61	547.43
Dolomiti di Brenta	9,239.35	6,097.70
Total area (ha)	**129,832.60**	**103,207.02**

Triassic period and one of the best examples of the preservation of depositional geometries of Mesozoic carbonate platform systems, documenting the recovery and evolution of life following the Permo-Triassic extinction crisis. In relation to geological processes, the property illustrates the interaction between volcanism and terrigenous carbonate sedimentation. Through their outcrops, the Dolomites permit the accurate reconstruction of the evolution of a passive continental margin and the successive collisional phases over more than 250 million years.

- The Dolomites contain approximately 2,400 vascular plant species, with 1,700 of these occurring at an altitude greater than 1,600 m. This is approximately 30% of the entire number of vascular plant species in Italy. The Dolomites feature 55 different types of forests, more than 50% of those of the entire Veneto region. A number of relict, endemic and rare species occur.

It is further noted that pioneering studies on stratigraphy, mineralogy, sedimentology and palaeontology have been undertaken in the Dolomites by leading geologists since the 18th and 19th century. The area has provided a natural laboratory for countless academics who have studied and worked here, including Giovanni Arduino (1714-1795), Déodat de Dolomieu (1750-1801), Alexander von Humboldt (1769-1859), Leopold von Buch (1774-1855), Edmund von Mojsisovics (1839-1907) and Ferdinand von Richthofen (1833-1905). The Latemar reef is amongst the best investigated carbonate platforms of the world.

3. COMPARISONS WITH OTHER AREAS

IUCN starts its comparative approach to this nomination from the standpoint of identifying whether the Dolomites as a whole (as opposed to the individual sites nominated) can be considered to be a mountain area of potential outstanding universal value. In general, although there are more than 60 mountain areas already inscribed as natural or mixed properties on the World Heritage List, none is primarily dolomitic or appears to display the same key natural features that are significant in the Dolomites as discussed below.

Aesthetic and landscape values: In general, the Dolomites are widely regarded as one of the most attractive parts of the European Alps, although they are far from being the highest or containing the largest glaciers. This is due to the combination of the colour of the rocks and their verticality and variety of form. The degree of dissection of the landscape, with broad valleys between near vertical cliff faces, makes the mountains unusually accessible and visually impressive. Comparable areas in the Alps include the northern calcareous Alps in Austria and Germany, and the calcareous western pre-Alps in France. However, these mountain areas are less impressive and colourful than the Dolomites. Elsewhere in Europe, the mixed World Heritage property of the Pyrénées - Mont Perdu (France and Spain) has spectacular limestone formations (e.g. the Cirque de Gavarnie or the Ordesa Canyon), although it is noted that the Triassic period plays a negligible role for the geology and geomorphology of this area. Also, the values within the Dolomites are clearly distinct from the World Heritage

property of Jungfrau-Aletsch-Bietschorn in Switzerland, due to the entirely different mountain topography.

There are many spectacular mountain landscapes elsewhere in the world, some of which are already on the World Heritage List. In North America, Waterton Glacier International Peace Park (Canada and USA) and the Canadian Rocky Mountain Parks include spectacular limestone mountains. Other comparable sites with similar topography in the Alberta and Montana Rockies (Canada and USA) and parts of the Karakoram Mountains (Pakistan) are also more pristine but feature different rock types.

However, the distinct and dominant landscape feature of the Dolomites is their spectacular limestone formations such as pinnacles, peaks and towers, almost always reaching hundreds of metres in height. Such a concentration of spectacular towers, peaks and pinnacles (e.g. Vajolet Towers, Cimon della Pala, Towers of Val di Roda, Focobon, Croda da Lago, Campanile Basso, Geislerspitzen, Cinque Torri, Marmarole, Campanile di Val Montanaia) and high vertical walls (e.g. Agner, Civetta, Burell, Sass Maor, Cima della Madonna, Torre and Spiz di Luganaz, Tofane) is outstanding even in the global context. The Agner north wall (1,600 m) is one of the highest vertical walls in the Alps, almost comparable in height with the famous Eiger north wall (1,800 m) in the Jungfrau-Aletsch-Bietschorn site, and one of the highest walls in any limestone mountains in the world.

Geological and geomorphological values: The Dolomites are of international significance for geomorphology as the classic site for the development of mountains in dolomitic limestone. The landscape is dynamic with frequent landslides (by the standards of geological timescales), floods and avalanches. This is shared with other high mountain areas; however the widespread presence in the Dolomites of massively jointed rocks over much weaker rocks encourages large scale slope failures as valleys are deepened by fluvial and glacial erosion. The Dolomites are also notable within the Alps for their small glaciers, including at comparably low altitudes, which are excellent indicators of climate change in mountain areas. Further comparative analysis is however required to investigate these values in a more comprehensive manner.

Important values in relation to the geology and stratigraphic succession of the Dolomites include:

- They represent an important interval of the Earth's history, specifically the Permian-Cretaceous Period;
- They exhibit important physical and/or biostratigraphic links between marine and continental palaeoenvironments;
- They include important fossil sites;
- The exhibit a complete geological record; and
- They illustrate carbonate shelf systems after the Permo-Triassic extinction crisis due to the preservation of specific complexes and the possibility of correlation between different areas.

The most important interval of the stratigraphic succession within the Dolomites is in that of the Permo-Triassic period, including its record of the Permian/Triassic boundary. The nomination notes that this interval of time is well represented in other mountain areas including in Switzerland, Germany, Austria, Hungary, Slovenia, Canada and the USA, and parts of the Himalayan range. Whilst these values are significant for geologists, IUCN notes that stratigraphic sites have previously been regarded as potentially too large a topic for World Heritage listing. Values represented at stratigraphic sites are relatively widespread globally, and whilst the Dolomites can be regarded as one of the world's important successions, there are others of equal importance in different depositional environments found in many other countries and continents. The Dorset and East Devon Coast World Heritage property (United Kingdom) contains a succession through the Triassic, Jurassic and Cretaceous periods, in combination with a number of internationally important vertebrate fossil sites and classic coastal geomorphology. Fossil values of the Triassic period are already included on the World Heritage List in the Ischigualasto / Talampaya Natural Parks (Argentina) and Monte San Giorgio (Switzerland, with potential for extension into Italy). The values of these properties, which are unequalled in their display of vertebrate fossils, exceed those of the Dolomites in conveying the diversity of terrestrial and marine life in the Triassic period.

Biological and ecological values: The Southern Alps are the richest region for vascular plants within the Alpine chain. However, the floral diversity of the nominated property is not significantly different from the diversity which can be found in other parts of the Southern Alps. In the Maritime Alps (e.g. Mercantour National Park, France and Argentera Nature Park, Italy), vascular plant diversity is considered at about the same level (2,400 plant species). A similar conclusion can be applied to endemism. According to data from WWF, many other sites in the Alps reach equal or higher levels of endemic and rare species than the nominated property. Despite an impressive number of more than 10,000 animal species, including at least 1,600 butterfly species, the faunal diversity of the nominated property does not stand out when compared to other mountain areas already on the World Heritage List. Several of the noteworthy mammals and birds also require larger and less fragmented areas for protection of viable populations than are included in the nominated property. In a global context, neither the flora nor the fauna of the proposed site are of outstanding value in relation to their diversity and endemism.

In summary, on the basis of the above comparative analysis, IUCN concludes that there is potential for World Heritage listing based on the natural values of the Dolomites; however this potential lies primarily in the aesthetic and, in particular, geomorphological values of the Dolomites. The geological values in terms of stratigraphy, carbonate systems and palaeontology are an essential and supporting element of these values, but in their own right are well demonstrated in other areas, too specialised to provide a strong argument for outstanding universal value, and/or exceeded in value by existing World Heritage properties. Biological and ecological values also appear to be matched across the region and thus the Dolomites are of importance at a regional rather than an international level. Therefore, IUCN considers there is not a basis for arguing for outstanding universal value of the Dolomites in relation to biodiversity values.

The latest version of the nomination proposes a series of 13 sites which aim to best represent the most significant natural values of the Dolomites. The nomination is complex; for example, the justification for inscription is based on 18 different arguments. Also, the submission of three different nomination documents (each over 500 pages long) during the evaluation process has made the completion of the evaluation and comparative analysis very difficult. On the basis of the overall evaluation of World Heritage potential within the Dolomites, IUCN concludes there is a potential case for outstanding universal value under two of the natural criteria: (vii) and (viii). However, IUCN considers the present basis for the nomination is too broad, and that the selection of sites to provide the basis for the nomination needs to be carefully reconsidered to emphasise the key aesthetic, geological and, in particular, geomorphological values of the Dolomites. A fuller global comparative analysis is also required to support the case for World Heritage listing in relation to these values.

4. INTEGRITY

4.1 Legal status

The situation in relation to the legal status of the different sites is complicated. The original nomination document lists up to nine different applicable regulations per site and province. In most cases, one site is shared by two provinces with different legal regulations. The majority of the nominated core zones is protected as nature parks (one core zone is also largely within a national park). Although this level of protection is considered sufficient in most cases for geological and geomorphological features, IUCN considers the existing regulations are insufficient in several cases for the effective preservation of landscape features in the Dolomites. The current legal complexity is also reflected in different management arrangements for the different sites, as discussed below. IUCN considers that a more transparent, effective and coordinated legal framework for the protection of the nominated sites would be desirable before any potential inscription of sites within the Dolomites.

The nomination outlines the land tenure situation for each site within the series. The majority of the nominated property is in public ownership. However, public property, under the definition applied in the nomination, does not mean state owned property only, but also includes land managed at the regional, provincial and municipal level. Therefore, a significant part of the property, if not the majority, is in the hands of municipalities and private owners. This is likely to represent a challenge for future management in relation to both coordination between the different levels involved and also the development and implementation of an effective overall management strategy.

4.2 Boundaries

The boundaries of the nominated core zones and their surrounding buffer zones are all clearly mapped. The State Party has amended the original selection of 22 clusters to propose the inscription of 13 sites. IUCN comments further on the selection of the nominated sites below (see section 5.1).

4.3 Management

A management plan for the whole of the originally nominated series was provided with the original nomination. This gives a clear impression of the responsibilities of the different park authorities (monitoring, communication, information and promotion). However, common objectives and a strategy for the management of the entire series do not exist, and the plan states that "the greatest difficulty encountered in proposing a unitary conservation plan lies in the impossibility of harmonising, at least over the short-medium term, the legislative systems of the various Provinces and Regions" concerning the safeguarding of nature". The plan is therefore at best an agreement for the coordination of the activities but a single management plan for the entire series does in fact not exist. The most recent information from the State Party from February 2007 notes that the management plan underscores the commitment by the five provincial administrations to ensure that the sites within the series are managed along the same lines. The State Party further notes that should the Dolomites be inscribed, the aims of the administrations would quickly be transformed into regulations and actions. IUCN notes this as a positive step in the right direction but that it currently falls short of the requirements for an integrated and effective management structure for the nominated property as a whole.

4.3.1 General situation of management

Management authorities exist for the nature parks and the national park within the nominated property. However, no management authority has full power on any territory, even within the national park. The responsibility is limited mostly to tourist information and facilities as well as some control function in relation to the regulations. Park authorities may influence and prohibit works if they are not consistent with the regulations of the protected area, but the decisions on the territory are taken by the land owners and those authorities responsible for the different uses of the land (for example, the forest authority is responsible for forest management and the water authority is responsible for water management). Some concerns have also been raised in relation to how effectively regulations have been and are implemented. For example, during the field visit, a new building (built within the last five years) was found at the Fanes refuge (with the capacity and facilities of a hotel) which will enlarge the capacity of the old refuge by at least one third. In another site, the Docoldaura refuge was completely renewed and enlarged to the size of a hotel. However, according to the regulations of the parks, only modernization works are permitted. Both tourist facilities are located within the core zones of the originally nominated series.

4.3.2 Management plans for the different sites

The original nomination document provides information on the status of management plans for the different protected areas, nine nature parks and one national park, in the originally nominated series. Four parks have approved environmental plans, and there is an approved environmental plan in one part of a fifth park stretching across two provinces. Plans are under preparation for the other five parks; one of these will be an environmental plan and the others will be plans under the directives of the Natura 2000 system: the 1992 European 'Habitats

Directive' 92/43/EEC and 1979 'Birds Directive' 79/409/EEC. According to these directives, any works that may potentially change the natural characteristics is not prohibited in general but must be subject to an environmental impact assessment. In conclusion, management plans exist for some of the sites and are under preparation for some others. It is thus noted that the level of management planning for individual sites varies and that further work is required in relation to the development and implementation of consistent management plans for all individual sites within the series, as well as an effective overall management strategy for the nominated property as a whole.

4.3.3 Integration with Geopark proposal for one of the sites

IUCN notes that the westernmost site of the nominated property lies within the Parco Naturale Adamello-Brenta, and that the latest version of the nomination documents notes that this park has recently applied for recognition as a European Geopark. This Geopark proposal is currently under the early stages of consideration by the European Geoparks Network. The integration of the Geopark proposal and its management in line with World Heritage objectives and requirements is a further issue to be clarified in any further development of the nomination.

In summary, IUCN notes the level of coordination, development and implementation of management plans, and the effectiveness of management is not currently sufficient to meet the necessary conditions of integrity. What is needed is the establishment of a management framework for the entire series, as a legally approved document to coordinate the management authorities concerned, with clear objectives and a realistic implementation strategy. However, IUCN also notes that steps outlined by the State Party are moving in the right direction.

4.4 Threats and human use

Tourism pressure and development is a key issue within the nominated property. The Dolomites are a major tourist destination within the Alps and beyond. Existing and future tourism developments, particularly in relation to further development of hotels, refuges, shelters and trails, pose a serious threat. As tourist facilities have reached, or even exceeded, the limits of tolerance for natural World Heritage properties in a number of the core and buffer zones of the nominated property, there in an urgent need for more effective planning, management and regulation of tourist facilities and activities that are consistent with the carrying capacity of the nominated property. An integrated tourism management strategy for the Dolomites is required which ensures that natural values are not compromised by inappropriate tourism development. In particular, there is a need for effective strategies and measures to manage and minimise tourism impacts within tourist zones, and to protect important natural and wilderness-like areas from tourism impacts, such as the Dolomiti Friuliane. Such an integrated tourism management strategy should also address and develop effective strategies and measures for the management of specific activities, such as climbing.

Public roads have been excluded from the originally nominated series wherever possible. This led to a high degree of fragmentation resulting from both the number of sites and the specific boundaries proposed. IUCN's suggestion to create larger, continuous core areas, if followed, would include some public roads in the nomination, and it may be desirable to consider road restrictions or closures (an initiative for closing the road up Val Cimoliana already exists but has not been realized up to now). Roads not open to the public can be found in many sites within the series. In forested areas, these roads are in use for forestry activities and also hunting (hunting is prohibited in all parks in all provinces except for Bolzano). Several roads are also found in high mountain areas above the treeline. These roads remain from World War I and are now used to supply and service refuges and shelters.

Limited forest exploitation (sanitary cuttings) is permitted in forests within the nominated property. The intensity of these forestry activities is low and commonly limited to sanitary cuttings of individual trees. However, no legal prohibition of clear cuttings exists. Summer pasture activities are found within the nominated property as well. While cattle are limited to the few fertile grazing grounds, sheep are found in many places within the nominated property.

In conclusion, IUCN considers that the nominated property currently does not meet the conditions of integrity as required under the Operational Guidelines.

5. ADDITIONAL COMMENTS

5.1 Justification for serial approach

When IUCN evaluates a serial nomination it asks the following questions:

a) What is the justification for the serial approach?

A serial approach may be justified in relation to the nomination of the Dolomites in order to bring together key areas that together represent the most significant natural values of the mountain range as a whole. IUCN considers, however, that such areas should be identified at a landscape scale and should be large and continuous enough to encompass the principal values of the mountain landscape and to meet the necessary conditions of integrity. As previously noted, the State Party submitted a fully revised nomination on 27 February 2007 which includes a proposal for the inscription of 13 sites.

IUCN notes this revised nomination as a positive step in the right direction but feels that further work is required before a clear case for outstanding universal value can be established. In particular, IUCN notes that the 13 sites still contain areas where the long-term integrity is questionable, either due to reasons of small size or for reasons relating to development pressures (for example, skiing facilities within Marmolada). There are also significant separations still between the different sites within the series in terms of both the core and buffer zones. Given that the principal values of the Dolomites are as a mountain landscape, the fragmented nature of the nominated property does not represent these values in a way that meets the expectations of wholeness set out in the Operational Guidelines.

b) Are the separate components of the property functionally linked?

The 13 sites proposed in the latest version of the nomination are functionally linked in the sense of representing complementary natural values of the Dolomites; however the functional linkage is compromised by the degree of fragmentation between and within the different sites. It is essential to address this fragmentation in any further development of the nomination through a re-configuration of the nominated property and a corresponding strategy that further strengthens functional linkages.

c) Is there an overall management framework for all the components?

As noted above, a management plan for the whole of the originally nominated series was provided with the original nomination, but is considered to be more an agreement for the coordination of the activities of different authorities than a single cohesive management plan for the entire series. Further work is underway and required in relation to the development and implementation of an effective overall management strategy for the nominated property as a whole.

6. APPLICATION OF CRITERIA

The property has been nominated under all four natural criteria.

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

The Dolomites are widely regarded as a mountain area with a distinctive aesthetic appeal and as one of the most attractive parts of the European Alps. The attraction is due to the combination of the colour of the rocks and their verticality and variety of form. The degree of dissection of the landscape, with broad valleys between near vertical cliff faces, makes the mountains unusually accessible and visually impressive. The degree to which these values can be regarded as being of outstanding universal value has not been verified by comparative analysis. The nomination as presently proposed undoubtedly contains some of the areas necessary to convey these values, but it also contains areas which are not relevant to them. As noted above, IUCN also considers that a discontinuous series of 13 sites within the Dolomites does not meet the conditions of integrity required under the Operational Guidelines for conveying and maintaining these aesthetic values and landscape features.

Therefore, IUCN considers that parts of the nominated property have the potential to meet this criterion as part of a more focussed and coherent nomination.

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

The Dolomites are of international significance for geomorphology as the classic site for the development of mountains in dolomitic limestone. The landscape is dynamic with frequent landslides (by the standards of geological timescales), floods and avalanches. Further comparative analysis is required to fully investigate these geomorphological values, as relatively little comparison is provided in the nomination document. The Dolomites also have an international significance for geology in relation to their stratigraphy, carbonate systems and palaeontology. These geological values are important supporting values to the primarily geomorphological values of the Dolomites. They should be a secondary focus in relation to the potential for World Heritage listing.

Therefore, IUCN considers that parts of the nominated property have the potential to meet this criterion, especially in relation to their geomorphology, as part of a more focussed and coherent nomination.

Criterion (ix): Ecological and biological processes

The nominated property shows a high degree of fragmentation resulting from both the number of sites and the specific boundaries proposed. The different mountain groups are separated by deep valleys, which are seriously affected by human activities, and tourism has also a significant impact on a number of the nominated sites. The nominated property is too fragmented and too affected by human activities for natural ecological and biological processes to take place in an undisturbed way.

IUCN considers that the nominated property does not meet this criterion.

Criterion (x): Biodiversity and threatened species

Biodiversity of the nominated property is at a level typical for the region and the diversity of specific groups, such as vascular plants, is comparable with other regions within the Southern Alps. In terms of its biodiversity values, the nominated property is therefore of importance at a regional rather than a global level and, in particular, there are no compelling arguments for these biodiversity values being at the level necessary for World Heritage listing, although there are values which should certainly be priorities for future site management.

IUCN considers that the nominated property does not meet this criterion.

7. RECOMMENDATIONS

IUCN recommends the World Heritage Committee **not to inscribe** The Dolomites, Italy, on the World Heritage List on the basis of criteria (ix) and (x).

IUCN recommends that the World Heritage Committee **defers** the examination of the nomination of The Dolomites, Italy, to the World Heritage List on the basis of criteria (vii) and (viii) to allow the State Party to bring forward a more focused and coherent nomination that meets the conditions of integrity.

IUCN recommends that the World Heritage Committee recommends the State Party to consider the following issues in the revision of the nomination:

a) Refocus the nomination around the aesthetic, geological and, in particular, geomorphological values of the Dolomites (criteria (vii) and (viii)). These values should be confirmed through a global comparative analysis of the geomorphological, geological (stratigraphy, carbonate systems, palaeontology) and aesthetic aspects that can be regarded as being of outstanding universal value in comparison to mountains already inscribed on the World Heritage List, and other comparable mountains elsewhere in the world; and

b) Make a new selection of a site or a much more coherent series of sites to convey those values at a landscape scale, and avoid including very small sites that represent very locally specific values. IUCN has suggested in this evaluation report a more appropriate configuration.

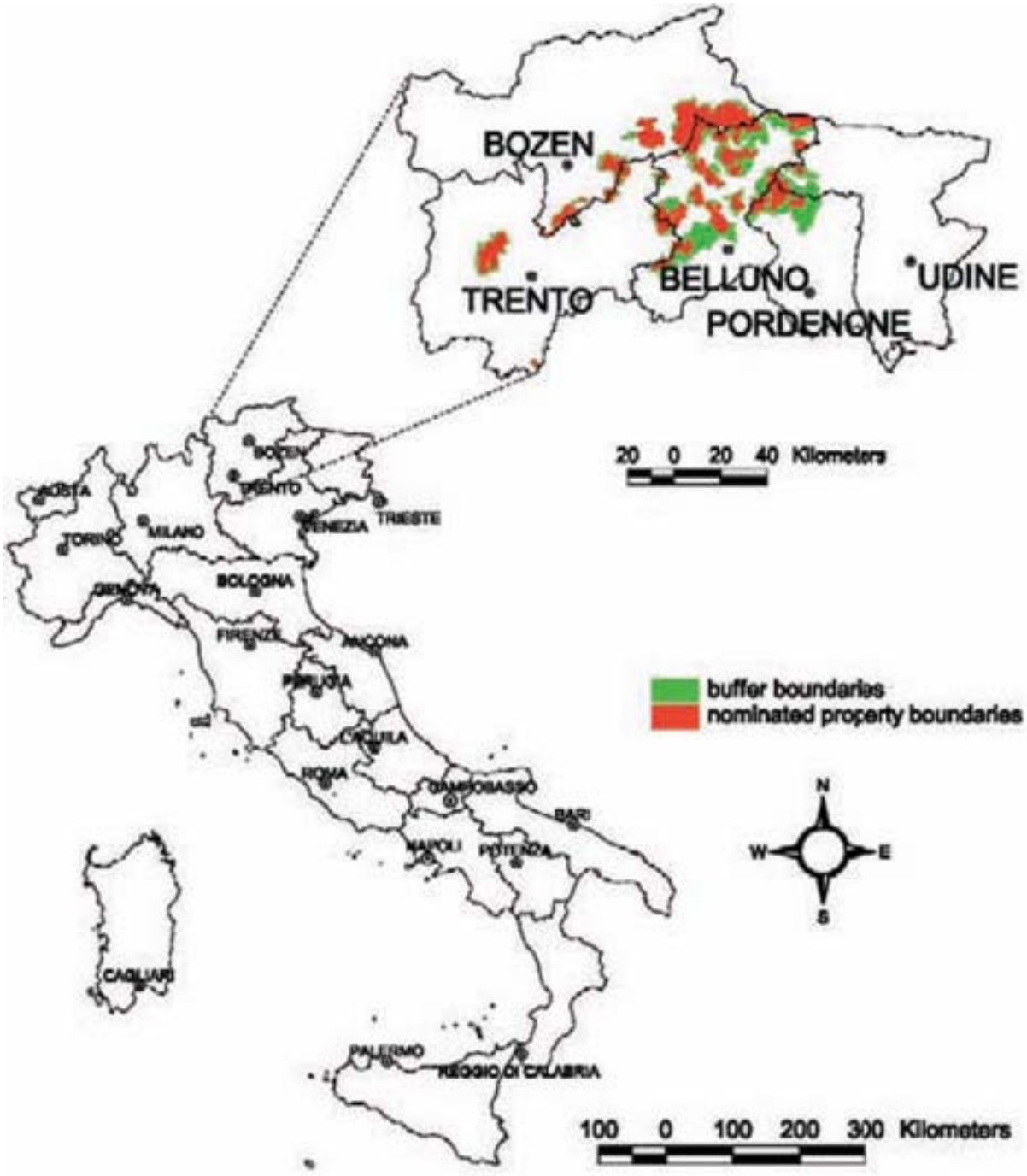
IUCN recommends that the World Heritage Committee further recommends the State Party to address the following specific areas of concerns to meet the conditions of integrity in relation to the requirements for protection and management:

a) Ensure that transparent, effective and coordinated legal protection is in place for the entire series that is eventually proposed;

b) Establish a management framework for the entire series, as a legally approved document to coordinate the management authorities concerned, with clear objectives and a realistic implementation strategy; and

c) Consider the need for more effective planning, management and regulation of tourist facilities and activities that are consistent with the carrying capacity of the nominated property. Tourist facilities have reached, or even exceeded, the limits of tolerance for natural World Heritage properties in a number of the core and buffer zones of the nominated property.

Map 1: Location and boundaries of nominated property



EUROPE / NORTH AMERICA

PRIMEVAL BEECH FORESTS OF THE CARPATHIANS

SLOVAKIA / UKRAINE

WORLD HERITAGE NOMINATION – IUCN TECHNICAL EVALUATION

PRIMEVAL BEECH FORESTS OF THE CARPATHIANS (SLOVAKIA AND UKRAINE) – ID No. 1133

Background note: The IUCN Technical Evaluation of the Primeval Forests of Slovakia, nominated by Slovakia as a serial natural property in 2003, was not discussed at the 28th session of the World Heritage Committee (Suzhou, 2004) because the State Party had requested that this nomination not be examined. IUCN's evaluation highlighted the need for the States Parties of Slovakia and Ukraine to work together to better conserve the remaining beech forests. The States Parties jointly submitted on 31 January 2006 a new nomination for a transnational serial natural property of key remnants of the remaining beech forests which is the subject of this evaluation.

1. DOCUMENTATION

i) **Date nomination received by IUCN:** April 2006

ii) **Additional information officially requested from and provided by the States Parties:** IUCN requested supplementary information on 20 November 2006 after the IUCN Evaluation Mission. The States Parties response was submitted on 30 November 2006, including detailed species lists and responses to all the issues raised by IUCN.

iii) **UNEP-WCMC Data Sheet:** 3 references (including nomination)

iv) **Additional literature consulted:** Commarmot, B. and Hamor, F.D. (eds.) (2005). **Natural Forests in the Temperate Zone of Europe – Values and Utilisation.** Proceedings of the Conference 13-17 October 2003, Mukachevo, Ukraine, Swiss Federal Research Institute WSL, Birmensdorf. Dudley, N. and Phillips, A. (2006). **Forests and Protected Areas.** Best Practice Protected Area Guidelines Series No. 12, IUCN-WCPA. European Committee for the Conservation of Nature and Natural Resources (1986). **Workshop on the Situation and Protection of Ancient Natural and Semi-Natural Woodlands in Europe.** Environmental Encounters Series No. 3, Strasbourg. IUCN (2006). **The World Heritage List: Guidance and Future Priorities for Identifying Natural Heritage of Potential Outstanding Universal Value.** IUCN. Kargel, W. (1990). **Inventory of Natural Primeval and Ancient Semi-Natural Woodlands within the Council's Member States and Finland**. Volumes 1-3. Strasbourg. Thorsell, J. and Hamilton, L. (2002). **A Global Overview of Mountain Protected Areas on the World Heritage List.** IUCN. Thorsell, J. and Sigaty, T. (1997). **A Global Overview of Forest Protected Areas on the World Heritage List.** IUCN. Vološèuk, I. (ed.) (1996). **Red Data Book – Lists of Threatened Plants and Animals of the Carpathian National Parks and Reserves.** Association of the Carpathian National Parks and Protected Areas, Tatranská Lomnica. Vološèuk, I. (1999). **The National Parks and Biosphere Reserves in the Carpathians: The Last Nature Paradises**. Association of the Carpathian National Parks and Protected Areas, Tatranská Lomnica.

v) **Consultations:** 4 external reviewers. Extensive consultations were undertaken during the field visit with: in Slovakia, representatives of the Ministry of the Environment (including the Minister), the Slovak Environmental Agency, Slovak State Nature Conservancy, Poloniny National Park, and Slovak Forests (a state-owned company); and in the Ukraine, representatives of the Rakhiv District State Administration, Uzhansky National Park, Carpathian Biosphere Reserve, and State Forest Research Enterprise.

vi) **Field visit:** David Mihalic, September – October 2006

vii) **Date of IUCN approval of this report:** April 2007

2. SUMMARY OF NATURAL VALUES

The Primeval Beech Forests of the Carpathians is a transnational serial property comprising ten separate components (see Table 1). These components stretch along a 185 km axis from the Rakhiv Mountains and the Chornohirskyi Range in the Ukraine, west along the Polonynian Ridge (and across the national border), to the Bukovské Vrchy and Vihorlat Mountains in Slovakia. The nominated properties are surrounded by buffer zones (not nominated) and ecological "connecting corridors" (also not nominated).

Table 1: Area of the core and buffer zones of the nominated property

Name of the site	Country / Region	Core zone (ha)	Buffer zone (ha)
Chornohora	Ukraine, Transcarpathian Region	2,476.8	12,925.0
Havešová	Slovakia, Prešov Self-Governing Region	171.3	63.99
Kuziy - Trybushany	Ukraine, Transcarpathian Region	1,369.6	3,163.4
Maramarosh	Ukraine, Transcarpathian Region	2,243.6	6,230.4
Rook	Slovakia, Prešov Self-Governing Region	67.1	41.4
Stuica - Bukovské Vrchy	Slovakia, Prešov Self-Governing Region	2,950.0	11,300.0
Stuzhytsia - Uzhok	Ukraine, Transcarpathian Region	2,532.0	3,615.0
Svydovets	Ukraine, Transcarpathian Region	3,030.5	5,639.5
Uholka - Shyrokyi Luh	Ukraine, Transcarpathian Region	11,860.0	3,301.0
Vihorlat	Slovakia, Prešov Self-Governing Region	2,578.0	2,413.0
Total area (ha)		**29,278.9**	**48,692.7**

The nominated properties can be briefly described as follows:

1. **Chornohora**, Ukraine: diverse beech forest communities in the Carpathian Biosphere Reserve and representative of what natural beech forests originally looked like in much of Central Europe.
2. **Havešová**, Slovakia: Havešová National Nature Reserve contains nearly homogenous, largely mono-dominant mature beech forests and the tallest and largest European beech specimens in the world.
3. **Kuziy-Trybushany**, Ukraine: oak-beech-fir forests in the Carpathian Biosphere Reserve and remarkable because of their diverse forest communities and 35 Red Data Book species.
4. **Maramorosh**, Ukraine: mostly mixed beech-spruce and beech-fir forests in the Carpathian Biosphere Reserve and near the Romanian Maramures National Park.
5. **Ro•ok**, Slovakia: Ro•ok National Nature Reserve, within the buffer zone of Poloniny National Park, contains nearly homogenous, largely mono-dominant mature beech forests.
6. **Stu•ica-Bukovské Vrchy**, Slovakia: a continuous complex of primeval beech forests comprising four forest preserves and parts of the core zone of Polininy National Park, extending along the Slovakian, Ukrainian and Polish borders, and connecting directly to Stuzhytsia-Uzhok.
7. **Stuzhytsia-Uzhok**, Ukraine: a part of the Uzhanskyi National Park containing mature beech forests, extending along the Ukrainian, Slovakian and Polish borders, and connecting directly to Stu•ica-Bukovské Vrchy.
8. **Svydovets**, Ukraine: diverse beech forest communities in the Carpathian Biosphere Reserve and the richest flora in the Ukrainian Carpathians.
9. **Uholka-Shyrokyi Luh**, Ukraine: 65 different forest communities across a range of environmental conditions, with beech trees up to 55 m in height and 130 cm in diameter and with a number of endemic and relict species, form this so called phytocoenotic core of the Carpathian Biosphere Reserve.
10. **Vihorlat**, Slovakia: Vihorlastský National Nature Reserve contains primeval beech forests and is part of Vihorlat Protected Landscape Area.

Temperate forests in Europe cover a large bioclimatic spectrum. “Virgin” or primeval temperate forests are rare in Europe due to the long-lasting, continuous human use of forests and due to high human population densities. Beech forests once covered 40 percent of Europe, following their re-colonisation of Europe about 6,500 years ago from refugia in the Balkans (Dinar Mountains and the Southern Carpathians), where they had persisted during the last ice age. As European civilization developed forests were extensively clear-cut for agriculture, used, altered, managed and impacted by humans. Nonetheless, they were appreciated for their natural values and protected as hunting or forest reserves. Some of the nominated properties have had formal protection for over 100 years.

The European beech (*Fagus sylvatica*) is the main climax tree species in the temperate zone of Central Europe and a significant forest element in an area extending west to northern Spain, north to southern Sweden and England, east to Poland and the Carpathian Arc, and south to the Apennine and Balkan peninsulas. The nominated properties are part of a continuous arc of natural and semi-natural beech forests in eastern Slovakia and the western Ukraine along the Eastern Carpathians, and belong to the Middle European Forest Biogeographical Province of Udvardy’s classification.

The European beech exhibits one of the most peculiar life-strategies of all tree species in the world: it is adaptable to very different environmental conditions, but, where life conditions are suitable, it tends to an absolute dominance. While this is not unusual for some species in early

successional stages, beeches occupy a site (as small as 30-50 ha) and hold it over indefinite generations, through all stages of succession, and without leaving space for the colonization of other tree species. This is an almost unique feature in ecology and violates some basic scientific theories on ecosystem organisation and functioning. On optimum sites the European beech establishes itself so well that no other tree species are able to co-exist and underlying ecological processes become so effective that attempts to convert beech forests to spruce monocultures have failed. Thus, natural European beech forests are often mono-dominant stands of this single species, but nevertheless they display an enormous spectrum of different plant (and related animal) associations below their canopies.

The ecology and biodiversity of beech forests is not linked to a single stand but to a great variety of forest types (including their species sets) throughout its range. The nominated areas chronicle the ability of the European beech to adapt to so many different ecological regimes with the consequent very high number of different and varying forest associations. The nominated property contains 123 forest associations that represent most of the forest associations found across its original range from low to high mountain beech forests (300 m to 2,061 m above sea level) and major forest types from oak-beech at lower elevations to fir-beech-spruce at higher elevations. The series is at a climatic crossroads of warm and cool summer Atlantic-Continental regimes. The series spans the corresponding temperature and precipitation gradients, aspect and slope gradients, and a broad range of bedrock (crystalline, limestone, flysch, andesite), soil types and soil depths (from shallow soils on limestone ridges to deep soils on flysch slopes).

The nominated property contains an invaluable genetic reservoir of beech and many species associated and dependent on these forest habitats, and a variety of other European forest flora and fauna found here but not restricted to these specific habitats. This includes all major plant and animal species normally found in higher-elevation European forests of all tree species, especially those that are rare or dependent on virgin, undisturbed forests, such as black stork. While larger and more well-known species considered rare and unique (brown bear, bison, wolf, wildcat, lynx, elk, etc.) occupy the nominated area, they are not dependent on it and are much better represented in other World Heritage properties. The same is true of vascular plants, although the nominated area contains more than 1,067 vascular plant species, 80 of which are red-data-book listed. However, these species add to the ecological complexity and completeness of these systems.

The nominated serial property represents all stages of beech forests in their entirety, contains the largest remaining primeval beech forests in Europe, the largest and tallest beech specimens in the world, and all the necessary elements essential for the long-term conservation of the various beech forest types and their associated ecological processes. The nominated property contains entire and complete naturally functioning ecosystems.

The nominated sites are true “virgin”, primeval forests that are original in structure, have developed under natural conditions, and have never been subject to use or management (except for protective conservation measures). The evidence is not only visual (no cut stumps, soil disturbance, etc.) but biogeochemical (i.e. the carbon/nitrogen ratio is markedly lower (10 times) than that found in natural, but disturbed, beech forests). These values have attracted long-term, scientific study using common, internationally accepted methodology for over 50 years in all biological stages (birth, growth, aging, death and decay) of these natural sites and their complex ecological systems over time, and will continue to be critically important to the understanding of the effects of global climate change in temperate regions.

3. COMPARISONS WITH OTHER AREAS

There are a total of eleven beech species in the northern hemisphere, one each in Europe, Western Asia, Taiwan, two each in Japan and North America, and four in southern China. The former ranges of all these species are centres of civilization with a dense human population and extensive agriculture. Today these species persist only in small undisturbed refugia and for more than half of the species it is even unclear whether there are any remaining undisturbed areas.

Forest protection differs widely among European countries Systematic analysis of strictly protected forest areas in 19 COST (European Cooperation in the Field of Scientific and Technical Research) countries, 8 central and eastern European countries, and Russia found 0.3 million ha virgin forests in 2,500 reserves with an average size of 100 ha. Scattered relics of original forest still exist in remote (mountainous and wetland) areas mainly in the Alpine, Balkan and Carpathian biogeographic regions. The 1997 IUCN theme study “A Global Overview of Forest Protected Areas on the World Heritage List” identified portions of the Carpathian region as areas which may merit consideration for nomination to the World Heritage List.

While the nomination is not representative of all types of original beech forest (e.g. lowland, less than 250 m above sea level, is not represented) that once covered Europe, it is representative of indigenous, natural European beech forests growing on middle and upper mountain areas; representing biomes that have mostly been devastated elsewhere across Europe.

There are a number of comparable World Heritage properties in Europe (see Table 2) and elsewhere. The montane forests of the Pyrénées - Mount Perdu (France and Spain) contain European beech but are not old-growth, virgin forest. Pirin National Park (Bulgaria) contains four beech forest associations instead of the 123 existing in the nominated property. Durmitor National Park (Montenegro) includes a 270 ha virgin mixed deciduous forest, much less than the area of over 29,000 ha of virgin forest existing in the nominated property. Inscribed under criteria (ix) and (x) and similar in size to the nominated property, it contains more plant species than the nominated property, including a number of endemics. Plitvice Lakes National Park (Croatia) contains some 14,000 ha of predominant beech forests at lower elevations and beech-fir forests at higher elevations (700 m), but has only 84 ha of virgin forest. Belovezhskaya Pushcha / Bia³owie¿a Forest (Belarus and Poland) was inscribed because of its

large area of remnant mixed deciduous and coniferous primeval European lowland forests which provides important habitats to a number of threatened animals and plants, but it does not include any beech forests.

The Western Caucasus (Russian Federation) lies in the only area in the world where warm-temperate deciduous forests have existed since the Tertiary and is their most important remaining refuge in west Eurasia. Inscribed under criteria (ix) and (x) and ten times the size of the nominated property, it contains oriental beech forests, not European beech forests, and considerably more plant species and threatened species than the nominated property. The Virgin Komi Forests (Russian Federation) cover 3.28 million hectares of tundra and mountain tundra in the Urals and are one of the most extensive areas of virgin boreal forest remaining in Europe, but the European beech does not occur in these forests. Great Smoky Mountains National Park (USA) has diverse deciduous forests with over 130 tree species. American beech is found in the upper elevation "northern hardwood forest" along with other tree species but beech is not a dominant species in these forests. Shirakami-Sanchi (Japan), comparable in size to one of the nominated sites (Uholka-Shyrokyi Luh), includes the last virgin remnants of the cool-temperate deciduous forests that once covered the montane areas of Japan. Siebold's beech dominates these forests and attains maximum heights of only 29 m which is much lower than the 56 m heights reported for the European beech in the nominated sites.

From an ecological and conservation perspective, the consensus of a number of experts is that the best remnants of beech forests are situated in the Trans-Carpathian Mountains. The nominated sites are supposedly the best example of this forest type – and its associated ecological processes – that still remains and are a significant part of the very last remnants of Europe's original nature. Fragments of previously disturbed mixed beech forests are found elsewhere but they are not of the same quality neither enjoying the same level of protection of the beech forests included in the nominated property. However, Germany has some significant old-growth beech forests that may extend the coverage of Europe's original beech forests in the World Heritage List. In other parts of the world, serial World Heritage properties (e.g. Central Eastern Rainforest Reserves, Australia and Atlantic Forest South-East Reserves, Brazil) protect the fragmented remnants of other globally significant forest types.

In conclusion, the nominated serial property contains key remnants of original forests representing almost all types of European beech forests and their associated ecological processes, including mono-dominant beech stands that have the largest and tallest European beech specimens

Table 2: Comparison of biodiversity (species numbers) between the nominated property and some comparable existing World Heritage properties

Name and size of World Heritage property	**Criteria**	**Vascular plants (threatened)**	**Fungi / Mosses / Lichens**	**Birds**	**Mammals**
Primeval Beech Forests of the Carpathians (Slovakia and Ukraine) 29,279 ha	**vii, ix, x**	**> 1,067 (80)**	**> 741 / 444 / > 436**	**101**	**73**
Belovezhskaya Pushcha / Bialowieza Forest (Belarus and Poland) 98,108 ha	vii	632-900 (38)	1,500-3,000 / ? / 210-254	212-232	54-55
Pirin National Park (Bulgaria) 40,060 ha	vii, viii, ix	1,315 (114)	375 / 329 / 367	177	45
Plitvice Lakes National Park (Croatia) 19,200 ha	vii, viii, ix	1,146 (?)	?	140	50
Durmitor National Park (Montenegro) 34,000 ha	vii, viii, x	1,325 (?)	?	163	37
Western Caucasus (Russian Federation) 298,903 ha	ix, x	1,580 (160)	700 / ? / ?	246	60
Virgin Komi Forests (Russian Federation) 3,280,000 ha	vii, ix	?	?	204	43

in the world. The different and varying forest associations (123 in all) are not represented in other World Heritage properties, although most of the species found here are not restricted to these specific habitats and are also better represented in other World Heritage properties. Whilst the nominated sites are not the only remaining undisturbed beech forests in Europe, the extent of the nominated series and the different forest types, stages and ecological conditions it contains, set them apart. These are the best of the last.

4. INTEGRITY

4.1 Legal status

The nominated properties in the Ukraine are all part of the Carpathian Biosphere Reserve, the Uzhanskiy National Park, or the trilateral (with Poland and Slovakia) East Carpathians Biosphere Reserve. They have had protection in some instances for over 100 years with increasing protection from legislation and national decrees since the 1920's. The situation is similar in the Slovakia with the nominated properties being part of either Polininy National Park or protected landscapes (Vihorlat Protected Landscape Area). In terms of their legal status and management regime all the nominated properties are equivalent to IUCN Category I or II protected areas. The surrounding buffer zones (not nominated, but considered as part of the Joint Management Plan) are a mixture of Category I, II and VI protected areas. The nomination also identifies ecological "connecting corridors" (not nominated, but considered essential as part of the Joint Management Plan) that are all within protected forests or existing national parks, biosphere reserves or other protected areas, with a minimum level of protection equivalent to IUCN Category VI protected areas. There are ongoing efforts to further protect these connecting corridors in the Ukraine (through national park designation). The nominated properties and surrounding buffer zones are also protected as NATURA 2000 sites.

All nominated properties are owned by the State and managed by their respective agencies but are also influenced by territorial governing authorities, the Prešov Self-Governing Region in Slovakia and the "General Scheme of Territory Planning" in the Ukraine. Territorial planning in Slovakia with respect to nature protection is similar to the European Ecological Network (EECONET).

4.2 Boundaries

The boundaries of the ten individual properties are adequately mapped and described in the nomination. The level of protection of the nominated sites is very high as the States Parties nominated only strictly protected areas. All nominated properties are within the "A Zone" or core zone of other protected landscape designations. In those nominated properties visited by IUCN, boundaries where trails intersected were clearly marked by signs indicating the protected areas and the strict protection zones. It is suggested that the States Parties clearly mark on the ground the boundaries of all the nominated properties.

The individual components of this serial property are of sufficient size to maintain the natural processes necessary for the long-term ecological viability of the property's habitats and ecosystems. The serial property contains all the necessary environmental conditions (elevation, temperature and precipitation gradients, aspect and slope gradients, and a broad range of bedrock, soil types and soil depths) for the long-term conservation of the various beech forest types and their associated ecological processes. The nominated core zones, together with their buffer zones and the ecological "connecting corridors", are considered sufficient to support ecological linkages.

4.3 Management

The World Heritage Convention is well-respected in both countries and inscription would likely significantly strengthen the current level of protection, enhance law enforcement regarding the nominated properties, and lead to more consistent management across the whole region. The Integrated Management Plan prepared for this serial nomination proposes a Joint Management Committee comprised of representatives from both countries and existing management entities to coordinate management actions and jointly manage the nominated serial property to maintain its values and integrity. While there is some provision for input from local citizens, NGOs and other interest groups (proposed as "bottom up" input), the power of the Joint Management Committee clearly lies with governmental agencies and local and regional planning regimes.

The Slovak State Nature Conservancy, Polininy National Park, Uzhanskiy National Park and the Carpathians Biosphere Reserve now provide management and staff for the nominated properties. Staff in both countries is professionally trained. Some sites (e.g. Vihorlat) do not have managers on-site but the other national park and biosphere reserve sites all have park or science staff in or near the properties including at visitor centres and museums at Nová Sedlica and Rakhiv. The Carpathian Biosphere Reserve has 310 staff, Uzhanskiy National Park has 110 staff, and Polininy National Park and the protected landscapes have 24 professional staff (including 8 rangers) between them and are supported by volunteer "nature guards". Staff will be supported by State Nature Conservancy officials of both countries and will coordinate management of buffer zones, where necessary, with local forestry officials as outlined in the Integrated Management Plan.

In 2004, the Ukrainian budget for the Carpathians Biosphere Reserve and Uzhanskiy National Park was approximately US$ 700,000, while the Slovakian budget for Polininy National Park and the other protected areas was about US$ 250,000 through the State Nature Conservancy. The overall management capacity appears to be sufficient at present, although not as strong in Slovakia as in the Ukraine, but both States Parties should be encouraged to provide additional dedicated funds to support effective implementation of the existing Integrated Management Plan.

The protection and management of the nominated core zones is enhanced by the size and breadth of the buffer zones as well as the proposed ecological "connecting corridors". The present management scheme protects all these areas to some degree, or in the case of the connecting corridors, proposes to increase the level of protection upon inscription. The Integrated Management

Plan, if implemented as proposed, could become a model for joint cooperative management of transnational serial properties with different levels of protection.

4.4 Threats and human use

The individual properties are not threatened at present by developmental pressures as they enjoy strict protection and are part of local and regional territorial planning. Local forestry plans and operations respect the strict protection of the nominated properties and support the nomination. Some tourism is present but numbers are small.

While air pollution, fire, wind-throw, and similar threats may be a concern they probably are not as significant as global climate change. Some forests at lower or higher elevation margins may change species composition as climate change occurs. Considering the long history of scientific research and established monitoring sites within the nominated properties, they offer much value for science in monitoring the potential effects of global climate change. One aspect of these properties' value is the ability of the beech to adapt to so many different ecological regimes (and in a number of different and varying forest associations) throughout its range.

Population in the regions are rural and unemployment is high. Out-migration appears to be prevalent as people seek jobs elsewhere. Because local forest use in buffer zones presently occurs with cutting for subsistence needs, it is assumed this practice will continue. Forestry is important to local people but is managed by State Forest agencies that are supportive of the nomination. The difference between natural forests and "primeval" forests – and perhaps even managed forests – is not well perceived by local populations, primarily because the forested landscape is so pervasive. The nominated properties have enjoyed strict protection for many years even as governments have changed. Management challenges with respect to illegal cutting are not new and will continue regardless of inscription. However, as a World Heritage property, jointly managed according to the goals of the Integrated Management Plan, the nominated properties will increase appreciation and support by local populations through environmental education which would contribute to addressing this and other conservation issues.

In conclusion, IUCN considers that the nominated property meets the conditions of integrity as required under the Operational Guidelines.

5. ADDITIONAL COMMENTS

5.1 Justification for serial approach

When IUCN evaluates a serial nomination it asks the following questions:

a) What is the justification for the serial approach?

The nominated property comprises some of the very last sites of "pristine" nature in Europe. Natural European beech forests are often mono-dominant stands of just this single species but nevertheless display a huge spectrum of different habitats and associated ecological processes below their canopies. Single stands of beech forest do not qualify as a "hot spot" of biodiversity and the number of endemics cannot compete with other (especially tropical) ecosystems in the world. However, the ten separate components of the nomination contain beech forests at their most diverse and display the qualities of a broad range of European beech forest types and associations. As "virgin" or primeval forests, undisturbed by humankind, they are also of significant scientific value. Individually, each component has great value; together, they represent an outstanding example of the ecology of complex temperate forests.

b) Are the separate components of the property functionally linked?

The ten separate components of the nomination are core areas of larger, existing protected areas in a single biogeographic region, with similar overall climatic conditions, across the border of two countries. The property includes specifically selected areas that are located on different bedrock, soil types, slopes and aspects, elevations, temperature gradients, etc. and, together, best represent primeval beech forests across a variety of environmental conditions.

c) Is there an overall management framework for all the components?

The existing management framework comprises a series of various protected landscapes, national parks and biosphere reserves that, due to the conjunction of national boundaries, has already led to a certain level of cooperation in management activities. The Integrated Management Plan could become a model for joint cooperative management and certainly equals or exceeds many of the existing management systems for transnational World Heritage properties.

5.2 Possible future extensions

IUCN understands there are discussions ongoing concerning possible future extensions of the nominated property in other areas in Central Europe. In this context, a number of reviewers suggested that the property could eventually be renamed (e.g. Primeval Beech Forests of Central Europe) to allow other States Parties to nominate sites of potential outstanding universal value as extensions to the series.

6. APPLICATION OF CRITERIA / STATEMENT OF OUTSTANDING UNIVERSAL VALUE

The property has been nominated under criteria (vii), (ix) and (x). IUCN considers that the nominated property meets criterion (ix) and proposes the following Statement of Outstanding Universal Value:

The Primeval Beech Forests of the Carpathians are a serial property comprising ten components. They represent an outstanding example of undisturbed, complex temperate forests and exhibit the most complete and comprehensive ecological patterns and processes of pure stands of European beech across a variety of

environmental conditions. They contain an invaluable genetic reservoir of beech and many species associated and dependent on these forest habitats.

Criterion (ix): Ecological and biological processes

The Primeval Beech Forests of the Carpathians are indispensable to understanding the history and evolution of the genus Fagus, which, given its wide distribution in the Northern Hemisphere and its ecological importance, is globally significant. These undisturbed, complex temperate forests exhibit the most complete and comprehensive ecological patterns and processes of pure stands of European beech across a variety of environmental conditions. Beech is one of the most important elements of forests in the Temperate Broad-leaf Forest Biome and represents an outstanding example of the re-colonisation and development of terrestrial ecosystems and communities after the last ice age, a process which is still ongoing.

Conditions of Integrity, Protection and Management

The individual components of this serial property are of sufficient size to maintain the natural processes necessary for the long-term ecological viability of the property's habitats and ecosystems. Effective implementation of the integrated management plan is required to guide the planning and management of this serial property. Key management issues include forest fire control and conservation of monumental old trees, conservation and management of mountain meadows, river corridors and freshwater ecosystems, tourism management, research, and monitoring.

IUCN considers, however, that the nominated property does not meet criteria (vii) and (x) based on the following assessment.

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

The nominated property contains sites in which European beech absolutely dominates the landscape. The nominated property exhibits the visual appeal commonly associated with "primeval" old-growth forests that some believe inspired European Gothic architecture. Whilst the scenic values of the primeval beech forests are important at the European level, they are however not unique or outstanding at the global level, in particular when compared to other World Heritage properties inscribed under this criterion.

IUCN considers that the nominated property does not meet this criterion.

Criterion (x): Biodiversity and threatened species

The nominated property displays an important diversity of forest flora and fauna; however, most of the species found here are not restricted to these specific habitats and are better represented in other World Heritage properties. Larger and more well-known species considered rare and unique, which occupy the nominated area, are not dependent on it and are also well represented in other World Heritage properties. There are a number of other temperate forest World Heritage properties worldwide with significantly higher biodiversity values, including threatened species, than the nominated property.

IUCN considers that the nominated property does not meet this criterion.

7. RECOMMENDATIONS

IUCN recommends that the World Heritage Committee **inscribes** the Primeval Beech Forests of the Carpathians, Slovakia and Ukraine, on the World Heritage List on the basis of criterion (ix).

IUCN recommends that the World Heritage Committee commends the States Parties of Slovakia and Ukraine for addressing IUCN's previous recommendation to work together and bringing forward a transnational nomination of the Primeval Beech Forests of the Carpathians.

IUCN also recommends that the State Party be requested to:

a) Enhance implementation of the existing Integrated Management Plan and establish a functional Joint Management Committee as proposed by the States Parties;

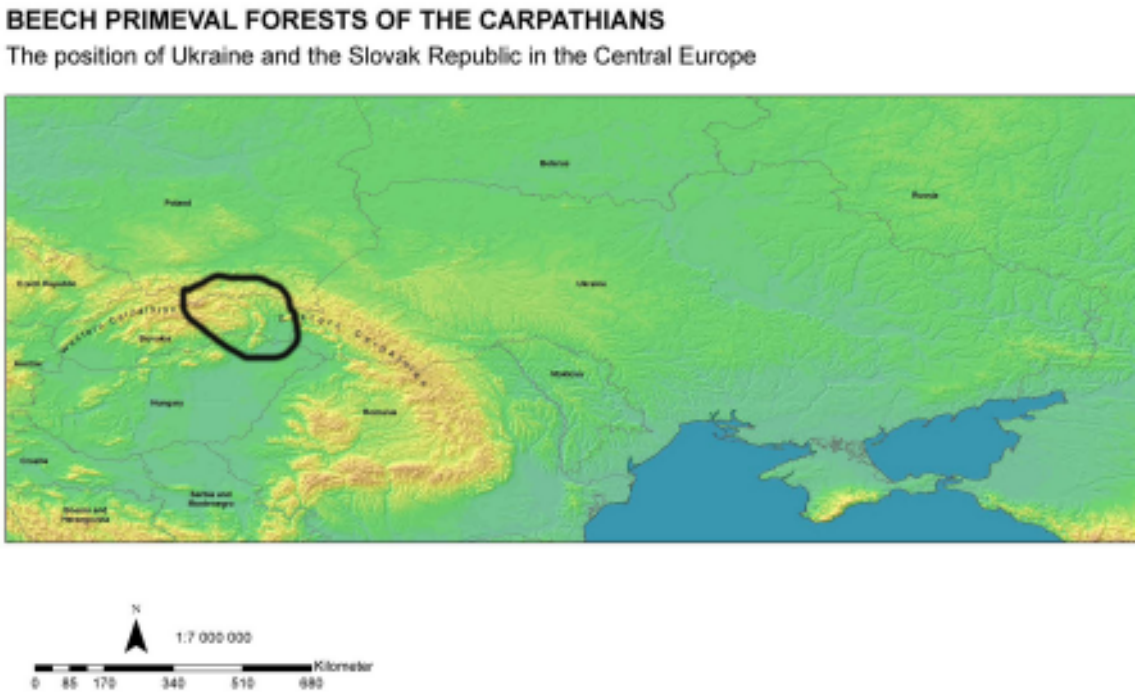
b) Include in the Integrated Management Plan provisions for input from local citizens, NGOs and other interest groups;

c) Give priority in the Integrated Management Plan to research and monitoring as this, considering the volume and relevance of existing baseline data and information for the sites included in this serial nomination, can provide a valuable contribution to understanding the potential impact of global climate change;

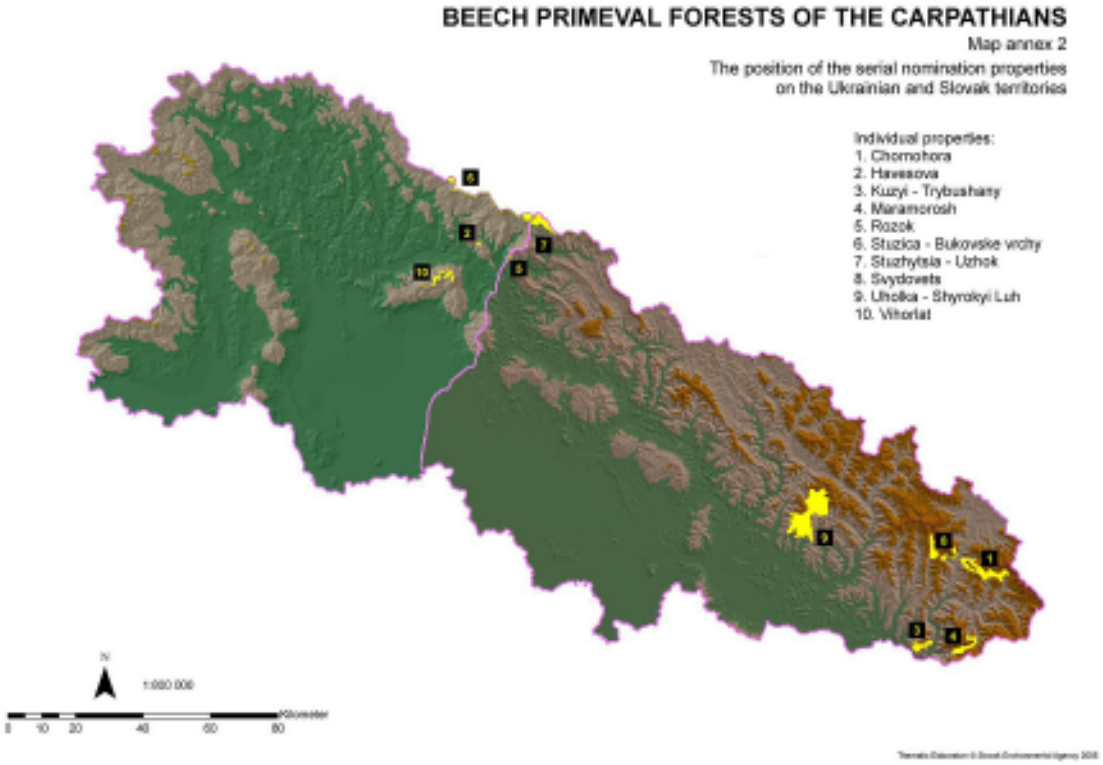
d) Explore options to provide additional funds to support the effective implementation of the Integrated Management Plan and the work of the Joint Management Committee; and

e) Clearly mark on the ground the boundaries of all the sites included in this serial nomination.

Map 1: Location of nominated property



Map 2: Boundaries of nominated property



EUROPE / NORTH AMERICA

TEIDE NATIONAL PARK

SPAIN

WORLD HERITAGE NOMINATION – IUCN TECHNICAL EVALUATION

TEIDE NATIONAL PARK (SPAIN) – ID No. 1258

1. DOCUMENTATION

i) **Date nomination received by IUCN:** April 2006

ii) **Additional information officially requested from and provided by the State Party:** IUCN requested supplementary information on 19 September 2006 before the IUCN Evaluation Mission. The State Party response was submitted on 21 November 2006, including responses to all the issues raised by IUCN.

iii) **UNEP-WCMC Data Sheet:** 1 reference (nomination)

iv) **Additional literature consulted:** Arana, V. and Carracedo, J.C. (1978). **Los Volcanes de las Islas Canarias.** Editorial Rueda, Madrid. Carracedo, J.C. et al. (2002). **Cenozoic volcanism II: the Canary Islands.** In: W. Gibbons and T. Moreno (eds.). The Geology of Spain. Geological Society Special Publication, London: 439-472. Day, S. and Carracedo, J.C. (2002). **Canary Islands (Classic Geology in Europe 4).** Terra, Harpenden. Decker, R. and Decker, B.C. (1997). **Volcanoes.** W.H. Freeman, New York. Editors of Chambers (2005). **Chambers Book of Facts.** Chambers Harrup. Gill, R. and Thirlwall, M. (2003). **Tenerife (Geologists' Association Guide 49).** Geological Society, London. IUCN (2005). **Geological World Heritage: A Global Framework.** IUCN. Ollier, C. (1988). **Volcanoes.** Blackwell, Oxford. Smithsonian National Museum of Natural History (2007). **Global Volcanism Program.** Accessed online: www.volcano.si.edu/index.cfm.

v) **Consultations:** 14 external reviewers. Extensive consultations were undertaken during the field visit with: representatives of the Ministry of Culture and Directorate of Teide National Park, Joint Management Commission of the Canaries National Parks (Ministry of Environment and Canaries Government), Teide National Park Patronato, and Mayors and Residents' Associations of the areas covered by the park; tourism stakeholders including SPET Assoc. Guías de Turismo, TUI and ASHOTEL; geology and landscape experts; representatives of scientific institutions such as Universidad de La Laguna, Consejo Superior de Investigaciones Científicas, Instituto de Astrofísica de Canarias, and Observatorio Atmosférico de Izaña; representatives of NGOs including Amigos de la Tierra, Amigos de la UNESCO, ATAN, CICOP, Greenpeace, Seo Birdlife and WWF; and the School Council of Canaries.

vi) **Field visit:** Bernard Smith, September – October 2006

vii) **Date of IUCN approval of this report:** April 2007

2. SUMMARY OF NATURAL VALUES

The nominated property comprises Teide National Park (TNP), which is situated on the island of Tenerife in the Autonomous Community of the Canary Islands, Spain. It covers 18,990 ha and spans an altitudinal range from 1,650 to 3,718 m above sea level. A buffer zone (Corona Forestal Natural Park) of 54,128 ha surrounds the nominated property.

The dominant feature of TNP is the Teide-Pico Viejo stratovolcano that, at 3,718 m, is the highest peak in Spain. The volcano stands at some 7,500 m above the ocean floor and is thus regarded as the world's third tallest volcanic structure. Seen from the sea, Teide has been renown throughout the centuries as a navigational marker for its distinctive silhouette that seems to float above the 'Alizé' clouds.

Tenerife is composed of a complex of overlapping Miocene-Quaternary stratovolcanoes that have remained active into historical times. Examples of relatively recent volcanism include the Fasnia Volcano (1705) and the eruption of the parasitic 'Narices del Teide' (Teide's Nostrils, 1798). The older and more complex crater of Pico Viejo dates from the Pleistocene. The stratovolcano is located in the centre of a large depression known as Las Cañadas Caldera, which is delimited to the east, south and part of the west by abrupt escarpments of up to 650 m that display the geological history of the area along their 25 km length.

In the east the Las Cañadas escarpment comprises alternating layers of lava and explosion debris, followed by an arc of pumice deposits and, finally, outflow deposits. The landscape continues to develop through active erosion and deposition as exemplified by features such as the Corbata del Teide torrent and the talus slopes of the Las Cañadas wall. To the north and north-west of the

stratovolcano the wall of the caldera is absent apart from a limited escarpment at La Forteleza. This is considered by many to reflect the lateral collapse of a proto-volcano via massive and complex avalanche-like collapses in the direction of Icod and Oratava.

Between the base of the stratovolcano and the foot of the wall is an extensive field of lavas (including obsidian – volcanic glass) and recent pyroclastic material. This area also contains numerous medium and small forms including ridges, cones, craters, volcano fields, domes, fissures, blocks, needles, tubes, channels, badlands and lahars. The geology of TNP represents the entire range of the magmatic series, with a large amount and variety of fully differentiated acid (felsic / phonolitic) volcanic materials as well as basic (basaltic) materials.

The nominated property thus presents a complex assemblage of geological features and is noted for the variety of structures present and the processes they represent within a limited and accessible space. As such it is an important scientific resource that has provided and continues to provide excellent opportunities for researchers to study and understand the evolution of volcanic terrains in detail and earth history in general.

The physical isolation of an oceanic island and the high mountain environment combine to produce a complex biological environment with a high degree of adaptive radiation and endemism. High altitude means that Tenerife is one of the few volcanic islands to have a zonal ecosystem above the tree-line. These are the unique summit *retamar* (white broom scrub) and peak ecosystems. Together with the lower slopes of the mountain these provide, as in Hawaii, an archetypal ecological succession that was first recognized by Alexander von Humboldt and was instrumental in his development of the concept of 'geobiology'. The vascular flora of TNP comprises 220 taxa, of which 73 are endemic to the Canaries and 33 to Tenerife, including 16 taxa that are exclusive to TNP. The most characteristic endemics are the Codeso, Rosalillo de Cumber, Teide Flixweed, Teide Violet and Teide White Broom. TNP also contains three endemic species of reptiles: a lizard (*Gallotia galloti galloti*), a salamander (*Tarentola delalandii*) and a skink (*Chalcides viridanus viridanus*), and twenty bird and five bat species. TNP also displays high levels of endemism within invertebrate populations with 70 species that are exclusive to TNP.

3. COMPARISONS WITH OTHER AREAS

The Global Volcanism Program at the Smithsonian Institution notes the existence of some 1,546 volcanoes active since the start of the Holocene. Depending on counting method there are currently at least 454 and possibly 1,343 active volcanoes on earth with the majority found within the 'Pacific Rim of Fire'.

The geological processes that shaped (and continue to shape) TNP are the result of a combination of factors associated with intra-plate ocean island volcanism and the prolonged volcanic history of the island. Because of these conditions, the Canary Islands have a high diversity and variety of volcanic products, features, structures and eruptive processes. Geological expert reviewers have emphasised the long history of evolution of TNP, the concentration of volcanic deposits and morphological features and structures, the unusual example of caldera formation processes involving massive landslides, and the unusual and diverse geochemical and magmatic evolution in an ocean-island setting as amongst the features of the nominated property that are both significant and distinctive in relation to other comparable sites. Although other islands in the Canary Islands archipelago contain significant features which rival those of TNP in value, it is in Tenerife, currently at the peak of its geological development, that these features are best represented. One other natural World Heritage property is inscribed in the Canary Islands: Garajonay National Park on La Gomera. The property is distinctly different to TNP and is listed on the basis of its unique Laurel forest community.

Volcanic systems are already well represented on the World Heritage List. Around 13 properties have been inscribed primarily for their volcanic values, making volcanic systems the best represented of the themes identified in IUCN's global theme study on Geological World Heritage, completed in 2005. The range of properties is diverse including Virunga National Park (Democratic Republic of the Congo), Sangay National Park (Ecuador), Tongariro National Park (New Zealand), Giant's Causeway and Causeway Coast (UK) and Yellowstone National Park (USA). It should also be noted that some volcanic properties have been inscribed solely for their aesthetic values (criterion vii) rather than geological values – most notably Kilimanjaro National Park (United Republic of Tanzania). There are a number of volcanic properties on the World Heritage List which are of greater scale compared to TNP, most notably the Volcanoes of Kamchatka property (Russian Federation) which far exceeds all other volcanic properties in the number and diversity of volcanoes included, but it, and a number of the other World Heritage properties, are located in an entirely different tectonic and landscape setting.

Direct comparisons may be made with the eight existing World Heritage properties that include volcanic features on island systems. These include the Hawaii Islands, Galapagos Islands, Aeolian Islands, Gough and Inaccessible Islands, Heard and McDonald Islands, Morne Trois Pitons and Pitons. Some of these contain stratovolcanoes, but none of these rivals the Mt Teide stratovolcano in its combination of size, complexity, age, depth of study and ongoing relevance to science. There are other intra-plate oceanic stratovolcanoes (e.g., Pico do Pico, Azores; Fogo, Cape Verde Islands) not included on the World Heritage List, but few are located on slow-moving or stationary lithosphere and TNP exceeds them in scale. The closest direct comparison in terms of intra-plate oceanic volcanoes is that between TNP and the Hawaii Volcanoes National Park. The latter contains shield volcanoes which exhibit volcanic eruptions involving the least evolved magmas of the intra-plate oceanic island magmatic series. On purely geological grounds, a strong case is made that, whilst both represent intra-plate volcanic complexes, Hawaii and Teide define the two ends of a spectrum in terms of development. From the relatively young, fast-moving, geologically simple islands of Hawaii, to the older, slower-moving, geologically complex and mature stratovolcano of Mt Teide.

The nominated property compares favourably to other World Heritage properties in relation to the scale and diversity of its geological and geomorphological features and its additional distinctive landscape values. Teide remains a scenically striking and remarkable landscape in some respects attributable to its barren slopes and spectacular volcanic features. Most striking of these is the Las Cañadas Caldera itself, but features such as the isolated pillar of Roque Cinchado when viewed against the profile of Mt Teide are equally iconic for most Spaniards, and many visitors. The park's high levels of visitation also provide supporting evidence of the draw of this visually spectacular landscape. In addition, local atmospheric conditions frequently create a unique visual dynamic, the 'sea of clouds' phenomenon that forms below the caldera. This creates a visual backdrop to the mountain, and also acts as a 'gateway' through which visitors must pass to arrive at the park, a natural phenomenon of exceptional beauty. The case for inscription is further supported by the long history of scientific investigation at the site and especially its importance in the development of modern geology and volcanology. TNP has attracted the interest of naturalists and geoscientists from all over the world, including pioneer work at the beginning of the 19th century by researchers such as Alexander von Humboldt, Leopold von Buch and Charles Lyell, who established basic concepts of geology and volcanology while studying this island.

In summary, although there are sites with comparable features, the diversity of volcanic features found in the nominated property and their impressive scale certainly place it in the category of other volcanic World Heritage properties. IUCN notes, however, the increasingly limited potential for further inscriptions of volcanic sites on the World Heritage List and has made recommendations on this issue in its evaluation of Jeju Volcanic Island and Lava Tubes (Republic of Korea) which is also currently under consideration by the World Heritage Committee.

4. INTEGRITY

4.1 Legal status

The nominated property is the area contained within TNP. As such it will be afforded the same legal status and protection that currently applies to the park. The primary national legislation governing TNP is Law 5/1981 which assigns TNP a special legal regime designed to protect it and limit the rights to use its natural resources. It also delimits a protective buffer zone.

In addition, Decree 153/2002 contains the legal basis for the protection of the natural resources of the park, establishing general management criteria and zoning of the park into Reserved, Restricted Use, Moderate Use and Special Use Zones to govern use. As well as the above general legislation, a range of supporting environmental legislation provides protection to the park and its resources.

Proposals are in development to transfer management responsibility of TNP to the Autonomous Community of the Canary Islands, through the Joint Management Commission of the Canaries National Parks. Measures are in place to ensure coordination and integration between the different levels of government.

The day-to-day management of the park is the responsibility of the National Park Technical Team who report to the Joint Management Commission. Participatory mechanisms such as the 'Patronage Committee' ('Patronato') ensure wide consultation with stakeholders.

The national and regional legislative framework currently in place to protect the integrity of TNP appears to be adequate and it is effectively administered through the various tiers of park management.

4.2 Boundaries

The boundary of the nominated property coincides with the existing boundary of TNP which generally follows the upper limit of the tree-line and is thus also defined by an appropriate ecological boundary.

Completely surrounding TNP is the buffer zone defined by the Corona Forestal Natural Park. Construction in the buffer zone is effectively prohibited and measures are in place to support natural resource protection and control introduced species.

4.3 Management

The management of TNP is carried out in accordance with a 'Management and Usage Administration Plan' which runs for six years and is due for renewal in 2008. The management plan specifies objectives and measures to protect the park's values and natural resources, raise public awareness through education, and control use and development.

TNP is adequately staffed and resourced with 23 staff directly employed and a further 114 working in the park for other agencies. At present, core funding for the park comes from the State via the budget of the Ministry of the Environment. This is then allocated to the Autonomous Organisation of National Parks that assigns and distributes funds to TNP. The park also receives budget contributions from the Star Programmes of the Autonomous Organisation of National Parks that finance specific park projects. Annual budgets range from 3.7 to 4.8 million euros and are considered adequate.

Impressive scientific research and monitoring programmes are in place on a range of issues such as visitor carrying capacity. In 1989, TNP was awarded the European Diploma for Protected Areas by the Council of Europe. This award is reviewed every 5 years and the park authorities have to submit an annual report. This award signifies a high standard of management.

4.4 Threats and human use

High mountain environments are particularly sensitive indicators of climate change. For this reason, TNP, together with other Spanish national parks, are to be included in a global change monitoring network. The Picos del Europa, Sierra Nevada and TNP have also been selected as sites to monitor wider ecological change. Through the Izaña Atmospheric Observatory, the high-altitude area above the temperature inversion is one of

five similar international sites monitoring global atmospheric change and is also part of the international Network for the Detection of Stratospheric Change. In this context, TNP is seen as a valuable early-warning system for environmental change based on long and detailed records of environmental conditions.

Biological threats are monitored through regular 'phytosanitary inspections' that survey indicator species for foliage loss, discolouration and evidence of damage from biological agents. There is some localised evidence of damage by beetles, but generally damage is slight.

Natural disasters including fire and seismic / volcanic activity are covered by contingency planning required by national legislation. This includes coordination of emergency plans with other administrative agencies and the presence in the park of emergency stations at El Portillo and the Cable Car Station, including a fire station. The scrub vegetation of the park is less susceptible to fire than the forest of the buffer zone. Fire prevention and control in this zone is the responsibility of the Insular Government of Tenerife (the Cabildo).

Visitor pressure is generally recognized as a significant potential threat to TNP. With more than 3.5 million visitors per annum, it is inevitable that key sites come under considerable strain at different times of the day and year. Site management based on usage zones is seen as the most appropriate type of management tool for dealing with the large numbers of visitors to TNP. Effective visitor education and use programmes assist in limiting visitor impact in sensitive areas.

Overall visitation to Tenerife is controlled through the imposition of strict numbers of bed spaces on the island. The emphasis within the next management plan will therefore be on the development of an integrated access strategy including the possible establishment of a series of 'service centres' on access routes just beyond the park boundary. These could contain a range of visitor facilities and it is envisaged by the park authorities that they should provide the opportunity for visitors to park their car and use a shuttle bus service to tour the park.

Devolution of management responsibility and the transfer of responsibility for TNP from national to regional government is possibly the greatest area of uncertainty regarding the future management of the park. Concerns relate to the potential erosion of long-term conservation goals and strategies in the face of development and economic pressures. It is important that participatory processes are maintained so that transparent decisions are made which are consistent with management objectives for the protection of the park's values and natural resources.

In summary, the national park status of the nominated property has ensured that sufficient management capacity is in place, as well as experience in managing the site effectively and in close collaboration with the local population. Its status has also resulted in effectively enforced legislative controls and a management strategy that is supported by central government funding.

Overall, IUCN considers that the nominated property meets the conditions of integrity as required under the Operational Guidelines.

5. ADDITIONAL COMMENTS

Although the property has not been nominated under criteria (ix) and (x), special mention should be made of the important role played by the biodiversity of TNP. Tenerife is one of the few islands in the world that can support zonal ecosystems above the tree-line, giving rise to two unique ecosystems and one of the best natural environments in the world for primary ecological successions linked to the variety of volcanic deposits and the adversity of the climate. There is an impressive faunal and floral biodiversity with close to 50 species of vascular plants that are exclusive to TNP.

6. APPLICATION OF CRITERIA / STATEMENT OF OUTSTANDING UNIVERSAL VALUE

The property has been nominated under criteria (vii) and (viii). IUCN considers that the nominated property meets these criteria and proposes the following Statement of Outstanding Universal Value:

Teide National Park, dominated by the 3,781 m Teide-Pico Viejo stratovolcano, represents a rich and diverse assemblage of volcanic features and landscapes concentrated in a spectacular setting.

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

Mount Teide is a striking volcanic landscape dominated by the jagged Las Cañadas escarpment and a central volcano that makes Tenerife the third tallest volcanic structure in the world. Within this landscape is a superlative suite of landforms that reveal different phases of construction and remodeling of the volcanic complex and highlight its unique geodiversity. The visual impact is emphasized by atmospheric conditions that create constantly changing textures and tones in the landscape and a 'sea of clouds' that forms a visually impressive backdrop to the mountain.

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

Teide National Park is an exceptional example of a relatively old, slow moving, geologically complex and mature volcanic system. It is of global importance in providing diverse evidence of the geological processes that underpin the evolution of oceanic islands, and these values complement those of existing volcanic properties on the World Heritage List, such as the Hawaii Volcanoes National Park. It offers a diverse and accessible assemblage of volcanic features and landscapes in a relatively limited area. The area is a major centre for international research with a long history of influence on geology and geomorphology especially through the work of von Humboldt, von Buch and Lyell which has made Mount Teide a significant site in the history of volcanology.

Conditions of Integrity, Protection and Management

The property is well managed and resourced, with a six-year management plan in place which is due for renewal in 2008. The property is afforded the same legal protection as other national parks in Spain and is surrounded by a buffer zone. Key management issues include the management of tourism, the potential impact of climate change, and effective coordination of management responsibility between national and regional levels of government.

7. RECOMMENDATIONS

IUCN recommends that the World Heritage Committee **inscribes** the Teide National Park, Spain, on the World Heritage List on the basis of criteria (vii) and (viii).

IUCN recommends that the World Heritage Committee commends the State Party for its continued efforts to conserve this protected area and for establishing impressive educational and awareness raising programmes in the park.

IUCN also recommends that the State Party be requested, as part of the process to review and update the management plan for Teide National Park, to:

a) Strengthen harmonization between strategic tourism planning and development in the Canary Islands and the use of Teide National Park to ensure that use does not adversely impact the outstanding universal value of the property;

b) Strengthen mechanisms to monitor visitor use and develop management approaches that balance the protection of park values with enhanced visitor experience;

c) Encourage improved research and monitoring of the potential impact of global climate change and the need for adaptive management strategies;

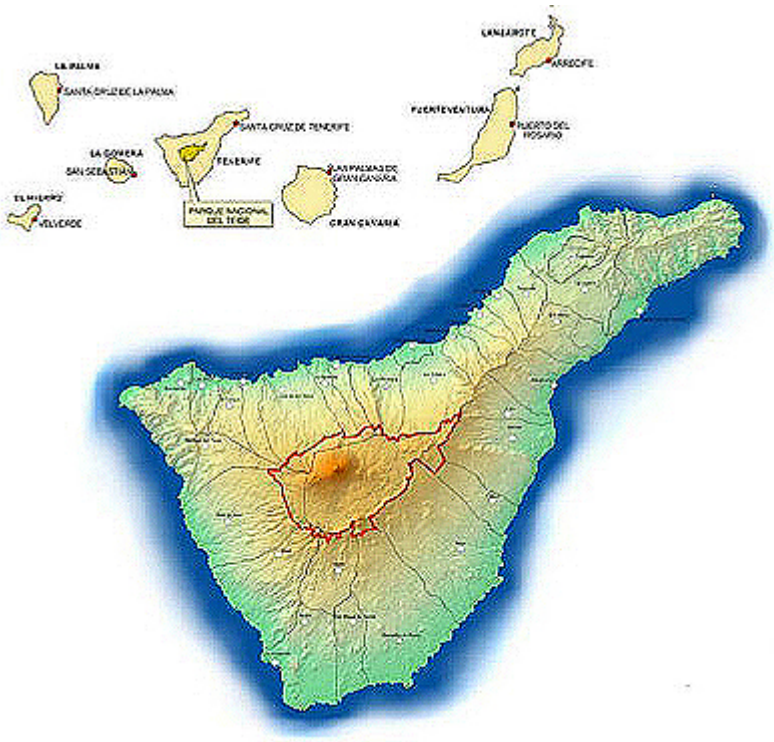
d) Strengthen coordination and cooperation between the Spanish State and Autonomous Community of the Canary Islands to share responsibility and to guarantee central funding; and

e) Encourage exchange of management experience and joint promotion between the Teide National Park and other World Heritage properties in the Canary Islands (Garajonay National Park and San Cristóbal de La Laguna).

Finally, and in the interests of maintaining the credibility of the World Heritage List, IUCN recommends that the World Heritage Committee notes that volcanic systems are relatively well represented on the World Heritage List and that there is increasingly limited potential for further inscriptions of volcanic sites on the World Heritage List. The Committee may therefore recommend States Parties considering further nominations of volcanic sites to consider the principles suggested in section 5.2 of the IUCN evaluation of Jeju Volcanic Island and Lava Tubes.

Map 1: Location of nominated property

Map 2: Boundaries of nominated property



LATIN AMERICA / CARIBBEAN

BANCO CHINCHORRO BIOSPHERE RESERVE

MEXICO

WORLD HERITAGE NOMINATION – IUCN TECHNICAL EVALUATION

BANCO CHINCHORRO BIOSPHERE RESERVE (MEXICO) – ID No. 1244

1. DOCUMENTATION

i) **Date nomination received by IUCN:** April 2006

ii) **Dates on which any additional information was officially requested from and provided by the State Party:** IUCN requested supplementary information on 22 November 2006 after the IUCN Evaluation Mission. The State Party responses were submitted on 1 December 2006 and 12 January 2007, including responses to the issues raised by IUCN.

iii) **UNEP-WCMC Data Sheet:** 3 references (including nomination)

iv) **Additional literature consulted:** Conservation International (2006). **Caribbean Atoll Reveals Unique Treasures.** Accessed online: www.peopleandplanet.net/doc.php?id=2671. Doyle, A. (2006). **New Fish and Seaweeds Found on Caribbean Atoll.** Accessed online: www.planetark.com/dailynewsstory.cfm/newsid/35098/newsDate/15-Feb-2006/story.htm. GBRMPA, World Bank and IUCN (1995). **A Global Representative System of Marine Protected Areas.** Volume 1-4. Great Barrier Reef Marine Park Authority, World Bank and IUCN. Hillary, A. et al. (2003). **Proceedings of the World Heritage Marine Biodiversity Workshop.** World Heritage Papers 4, UNESCO World Heritage Centre. Kramer, P.A. and Kramer, P.R. (2002). **Ecoregional Conservation Planning for the Mesoamerican Caribbean Reef.** WWF. Spalding, M.D. et al. (2001). **World Atlas of Coral Reefs.** University of California Press, Berkeley. Sullivan Sealey, K. and Bustamante, G. (1999). **Setting Geographic Priorities for Marine Conservation in Latin America and the Caribbean.** The Nature Conservancy. Van der Land, J. (1977). **The Saba Bank: a Large Atoll in the Northeastern Caribbean.** Fisheries Report No. 200, FAO.

v) **Consultations:** 6 external reviewers. Extensive consultations were undertaken during the field visit including with directors and staff of the National Commission for Natural Protected Areas, staff of the Sub-Directorate of Underwater Archaeology of the National Institute of Anthropology and History, and representatives of three fisheries cooperatives and three tourism cooperatives.

vi) **Field visit:** Carl Gustaf Lundin, October 2006

vii) **Date of IUCN approval of this report:** April 2007

2. SUMMARY OF NATURAL VALUES

The Banco Chinchoro Biosphere Reserve is located off the coast of the Mexican State of Quintana Roo, some 33 km to the east of Mahahual, a coastal fishing village. The reserve comprises a rectangular shaped area which covers 144,360 ha. It is an oceanic site along the east side of the 1,000 m deep Yucatan Channel, which lies between the bank and the coast. It is part of the 1,200 km long Mesoamerican barrier reef, the second largest in the world, and is the largest platform reef off the Mexican coast.

The bank is dominated by the Yucatan current which runs from south to north up the east coast and whose eddies and counter-currents affect the whole area. It is an oval-shaped false atoll some 42 km long and 16 km wide sitting on an underwater ridge of limestone. The bank is composed of reefs and cays enclosing a lagoon of some 80,000 ha showing a number of shallow marine habitats and reef formations. These include wooded sandy cays, fringing mangroves, seagrass beds, sandy-bottomed lagoons, patch and barrier reefs, and open ocean. Reef growth is most active on the windward side to the east, but less active and discontinuous on the west.

The interior shallow lagoon floor, 2 m deep in the north to 10 m deep in the south, is covered by mud, sand, algae, patchy hard bottom coral communities, and seagrass beds. In the deeper portions of the lagoon to the south, well-developed patch reefs occur. The terrestrial part of the nominated property covers 4,575 ha consisting of keys emerging from the northern, central and southern reef systems. There are three keys, Cayo Norte, Cayo Centro and Cayo Lobos. The southern island, Cayo Lobos, is a small sandbank with little vegetation. The other two cays are quite large with well vegetated beach berms and small interior lagoons. The largest island, Cayo Centro, contains extensive mangroves and salt-water marshes, as well as lush seagrass beds around the edges. The soils are calcareous with the exception of muddy sand in the lagoons. The cays have no freshwater, and thus there are no native mammals or amphibians on the islands.

Introduced species include rats and cats which impact on native birds and reptiles.

Plant diversity is relatively low because of the flat nature of the islands, high salt concentration in the soil, and the long distance from the coast. However, the islands are important stopover sites for migratory birds in the Caribbean Region. Some 135 species of birds are found in the area, including one endemic. The mature mangroves on Cayo Centro are important breeding and nesting grounds for both local and migratory birds. Green, hawksbill, and loggerhead turtles frequent the bank, and Cayo Centro is a breeding and nursery area for American crocodiles.

The coral reefs are the richest in Mexico with 95 species, including 47 species of reef-building corals; which is 72% of the reef-building corals in the Caribbean. The reef biodiversity is typical of a well developed coral reef ecosystem. Main components of the reef are the massive elk horn and deer horn corals, and gorgonians like sea-whip coral. The dominant hard corals are mountain coral, brain coral, star coral, lettuce corals, and fused staghorn coral, which is scarce in the Mexican Caribbean. The dominant soft corals are knob candelabrum, sea fan, slimy sea plume, and fan coral. Hydrocorals include the fire corals. The accompanying macroinvertebrate life is abundant, with 145 species recorded. There are large numbers of sponges and algae, phytoplankton, zooplankton, copepods and nematodes. Algae number 135 species. There are 31 species of caridean shrimps from 7 families. The area supports the last commercially viable queen conch fisheries in Mexico, though it is in rapid decline, as well as a stable spiny lobster fishery.

Reef fish are a key element of the reef system and a regional resource for fisheries. Fish diversity is comparable to other marine areas in the Caribbean, with a total of 199 species recorded, including 121 species of reef fish from 33 families. The most important families are the parrot fish (12 species), groupers (11 species), grunts (11 species), damselfish (10 species), wrasses (9 species), triggerfish (6 species), snappers (6 species), jacks, and barracuda. The oceanic zone is visited by the endangered Nassau grouper and false killer whale. The lagoon is an important spawning ground for marine fish: fish larvae of 36 marine fish families have been found, with larvae being more abundant in the lagoon than in the oceanic zone. Some marine fish even complete their pelagic phase in the lagoon, and at least two viable grouper spawning aggregation sites have been documented. The bank is therefore an important nursery and dispersal centre for marine organisms.

3. COMPARISONS WITH OTHER AREAS

Coral reefs occur in some 105 countries in the world, including all countries in the wider Caribbean. However, Indo-Pacific coral reefs are much richer than their Caribbean counterparts in terms of biodiversity. For example, there are about 700 major reef-building coral species in the Indo-Pacific as compared to only about 65 in the Caribbean. Of the 162 natural properties currently included on the World Heritage List, 18 have been inscribed primarily for their marine attributes, and two of these (Belize Barrier Reef Reserve System, Belize and Sian Ka'an Biosphere Reserve, Mexico) are located in the Caribbean.

The nominated property, Banco Chinchorro Biosphere Reserve, lies in a Conservation International Biodiversity Hotspot, in a WWF Global 200 priority ecoregions for conservation, and is a UNESCO Biosphere Reserve. The Nature Conservancy considers it one of the two priority areas contributing to the conservation of the Mesoamerican Barrier Reef System.

Banco Chinchoro is essentially a typical tropical oceanic coral barrier reef, thus the main bases for comparisons with similar existing World Heritage properties are:

- The vividness and visual effect of the colours of its reefs, keys, lagoon and waters, which is found at many other coral reef sites and not unique of the nominated property;
- Its geology as an Atlantic limestone-ridge based barrier reef, which is similar to that of the Belize Barrier Reef World Heritage property;
- The importance of its ecological processes measured by the number and variety of its habitats, which are comparable to other Caribbean coral reef sites;
- Their regional influence, in this case as an important nursery and dispersal centre for marine organisms, which is however also comparable to other Caribbean coral reef sites; and
- The richness and relatively high endemism of its biota, including a number of endangered species, which is however similar to the Belize Barrier Reef World Heritage property and much lower than for Indo-Pacific coral reef sites.

There are two very comparable neighbouring coral reef sites on the World Heritage List, the Belize Barrier Reef and Sian Ka'an, which are also part of the Mesoamerican Barrier Reef. Here, numbers of coral species are roughly equal (see Table 1), but there are much more fish species in the Belize Barrier Reef. Birds, terrestrial animals and plants are more numerous in Sian Ka'an. Other related World Heritage properties in or near the Caribbean are: Desembarco del Granma and Alejandro de Humboldt National Parks in Cuba, Guanacaste Conservation Area in Costa Rica, the Pitons Management Area in Saint Lucia, and the Brazilian Atlantic Islands. These have coral, but are chiefly of interest for other reasons, and do therefore not warrant further comparisons.

On the Pacific side of Mesoamerica are Cocos Island National Park in Costa Rica and Coiba National Park in Panama. Both have fewer coral species (32 and 58 respectively), but many more fish and mollusc species than the nominated property, and high endemism.

Other comparable coral reef sites on the World Heritage List are the Great Barrier Reef and Shark Bay in Australia, the Tubbataha Reef in the Philippines, and the Aldabra Atoll in the Seychelles. The Great Barrier Reef is incomparably larger and richer in every way than the nominated property. Compared with Banco Chinchorro, Shark Bay is a very large site with an equal number of coral species, many more fish and bird species, large numbers of reptile species and vast seagrass beds, but its terrestrial part is located in a semi-arid desert. Both

Table 1: Comparison of biodiversity (species numbers) between the nominated property and some comparable existing World Heritage properties

Name and size of World Heritage property	Criteria	Coral	Fish	Molluscs	Birds
Banco Chinchorro (Mexico) 144,360 ha (97% sea)	**vii, viii, ix, x**	**95**	**199**	**104**	**135**
Great Barrier Reef (Australia) 34,870,000 ha (95% sea)	vii, viii, ix, x	400	1500	4000	242
Shark Bay (Australia) 2,197,300 ha (31% sea)	vii, viii, ix, x	95	323	100	230
Belize Barrier Reef (Belize) 96,300 ha (50% sea)	vii, ix, x	100	500	350	187
Cocos Island (Costa Rica) 199,790 ha (97% sea)	ix, x	32	300	500	87
Sian Ka'an (Mexico) 528,000 ha (23% sea)	vii, x	83	175	103	339
Coiba (Panama) 430,825 ha (50% sea)	ix, x	58	760	453	147
Tubbataha Reef (Philippines) 33,200 ha (99% sea)	vii, ix, x	396	441	?	46
Aldabra Atoll (Seychelles) 34,200 ha (41% sea)	vii, ix, x	210	287	?	65

the Tubbataha Reef, which is almost entirely submerged, and the Aldabra Atoll (40% bleached in 2005) have many more coral and fish species than the nominated property. However, all these sites are Indo-Pacific.

The nomination mentions at least six other sites in the Caribbean of comparable biotic richness to Banco Chinchorro: Cozumel in Mexico, Cayo Cochinos and Jardines de la Reina in Cuba, Jaragua in the Dominican Republic, Bonaire in the Lesser Antilles and Los Roques in Venezuela. Moreover, the largest false atoll in the Caribbean is not Banco Chinchorro, but the Saba Bank in the Eastern Caribbean, which covers 2,000 km^2 and is the 3rd largest atoll in the world.

In conclusion, IUCN considers that the nominated property is of national and regional importance but it does not rank highly when compared at the global level.

4. INTEGRITY

4.1 Legal status

The nominated property is owned entirely by the Mexican government. Legal protection is provided by a 1996 federal decree which established the Banco Chinchorro as a Biosphere Reserve.

4.2 Boundaries

The boundaries of the reserve include the atoll and surrounding waters, and are considered adequate for management and conservation.

4.3 Management

Management of the area is carried out by the National Commission for Natural Protected Areas (CONANP) of Mexico. There is an Advisory Council of representatives from research and academic institutions, NGOs, social organizations, and federal and state governments. For some activities, several other agencies are also responsible, such as the Environmental, Naval, and Communication and Transportation Ministries, and the Tourism Advisory Sub-Council. There are nine permanent staff: the director, assistant director, fisheries technician, biologist, educational specialist and four guards, some being fishermen. Equipment includes two fast boats and a light aircraft. The federal government provides about US$ 300,000 annually. Other revenues come from entry fees and charges for tourist activities such as diving and boating. US$ 50,000 a year has been donated by the SUMMIT Foundation between 2000 and 2007. USAID and WWF provided US$ 45,000 for a field station, and the enforcement and surveillance programme is supported by WWF with funds from the Packard Foundation and a tax on legal fish catches. The reserve is supported by the GEF with a Trust Fund to guarantee long-term financing of the guards.

The aim of the management is to ensure the continuity of the reef ecosystem, which is important since coral reefs are widely dying elsewhere in the Caribbean, and the conservation of its natural resources through sustainable use. The main economic activities are tourism and fishing, both of which are incorporated into a participatory management programme. A master plan for the management of the reserve was prepared in 2000. It

covers, for example, protection and surveillance; natural resource management; restoration and reforestation of damaged habitats; cay conservation (including rat and cat eradication); disaster and waste control; ecological research and surveys; fishery studies; fisheries and tourism use; environmental education and publicity; finance, administration, operation and training. From ten field survey stations, programmed monitoring is done of coral coverage and mortality, algal coverage, sponges, conch and lobster larvae, spawning sites, fish abundance, seagrass cover, sedimentation, water quality, and forest characteristics.

The 144,360 ha of the reserve are divided into core (4,587 ha) and buffer zones (139,773 ha). The buffer zone has been divided into sub-zones for commercial fishing by cooperatives (40% of the area), catch and release sport fishing, diving and wreck-diving. One aim has been to raise the quality of life for fishermen through training and self-management of fisheries activities. The fishing communities have been persuaded to adopt responsible measures: respect for a closed season, for minimum legal sizes of fish, and for specific quota of species caught; no use of nets, air tanks or compressors; and no increase in the number of their boats or the number of members in their cooperatives.

IUCN recommends the State Party, as part of the process to review and update the management plan for Banco Chinchorro Biosphere Reserve, to continue improving the management of the reserve by giving priority to the identification and implementation of a series of measures to promote sustainable fisheries and prevent illegal fishing in and around the reserve as well as maintaining and improving existing research and monitoring programmes. The State Party should also assess the feasibility of establishing more no-take areas in the reserve to enhance connectivity and larvae dispersal and enable recovery of depleted fish stocks. It is further recommended that tourism management be strengthened and options explored for the tourism industry to contribute to the existing Trust Fund supporting the long term management of the reserve. The State Party should also develop and implement a strategic plan to address threats associated with marine pollution, climate change and invasive species.

4.4 Threats and human use

The major threats to the bank are hurricanes and epidemic diseases such as black band and white band, and coral bleaching resulting from global warming: in nearby Belize there were massive coral die-backs related to El Niòo in 1995 and 1998. Predation on the native reptiles and birds by cats and rats on Cayo Centro and rodents on Cayo Norte is a problem. There are no permanent human settlements except for a naval out-station on Cayo Norte, the reserve guard base and 15 seasonal cabins used by fishermen during the lobster season from July to February. There is public access to the reserve, mainly for scuba diving and snorkelling.

Two main species are fished, spiny lobster and queen conch, by three fishing cooperatives, totaling some 130 men in 2005 who are based in the mainland communities of Mahahual, Xcalak and Chetumal City. Based on their absence in the marine environment it is clear that many fish spices are extensively fished for subsistence or local markets. Illegal fishing and overfishing of threatened species and the profitable conch and lobster, and pollution by fishermen's wastes have decreased since the co-option of their cooperatives but they still exist. Sewage treatment plants for fishing settlements have been installed and a regional plan for waste control is to be developed.

Tourism use of the reserve is on the rise. Snorkelling and scuba diving, especially wreck-diving, and underwater photography are major attractions. There are 12 known named wrecks and the wrecks of 18 galleons from the 16th–17th centuries when this sea was first mapped as part of the Spanish main, and when the black rat may have been introduced. Additional tourism activities include fly-fishing, boating, sea kayaking, water-skiing, swimming and bird watching. Separate buffer sub-zones have been defined for catch and release sport fishing, diving and wreck-diving.

Coastal tourism is a potential threat. Large scale development of the 'Costa Maya' is planned, and the coastal village of Mahahual pier is expected to receive 3,000 cruise ship tourists a day, resulting in increased risk of pollution or collisions from increased maritime traffic. However, there are a number of initiatives to alleviate the environmental and social impacts by cruise ships. Protective measures such as boundary and mooring buoys are being installed against the impacts of tourism.

4.5 Research

The bank is an excellent base for scientific studies. During the last ten years some 35 studies have been carried out by several Mexican universities and institutes. Preparation for the management master plan involved the development of reports on a dozen life forms and seven key habitats. Research subjects have included the lagoon coral system, water quality, zooplankton, reef fish, sustainable production of spiny lobster and queen conch, shrimps, migratory bird habitat selection, crocodiles, other herpetofauna, floral and faunal surveys and monitoring, and (wreck) archaeology. Local fishermen donated a boat for surveillance now used also for research and they participate in some of the research programmes. A solar-powered field station was completed in 2005 with rainwater storage and non-polluting waste treatment.

Overall, IUCN considers that the nominated property meets the conditions of integrity as required under the Operational Guidelines. IUCN notes, however, that the conditions of integrity could be further improved if the recommendations outlined in sections 4.3 and 7 are implemented in the process to review and update the management plan.

5. ADDITIONAL COMMENTS

None.

6. APPLICATION OF CRITERIA

The property has been nominated under all four natural criteria.

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

The nomination argues for the application of this criterion based on the relatively isolated false atoll formation of karstic origin, the aesthetic values related to the lagoon's colours, the interest to tourists of the property's biodiversity, and the presence of shipwrecks on the reef dating back to the 15th century. None of these characteristics, however, can be considered unique or best represented at the Banco Chinchoro. The atolls within the Belize Barrier Reef Reserve System World Heritage property have similar characteristics. The Banco Chinchorro is not even the largest false atoll in the Caribbean. That distinction goes to the Saba Bank in the Eastern Caribbean, which covers 2,000 km² and is the 3rd largest atoll in the world.

IUCN considers that the nominated property does not meet this criterion.

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

The case for this criterion is made primarily on the claim that the nominated property is one of the only three atoll-like coral reef formations in Mexico. This is an argument only for national significance.

IUCN considers that the nominated property does not meet this criterion.

Criterion (ix): Ecological and biological processes

The justification for using this criterion is based on the ecological and economic importance of the marine ecosystems in the nominated property, the refuge provided to migratory birds, and the function of the reserve as a nursery area for many species. However, these attributes are common to most marine protected areas, and the nomination fails to demonstrate the case for the outstanding universal value of the nominated property compared to other marine protected areas.

IUCN considers that the nominated property does not meet this criterion.

Criterion (x): Biodiversity and threatened species

The justification for using this criterion is based on the nominated property containing the four main habitat types characteristic of tropical coral reef ecosystems, which serve as refuges for threatened and endangered species; the isolation of the reserve and its natural processes, which provide an opportunity to study theories concerning species evolution, extinction, and colonization, and interactions among species and their adaptation to isolated environments; and the importance of the reserve for in-situ conservation of complex food networks. However, these attributes are common characteristics of most tropical reef areas and better represented in other marine protected areas already inscribed on the World Heritage List.

IUCN considers that the nominated property does not meet this criterion.

7. RECOMMENDATIONS

IUCN recommends the World Heritage Committee **not to inscribe** the Banco Chinchorro Biosphere Reserve, Mexico, on the World Heritage List on the basis of natural criteria.

IUCN recommends that the World Heritage Committee commends the State Party for its continued efforts in conserving this important marine protected area, as well as the NGOs, other organisations and private partners that are contributing to these conservation efforts.

IUCN also recommends that the World Heritage Committee requests the State Party, as part of the process to review and update the management plan for Banco Chinchorro Biosphere Reserve, to:

a) Continue improving the management of the reserve by giving priority to the identification and implementation of a series of measures to promote sustainable fisheries and prevent illegal fishing in and around the reserve as well as maintaining and improving existing research and monitoring programmes;

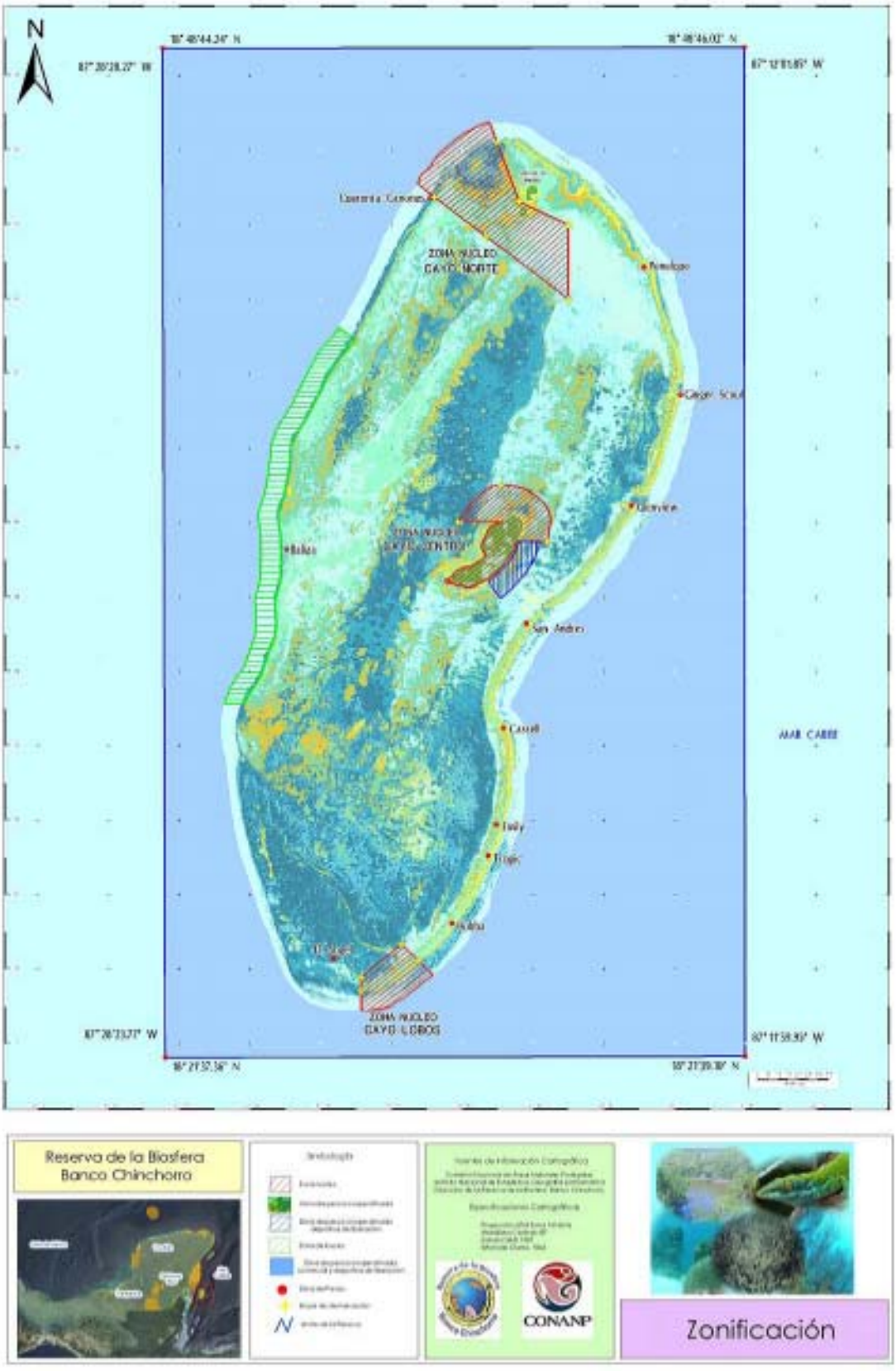
b) Assess the feasibility of establishing more no-take areas in the reserve to enhance connectivity and larvae dispersal and enable recovery of depleted fish stocks;

c) Strengthen tourism management and explore options for the tourism industry to contribute to the existing Trust Fund supporting the long term management of the reserve; and

d) Develop and implement a strategic plan to address threats associated with marine pollution, climate change and invasive species.

The World Heritage Committee may further recommend the State Party to consider, once the recommendations above are addressed, the extension of the Sian Ka'an World Heritage property to include the Banco Chinchorro Biosphere Reserve.

Map 1: Boundaries of nominated property



A. Nomination of Natural Properties to the World Heritage List

A2. Extensions of Natural Properties

EUROPE / NORTH AMERICA

JUNGFRAU - ALETSCH - BIETSCHHORN (EXTENSION)

SWITZERLAND

WORLD HERITAGE NOMINATION – IUCN TECHNICAL EVALUATION

JUNGFRAU-ALETSCH-BIETSCHHORN (SWITZERLAND) – ID No. 1037 Bis

(Extension)

Background note: The existing World Heritage property, Jungfrau-Aletsch-Bietschhorn (JAB), was inscribed on the World Heritage List in 2001 under three natural criteria: (i) (now viii); (ii) (now ix); and (iii) (now vii). This recognised that the property provides an outstanding example of the formation of the High Alps, including the most glaciated area in the region and the largest and longest glacier in Eurasia; includes a wide diversity of ecosystems, including successional stages due particularly to the retreat of glaciers resulting from climate change; and has an impressive landscape that has played an important role in European art, literature, mountaineering and alpine tourism. The proposed extension would extend the property to the east and west, with an increase in area from 53,900 ha to 82,400 ha.

1. DOCUMENTATION

i) **Date nomination received by IUCN:** April 2006

ii) **Dates on which any additional information was officially requested from and provided by the State Party:** IUCN requested supplementary information on 4 October 2006 after the IUCN Evaluation Mission. The State Party responses were submitted on 27 November 2006 and 26 February 2007, including a new management plan and responses to all the issues raised by IUCN.

iii) **UNEP-WCMC Data Sheet:** 13 references (including nomination)

iv) **Additional literature consulted:** Wiesmann, U. et al. (2005). **Between conservation and development: Concretizing the first World Natural Heritage Site in the Alps through participatory processes**. Mountain Research and Development 25, 128-138.

v) **Consultations:** 9 external reviewers. Extensive consultations were undertaken during the field visit with: representatives of the Federal Office for the Environment; representatives of the Office for Communes and Spatial Planning of the Canton of Berne and the Forest and Landscape Service of the Canton of Valais; representatives of 15 of the 26 communes on which the proposed extended World Heritage property is situated (mainly those in the proposed extensions); scientists from the University of Berne; representatives of Kraftwerke Oberhasli (KWO: hydro-electricity generating company); staff of the JAB Management Centre; and members of the JAB Supervisory Board and JAB Core Groups.

vi) **Field visit:** Martin Price and Bastian Bomhard, September 2006

vii) **Date of IUCN approval of this report:** April 2007

2. SUMMARY OF NATURAL VALUES

The current Jungfrau-Aletsch-Bietschhorn (JAB) World Heritage property covers an area of 53,900 ha on the territory of 15 communes in the Swiss Alps. The proposed extension would increase the area by 53% to 82,400 ha on the territory of 26 communes. Of this extended area, 57% lies in the Canton of Valais (18 communes) and 43% in the Canton of Berne (8 communes). The Summary of Natural Values in the 2001 IUCN Technical Evaluation of the current property largely covers the key points for the extended property. Significant additions include the following:

1) A number of new glaciers, especially those in the upper basin of the Aar catchment (Oberaar, Lauteraar, Finsteraar, Unteraar, Rosenlaui, Oberer Grindelwald) to the east and the plateau glacier of the Kanderfirn/Petergrat to the west, so that the glaciated area increases from 24,900 to 35,000 ha, with five of the longest glaciers in the Swiss Alps. Many of these have global importance for monitoring climate change, particularly the Lauteraar glacier, which has been a key site for glaciological research since the work of Louis Agassiz in the 1840s;
2) The extension of the northern perimeter of the property, from 25 to 40 km, so that it now includes almost the entire dramatic north wall of the Bernese

Alps, including the Bluemlisalp group in the west and the Wetterhorn and Wellhorn in the east;

3) The Grimsel area, the Doldenhorn group, and parts of the Bietschhorn massif which are not included in the current property;
4) Other key landscape features, such as the Oeschinensee (glacial lake), the roche moutonnée landscape in the Grimsel region, and the Rosenlauischlucht (fluvial gorge); and
5) New elements from the Helvetic sedimentation region.

3. COMPARISONS WITH OTHER AREAS

The comparison made in the 2001 IUCN Technical Evaluation covers the key points for the proposed extended property and the proposed extensions only add to the logic of the argument, as exemplified by the significant additions mentioned above.

4. INTEGRITY

4.1 Legal status

The communes own most of the land in the extended JAB property; another major landowner is KWO, which owns 8500 ha in the Grimsel area. Almost all of the proposed extended property (77,400 ha: 94%) is protected within two sites of the Federal Inventory of Landscapes and Natural Monuments of National Importance (BLN). In addition, 41% of the area has additional protection status. This includes five biotopes of national importance (1,150 ha, 1.4%), six federal hunting reserves (9,000 ha, 11%), four landscapes protected under the Ordinance Concerning Compensation for Losses in Hydropower Generation (16,000 ha, 19%) – these designations are more strictly protected than BLN; as well as 29 cantonal nature protection areas (13,110 ha, 16%). Many of these designations overlap; of the 5.6% of the proposed extended property that is not under BLN protection, 2%, in the Engelhörner massif at the northeast extremity of the expanded site, is protected as a federal hunting reserve. Thus, only 3.6% is not under any type of protection. The two relatively small areas concerned (one in the commune of Blatten in the Lötschental, the other below the Doldenhorn north of the Oeschinensee) were visited, and discussions in the field concluded that their natural values are not at risk, and therefore the proposed boundaries of the extended property are appropriate. Eventually, it would be desirable for these two small areas, as well as the small area in the Engelhörner massif, to be included in the BLN during the ongoing process of review and revision.

In addition, it should be noted that, within the Canton of Valais, the natural and cultural heritage protection legislation of 1 October 2000 requires communal land-use plans to list the JAB property as a protected area of international importance. In the Canton of Berne, the Cantonal Landscape Development Concept includes location-specific statements on 'cantonal priority areas' which include all the federally-designated sites mentioned above, and there is a special policy to implement the JAB property.

4.2 Boundaries

The delineation of the boundaries of the current JAB property resulted from intensive consultations among 14 of the region's communes and other stakeholders. At the time of the evaluation mission to the originally nominated site in March 2001, it was noted that extensions to the west and east would be likely. The new boundaries for the proposed extensions were again intensively negotiated from 2001 to 2004, this time with 26 communes and other stakeholders. Overall, the proposed boundaries, as noted in Section 2 of this report, significantly increase the values for which the JAB property has been inscribed. These boundaries are largely those of the two BLN sites in the region (see above). The primary exception is to the east of the area, where the majority of the commune of Innertkirchen (especially the Gauli glacier and forefield) falling within the BLN site was not included because of concerns from the traditional agricultural and tourism sectors. During the mission in September 2006, representatives of this commune stated that this land might be proposed for inclusion at a later date. Also to the east, the boundaries of the proposed extended property around the Grimselsee have been drawn to allow for possible raising of the hydropower dam. For related reasons, a considerable part of the commune of Gutannen falling within the BLN site is not included because of extensive hydropower infrastructure (and it should be noted that there is an extensive network of tunnels for this purpose under much of the proposed eastern extension, though these do not in any way endanger the characteristics for which the property is designated). To the west, the boundary of the extension also does not match the BLN site, as the Balmhorn massif is excluded. However, the location of the boundary along the north side of the Gasterntal is appropriate.

4.3 Management

Following extensive participatory processes, a highly democratic institutional structure has been implemented through the JAB World Heritage Association, registered in May 2002 under Swiss law. The four main elements of this Association are:

- An assembly of delegates, with 24 members from each of the two cantons, representing regions, communes and organisations;
- A supervisory board, with 6 members from each of the cantons, representing regions, communes and organisations;
- A strategic steering committee, with representatives from the Confederation and the two cantons; and
- A management centre, with two offices, one each in the Cantons of Bern and Wallis, with a staff of two full-time equivalents who are highly qualified and have some administrative support.

In addition, the staff of the management centre work with core groups, including representatives of key stakeholders, in developing and implementing work in 21 'fields of action' that relate to a wide range of activities

within the proposed extended World Heritage property and also across the entire area of each of the 26 communes which have parts of their territory within the proposed extended World Heritage property, what is referred to as a 'World Heritage Region', as discussed below.

This institutional structure is appropriate given the institutional complexity. The 'management plan' dated 1 December 2005 was developed in an exemplary participatory process directly involving 256 people from the full range of stakeholder groups. The overall goals of this document, however, are not entirely consistent with the natural values for which the existing World Heritage property (and equally its proposed extension) has been inscribed; for instance, the goals referring to economic use. This reflects the fact that the document refers to a larger 'World Heritage Region' with 35,000 inhabitants which includes, as its core, a World Heritage property which has only 10 permanent inhabitants, though it has both seasonal residents (e.g., at mountain huts and occupied with grazing animals) and, throughout the year but especially in winter, very large numbers of visitors to sites on or near its boundary as well as mountaineers and skiers, some of whom arrive by helicopter. Consequently, this document is not an effective plan for the management of the proposed extended property, for three reasons:

1) Although the document outlines a very large number of highly desirable actions, it does not state how they will be practically achieved. More accurately, it could be described as a 'management strategy';
2) It does not refer in any great detail to many actions already being undertaken in the area which contribute to the maintenance of the values for which the property has been inscribed. Such activities are undertaken by federal and cantonal employees and others, including employees of various conservation and recreation NGOs; and
3) It does not adequately differentiate between actions which directly contribute to the maintenance of these values, those which indirectly contribute, and those which are desirable but more generally of relevance for the sustainable development of the so-called broader 'World Heritage Region'.

IUCN therefore recommended on 4 October 2006 that this 'management plan' should be regarded as a 'management strategy', and that a new management plan should be prepared, which should clearly identify 1) priorities for action, differentiating between activities that directly contribute to the maintenance of the values of the natural World Heritage property and its integrity (i.e., essential measures) vs. those that contribute indirectly and/or to regional sustainable development; and 2) specific activities, each with the responsible organisation(s) and the resources (especially in terms of funding and manpower) allocated to them. Given the many conservation designations in the area, IUCN also noted that it is essential that the new management plan clearly states how these activities are to be coordinated and, in this, what is the role in planning and management of the respective organisations, including the management centre.

In response to IUCN's recommendation the State Party prepared a new management plan which was submitted on 26 February 2007. Together with its six annexes, this new management plan provides all the necessary information on the activities, responsible organisations and resources for the conservation of the World Heritage property, and how these activities are to be coordinated.

The establishment of the management centre, with two offices, was essential for the coordination of a large number of activities by diverse stakeholders over a large area. The current levels of staffing at the management centre appear appropriate. There are also a number of staff employed by federal and cantonal institutions and both recreation and conservation NGOs who work within the proposed extended World Heritage property. However, IUCN noted on 4 October 2006 that, while long-term funding commitments from members of the Association and the Canton of Berne are in place, core funding to support the key activities of the management centre is not guaranteed, especially from the Canton of Valais and the Confederation. In response to IUCN's recommendation the State Party submitted on 26 February 2007 letters from the Federal Office for the Environment as well as the Cantons of Berne and Valais confirming their commitment and financial support for the implementation of essential measures and key activities into the foreseeable future.

4.4 Threats and human use

The proposed extension will not change the relatively small number of threats to the property. Tourist developments are limited, and a federal review of the use of the area for helicopter skiing is currently underway. This appears likely to limit the number of landing sites and flights. Climate change is certainly affecting the property, as shown by the retreat of the glaciers. However, this – and its ecological consequences – should be recognised as ongoing glaciological / geomorphological and ecological processes (criteria viii and ix) of which the property provides an outstanding example.

IUCN considers that the proposed extension meets the conditions of integrity as required under the Operational Guidelines.

5. ADDITIONAL COMMENTS

5.1 Name

While the name of the existing World Heritage property is appropriate, the proposed extension would add a considerable area, so that some of the surrounding communes (especially those added as a result of the extension process) have little affinity to the three names in the name of the current property, i.e., Jungfrau, Aletsch, Bietschhorn. Following discussions during the evaluation mission, it was therefore suggested that a more appropriate name for the extended property should be identified, which should have at least three benefits: 1) it should have greater acceptance by the majority of people in the concerned communes; 2) it should be more widely recognised at the international scale (and also potentially avoid confusion with existing tourist-oriented names such as Jungfrau Region); and 3) it should leave open the

possibility of serial nominations within the Alps on the territories of other States (see below). Given that other sites within the Swiss Alps have been named for much more local characteristics (e.g., Monte San Giorgio, Benedictine Convent of St John at Müstair), such renaming should not cause any confusion. Options for the renaming of the property are currently under consideration and the State Party should be encouraged to bring forward a new name for the property in due course.

5.2 Possible future extensions

As noted above, the majority of the commune of Innertkirchen (especially the Gauli glacier and forefield) within the boundaries of the BLN site was not included in the proposed extended property because of concerns from the traditional agricultural and tourism sectors. It would be desirable if this relatively small area could be included at a later date, through a minor boundary modification, to further strengthen the integrity of the property.

5.3 Possible future inclusion in a serial property

There have been many discussions, including those at a regional thematic expert meeting held in June 2000 in Austria, concerning a serial World Heritage nomination in the Alps. Such discussions are ongoing, particularly within the context of the Alpine Network of Protected Areas.

6. APPLICATION OF CRITERIA / STATEMENT OF OUTSTANDING UNIVERSAL VALUE

The proposed extended JAB property has been nominated under criteria (vii), (viii) and (ix). The arguments presented in the nomination are in line with those identified in the 2001 IUCN Technical Evaluation and remain valid. IUCN considers that the nominated property meets these criteria and proposes the following Statement of Outstanding Universal Value:

The Jungfrau-Aletsch-Bietschhorn region is the most glaciated part of the European Alps, containing Europe's largest glacier and a range of classic glacial features, and provides an outstanding record of the geological processes that formed the High Alps. A diverse flora and fauna is represented in a range of habitats, and plant colonization in the wake of retreating glaciers provides an outstanding example of plant succession.

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

The impressive landscape within the property has played an important role in European art, literature, mountaineering and alpine tourism. The area is globally recognised as one of the most spectacular mountain regions to visit and its aesthetics have attracted an international following. The impressive north wall of the High Alps, centred on the Eiger, Mönch and Jungfrau peaks, is a superlative scenic feature, complemented on the southern side of the Alpine divide by spectacular peaks and a valley system which supports the two longest glaciers in western Eurasia.

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

The property provides an outstanding example of the formation of the High Alps resulting from uplift and compression which began 20-40 million years ago. Within an altitude range from 809 m to 4,274 m, the region displays 400 million-year-old crystalline rocks thrust over younger carbonate rocks due to the northward drift of the African tectonic plate. Added to the dramatic record of the processes of mountain building is a great abundance and diversity of geomorphological features such as U-shaped glacial valleys, cirques, horn peaks, valley glaciers and moraines. This most glaciated part of the Alps contains the Aletsch glacier, the largest and longest in Europe, which is of significant scientific interest in the context of glacial history and ongoing processes, particularly related to climate change.

Criterion (ix): Ecological and biological processes

Within its altitudinal range and its dry southern/wet northern exposures, the property provides a wide range of alpine and sub-alpine habitats. On the two main substrates of crystalline and carbonate rocks, a variety of ecosystems have evolved without significant human intervention. Superb examples of plant succession exist, including the distinctive upper and lower tree-line of the Aletsch forest. The global phenomenon of climatic change is particularly well-illustrated in the region, as reflected in the varying rates of retreat of the different glaciers, providing new substrates for plant colonization.

Conditions of Integrity, Protection and Management

The property is well managed, with a management strategy and plan in place which have been developed through an exemplary participatory process. Almost all of the property is under some form of legal protection. Key management issues include the potential impact from climate change, the management of tourism, and the need to ensure effective coordination of management responsibility between federal, cantonal and communal levels of government.

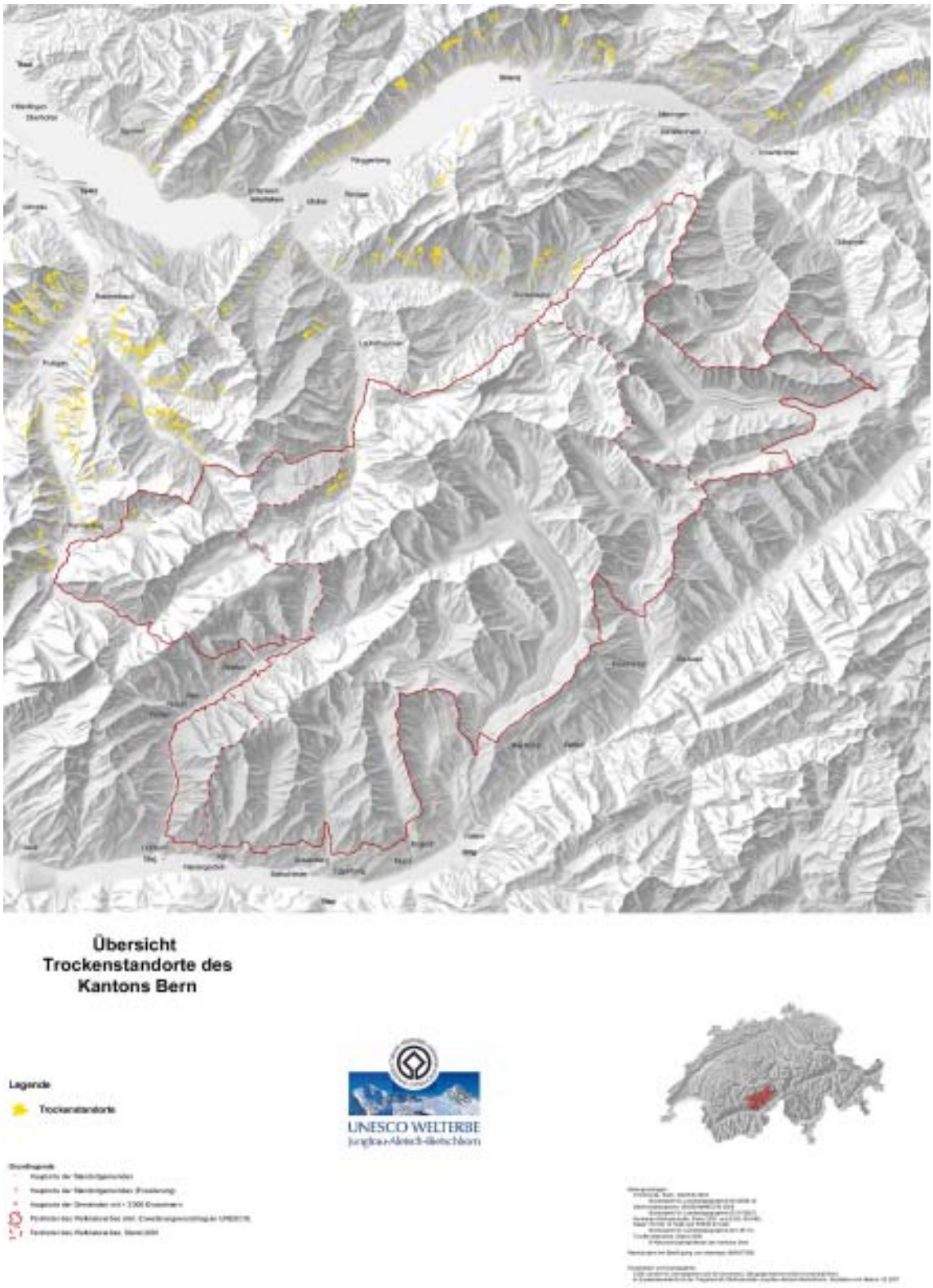
7. RECOMMENDATIONS

IUCN recommends that the World Heritage Committee **extends** the Jungfrau-Aletsch-Bietschhorn property, Switzerland, on the World Heritage List on the basis of criteria (vii), (viii), and (ix).

IUCN recommends that the World Heritage Committee commends the State Party for preparing a comprehensive management plan and strategy to ensure the effective conservation and management of the property.

IUCN also recommends that the State Party be requested to consider changing the name of the property to better reflect its extended area and notes that the State Party has already initiated a process to identify a suitable name.

Map 1: Location and boundaries of nominated property



B. Nomination of Mixed Properties to the World Heritage List

B1. New Nominations of Mixed Properties

AFRICA

THE RICHTERSVELD CULTURAL AND BOTANICAL LANDSCAPE

SOUTH AFRICA

WORLD HERITAGE NOMINATION – IUCN TECHNICAL EVALUATION

THE RICHTERSVELD CULTURAL AND BOTANICAL LANDSCAPE (SOUTH AFRICA) – ID No. 1265

1. DOCUMENTATION

i) **Date nomination received by IUCN:** April 2006

ii) **Additional information officially requested from and provided by the State Party:** IUCN requested supplementary information on 19 September 2006 before the IUCN / ICOMOS Evaluation Mission. The State Party responses were received in September and October 2006, including detailed species lists and responses to the issues raised by IUCN.

iii) **UNEP-WCMC Data Sheet:** 2 references (including nomination)

iv) **Additional literature consulted:** Burgess et al. (2004). **Terrestrial Ecoregions of Africa and Madagascar: A Conservation Assessment.** Island Press, Washington. CEPF (2003). **Ecosystem Profile: The Succulent Karoo Hotspot, Namibia and South Africa.** Critical Ecosystem Partnership Fund. Cowling, R. and Pierce, S. (1999). **Namaqualand: A Succulent Desert.** Fernwood Press, Vlaeberg. Davis et al. (eds.) (1994). **Centres of Plant Diversity: A Guide and Strategy for their Conservation.** Volume 1. WWF and IUCN. Huntley, B. (1989). **Biotic Diversity in Southern Africa.** Oxford University Press, Oxford. Jürgens, N. (1997). **Floristic biodiversity and history of African arid regions.** Biodiversity and Conservation 6, 495-514. Le Roux, A. and Schelpe, T. (1994). **Namaqualand: South African Wildflower Guide 1.** Botanical Society of South Africa, Cape Town. Mittermeier, R.A. et al. (2004). **Hotspots Revisited: Earth's Biologically Richest and Most Endangered Terrestrial Ecoregions.** Conservation International. Van Jaarsveld, E. et al. (2000). **Succulents of South Africa: A Guide to the Regional Diversity.** Tafelberg Publishers, Cape Town. Williamson, G. (2000). **Richtersveld: The Enchanted Wilderness.** Umdaus Press, Hatfield.

v) **Consultations:** 9 external reviewers. Extensive consultations were undertaken during the field visit with: representatives of the State Party, elected government officials (including the Premier of the Northern Cape Province, four cabinet ministers and two mayors), representatives of different national and provincial government departments, staff and members of the Richtersveld Community Conservancy, the Richtersveld National Park manager, the consultants who prepared the nomination document, and many local community members.

vi) **Field visit:** Wendy Strahm (IUCN) and Donald Chikumbe (ICOMOS), October 2006

vii) **Date of IUCN approval of this report:** April 2007

2. SUMMARY OF NATURAL VALUES

The Richtersveld region is located in the northwestern corner of South Africa in the Northern Cape Province, stretching from Steinkopf and Port Nolloth in the south up to the Orange River, and from Alexander Bay in the west to Vioolsdrif in the east. The core area of the nominated property is the Richtersveld Community Conservancy (RCC), covering about 160,000 ha. Buffer zones to the nominated property are the Richtersveld National Park to its north covering an area equal in size to the core area (162,445 ha), the Helskloof (Nababiep) Nature Reserve to the southeast (10,980 ha), the Richtersveld Communal Grazing Areas (around 225,000 ha) which surround most of the rest of the core area of the nominated property, and the Orange River which is also an international border with Namibia.

This mountainous desert region is very arid, with rainfall ranging between 25 to 300 mm per year and summer temperatures reaching up to 45° C, although the RCC can occasionally experience subzero temperatures. A combination of unusual climatic regimes (the RCC is located in an area where summer and winter rainfall zones overlap) means that a variety of conditions favour different species. And although rainfall is low, when the cold Benguela Current in the Atlantic Ocean meets the dry coastal desert, a thick mist forms and extends into the region which provides additional moisture. At the end of the winter rainfall season the Richtersveld is full of stunning flowers and greenery growing between the rocks and stone, although this completely changes later in summer, when the region is dry and parched.

The scenery is characterized by high mountain areas and cliffs exhibiting various geological formations. Eight different geological units with rocks ranging in age from one to 2,000 million years old have been described. Different geological suites consist of volcanic and metamorphic rocks (mainly granites and gneisses),

intermingled with outcrops which include sandstone, mudstone, limestone, quartzite, tillite and lava, creating a variety of habitats. The Stinkfontein range which runs through the centre of the core area serves as a high central "spine", creating a barrier between the cold mist from the west and the drier areas to the east, which further increases the variety of habitats. The highest mountain, the Cornellsberg (1,377 m), lies in the centre of the core area. These mountains also serve as physical barriers to encroachment along its borders.

With its complex geology, the Richtersveld is mineral rich, particularly with diamonds in the alluvial deposits of the Orange River and coastal regions, but other heavy minerals also occur in the region. Mining is concentrated in the alluvial regions, although this is reported to be declining, and mining areas have not been included in the core area of the nominated property nor in most of its proposed buffer zone. Quartz fields also occur in the core area, which are remarkable habitats as the ground is covered in small quartz pebbles which provide camouflage and moderate the temperature for "stone plants" and numerous other tiny succulents.

The Richtersveld region is composed of three biomes, principally the Succulent Karoo and Desert biomes, with a small patch of Fynbos in the Stinkfontein range. The East Gariep Centre of Endemism of the Succulent Karoo falls right within the core area of the nominated property. Of the 13 different vegetation types represented in the core area, 8 belong to the Succulent Karoo. However, the Succulent Karoo Ecosystem Programme (SKEP) identified 135 vegetation types in the Succulent Karoo biome as a whole. The typical vegetation of the Succulent Karoo is a dwarf shrubland dominated almost entirely by leaf succulents, which is unique among the deserts of the world. The families Mesembryanthemaceae, Crassulaceae, Asclepiadaceae and Euphorbiaceae are particularly rich in succulent plant species. Grasses are infrequent and are mainly annuals. The mass flowering displays of annuals (mainly Asteraceae) and geophytes in spring, particularly in disturbed areas, are characteristic. Some trees grow on rocky outcrops and along river courses.

The Succulent Karoo is renowned for its rich floral diversity. 848 species of vascular plants have been recorded in the Richtersveld Community Conservancy (RCC) and 854 in the Richtersveld National Park (RNP), which is part of the proposed buffer zone. A total of 576 of all these species are found in both areas, meaning that each area has a distinct flora, with the RCC having 30 recorded endemics and the RNP 36. However, given the difficult accessibility to the area and few botanical surveys, any species lists are likely to be an underestimate. For comparison, SKEP records 6,356 species in the entire Succulent Karoo with about 2,500 strict endemics or near-endemics.

A number of interesting plants grow in the region. Most apparent is the "Botterboom" or "Butter Tree" (*Tylecodon paniculatus*), with its succulent trunk resembling a miniature baobab. Three of the four South African tree aloes are found in the Richtersveld, with two of them endemic to the region. This includes what has been identified as a flagship species, the "Baster Quiver Tree" (*Aloe pillansii)*. Small populations of the "Halfmens" (a *Pachypodium* with a spiny trunk and little tuft of leaves at its summit) also occur in the Conservancy. Neither of these two species, however, is unique to the nominated property as suggested in the nomination document.

An interesting feature of much of the Succulent Karoo is the presence of "heuweltjies" or "mima-like mounds". Originally created by termites and often colonized by a wide variety of burrowing animals, these round patches which are clearly apparent in certain vegetation types are physically and chemically very different from the intervening matrix, and support a flora markedly different in appearance and composition. They are also more vulnerable to trampling and overgrazing by livestock. Some heuweltjies are reported in the nomination document to occur inside the core area, although during the field visit they were only observed in the buffer zone.

Although the property has been nominated for its rich floral diversity, faunal diversity is also rich with high endemism for reptiles and invertebrates. A number of snakes occur in the area, including the endemic Desert Mountain Adder and the Namaqua Dwarf Adder, the smallest of Africa's adders measuring only 20-25 cm. Given the extreme heat many animals burrow, including amphibians such as the endemic Namaqua Rain Frog and Namaqua Caco Frog. Other endemics include two species of burrowing skinks, four species of girdled lizards, five species of legless skinks and the Namaqua Chameleon. Mammal species are uncommon and most of the large ungulates and associated carnivores have disappeared from the region.

3. COMPARISONS WITH OTHER AREAS

The Richtersveld region is part of the larger Succulent Karoo biome, which is a distinct regional centre of endemism ranging from southern Namibia in the north to the Cape Fold Mountains in the south, which mark the edge of the Cape Floral Region. The Succulent Karoo covers an area of 116,000 km^2, of which about 30,000 km^2 remains in a fairly reasonable state of conservation. According to current information the entire Succulent Karoo contains 6,356 species in 1,002 genera and 168 families. It has the richest succulent flora in the world. Approximately 29% of the flora are succulents and 18% geophytes. Some 80 genera are endemic, mostly succulents and geophytes, and 1,630 (26%) species are strict endemics and 905 (14%) are near-endemics (i.e. having their centre of distribution in the Succulent Karoo).

The 2004 "Review of the World Heritage Network" by IUCN and UNEP-WCMC and IUCN's 2004 and 2006 strategy papers on "Future Priorities" identified the Succulent Karoo as an area which merits consideration for nomination to the World Heritage List. This region has also been identified as a Centre of Plant Diversity by WWF and IUCN as well as a Biodiversity Hotspot by Conservation International. However, the Succulent Karoo covers a very large area that is ecologically much more diverse than the subset of it that is included in the nominated property.

The Richtersveld region is also part of Namaqualand, defined by plant geographers as the part of the Succulent Karoo that is strongly influenced by winter rainfall and fog. With this definition, Namaqualand extends from the northern boundary of the Cape Floral Region all the way up the Atlantic coast to just north of Lüderitz in Namibia,

Table 1. Plant species richness and endemism for SKEP priority areas in the Succulent Karoo

Name of SKEP priority area	Area (ha)	Plant species (threatened)	Plant endemics	Percentage endemics	Vegetation types
Sperrgebiet (Namibia; includes parts of the Gariep Centre)	56,100	776 (284)	234	30%	15
Greater Richtersveld (includes part of the Gariep Centre and, as a subset of it, the nominated property)	**?**	**2,700 (?) (848 in property)**	**560**	**21%**	**68 (13 in property)**
Bushmanland Inselbergs	31,400	429 (87)	67	16%	1
Namaqua Uplands	33,500	1,109 (107)	286	26%	7
Central Namaqualand Coast	34,600	432 (44)	85	20%	14
Knersvlakte	48,500	1,324 (128)	266	20%	23
Hantam Tanqua Roggeveld	86,600	1,767 (173)	357	20%	13
Central Breede River Valley (figures are for entire Worcester-Robertson Karoo)	?	1,500 (?)	115	8%	1
Central Little Karoo	51,000	1,325 (92)	182	14%	11

which includes the Sperrgebiet. The other part of the Succulent Karoo, where rainfall often peaks in the spring and autumn months, belongs to the Southern Karoo Domain. Although biogeographical assessments vary, in general the Succulent Karoo has been further divided up into five "Hotspots" within it: the Gariep Centre (which contains the nominated property), Kamiesberg, and Knersvlakte in Namaqualand, and the Western Mountain Karoo and Little Karoo in the Southern Karoo Domain. While many Succulent Karoo species are common to more than one area, these five areas are very rich in endemics. The Succulent Karoo Ecosystem Programme (SKEP) has further divided the Succulent Karoo into nine priority areas for conservation, and Table 1 shows the number of plant species, endemics and vegetation types in each of these priority areas.

It has been estimated that there are 1,773 vascular plant species in the Gariep Centre (which encompasses the Richtersveld as well as the Sperrgebiet in Namibia), of which 227 are endemic. Of these, 848 species have been recorded in the Richtersveld Community Conservancy (RCC), and a similar number (854) in the Richtersveld National Park (RNP) which is part of the proposed buffer zone. A total of 576 species are found in both these areas, meaning that each area has a distinct flora, with the RCC having 30 recorded endemics and the RNP 36. Therefore, it would seem that the RNP (which is an IUCN Category II protected area) and the RCC (which is still awaiting legal designation) are of similar importance to the conservation of ecological processes and biodiversity in the Succulent Karoo. This needs to be taken into account when comparing the importance of the nominated property with other sites occurring both in Namaqualand and in the entire Succulent Karoo.

From Table 1 it is clear that it is impossible for any one of the priority areas, or any of the above mentioned "Hotspots", to be representative of the Succulent Karoo as a whole. It is also noteworthy that access to the Sperrgebiet is extremely limited by the diamond mining industry so to date there is limited knowledge of its flora, but it is considered by a number of experts as the last real wilderness in the Succulent Karoo. It is therefore likely that the Sperrgebiet, recently designated as a National Park in Namibia, has in fact a higher species richness and endemism than indicated in Table 1.

The comparative analysis provided in the nomination document does not consider the issues mentioned above and compares the nominated property to a number of incomparable World Heritage properties. As the nomination is for a mixed property, comparisons were made with both cultural as well as natural World Heritage properties, including the Pirin National Park, Bulgaria; the Banc d'Arguin National Park, Mauritania; the Arabian Oryx Sanctuary, Oman; the Vallée de Mai Nature Reserve, Seychelles; and the Cape Floral Region Protected Areas, South Africa. However, none of these properties are comparable to any site in the Succulent Karoo, either because they are not deserts, or because the sites were inscribed on the World Heritage List for values other than their flora (such as the Banc d'Arguin and the Arabian Oryx Sanctuary).

The nomination document also compares numbers of succulent plant species from different regions or centres of endemism in Southern Africa, and unsurprisingly finds that the Succulent Karoo has many more succulents than other areas. However, the central portion of the Gariep Centre of the Succulent Karoo, which is not adequately represented in the nominated property, has been recorded as having a greater number of succulent plant species

than any other parts of the Succulent Karoo. Finally, although it is true that the "Baster Quiver Tree" and "Halfmens" are flagship species for conservation of the Succulent Karoo and occur in the Richtersveld Community Conservancy, during the field visit it became clear that these species are in fact very rare in the core area of the nominated property, and ensuring their long term conservation would thus require additional areas.

In conclusion, it is clear that that the Succulent Karoo biome, which is currently not represented on the World Heritage List, merits consideration for nomination to the World Heritage List. However, as noted above, it is not possible to claim that the core area of the nominated property is best representing the rich and distinct flora of the Namaqualand, let alone Succulent Karoo. Protected areas such as those in the proposed buffer zone as well as the Namaqua National Park, Knersvlakte Nature Reserve and Goegap Nature Reserve, all in South Africa, are also important sites, containing many of the same, and many more other natural values than the nominated property. Together, as a serial property, they would be much more representative of the Namaqualand flora, one of the key components in the Succulent Karoo biome, than the Richtersveld Community Conservancy by itself.

4. INTEGRITY

4.1 Legal status

The core area of the nominated property, the Richtersveld Community Conservancy, has to date no formal protected area status, although steps are underway to declare the Conservancy as a Heritage Area under Section 31 of the National Heritage Resource Act (1999) which will confer some legal protective status. The community has, through the nationally legislated Integrated Development Planning process, designated the Conservancy as a community protected area.

The landowners are the Community Property Association, a communal system which has been developed during the process of land restitution in South Africa, although title holding is still in the process of being finalised under legislation affecting communal property. Whilst this community-based approach is considered valid to promote conservation and sustainable development, in terms of meeting the conditions of integrity as required under the Operational Guidelines, it is required that the protected area status, land ownership and governance of the nominated property are formalised.

As for the legal status of the buffer zones, the Richtersveld National Park was declared as such in 1991 and benefits from the Protected Area Amendment Act (Act No. 31 of 2004). The park is managed by South African National Parks (SANParks) on the basis of a contract between SANParks and the local community. This contract provides benefits to the community, including park income, employment opportunities, and grazing rights, in exchange for park status and tourism opportunities. The park also forms part of the Ai-Ais/Richtersveld Transfrontier Park which was declared jointly with Namibia in 2003. However, land ownership and governance of the transfrontier park is unclear and discussions with local community members during the field visit revealed a wish by some communities to regain control of the management of the park. Although Richtersveld National Park is only included in the proposal as part of the buffer zone, more information is needed to ascertain whether the actual legal status of this park can ensure its long term conservation.

The Helskloof (Nababiep) Nature Reserve is a gazetted provincial nature reserve with no clear management plan or authority. Because of the lack of a management plan and clear governance structure, this reserve was included in the buffer zone and not in the core area of the nominated property. The nomination document notes that this reserve is soon to be taken under the Conservancy's management and boundaries, but this would require a change in its current legal status, and no information has been provided on how and when this change will be proposed and approved.

4.2 Boundaries

The nomination document states that the 160,000 ha core area of the nominated property is of sufficient size to encompass the most critical environments and the necessary diversity of environments to adequately protect the valuable flora of the Gariep Centre of Plant Endemism and Succulent Karoo Biodiversity Hotspot. However, given the discussion in section 3 above, it is difficult to see how any single site could adequately represent all the environments necessary to adequately protect the diverse and localised flora of the Succulent Karoo. The same issue arose when trying to designate the World Heritage property in the neighbouring Cape Floral Region, and in the end a serial approach was used, encompassing eight protected areas across the region with a total area of 553,000 ha, to ensure as wide a representation as possible of environments.

The Gariep Centre is the biologically richest of the five "Hotspots" in the Succulent Karoo; however, the core area of the nominated property includes only a subset of the natural values of the Gariep Centre, and even if the Gariep Centre as a whole would be better represented in the nomination, it would still not be representative of the entire Succulent Karoo. As the proposed buffer zone, particularly the Richtersveld National Park, seems to contain a more diverse and also different flora than the proposed core area itself, additional thought needs to be given to the proposed boundaries. Including the Richtersveld National Park in the core area would, however, require the State Party to address issues associated with mining and its impact on the natural values and integrity of the property. Similarly, the Sperrgebiet in Namibia contains significant and distinct natural values of the Gariep Centre, which could be considered in revising the boundaries for a potential transnational serial nomination that better represents the Succulent Karoo.

4.3 Management

The region is characterised by weak institutional capacity. The Richtersveld Community Conservancy (RCC) is currently run by two paid staff: the Conservancy Manager and an Administrative Officer with one other independent staff responsible for managing small infrastructure projects. The provincial Department of Arts, Sports and Culture and Department of Tourism, Environment and Conservation (DTEC) have indicated they could jointly

fund a further full-time position at the Conservancy. The staff are guided by a Management Committee that meets four times a year and includes representatives from the four surrounding communities and local organisations and associations (Richtersveld Tourism Association, Richtersveld Small Miners Association, SANParks, DTEC, etc.).

Although the Richtersveld National Park is only included in the buffer zone, it is important to note that it operates under a modest budget of only US$ 100,000 per annum and its management operations are implemented by three professional staff. However, approximately US$ 3 million was granted by central government through the Poverty Relief Fund to support the development of tourism infrastructure in the park. Enforcing park regulations is planned to be undertaken by local livestock farmers who reside in the area, as well as the so-called Conservancy Management Patrols, although to date there is no budget or staff to do this. The Helskloof (Nababiep) Nature Reserve has no staff presence in the Richtersveld. Environmental management for the Richtersveld region, including regulation of the mining industry, primarily takes place from Kimberley, a thousand kilometres away, and to a limited extent from the town of Springbok, over a hundred kilometres away.

Past funding which was instrumental in the development of the RCC has been provided by GTZ, NORAD, and UNDP. Past and ongoing donors include Conservation International (ongoing until 2007), the Department of Environment Affairs and Tourism (DEAT) (ongoing until 2007), and the GEF (ongoing until 2010) who also fund a local project coordinator. For example, the RCC has received a US$ 1 million grant through DEAT and its Social Responsibility Projects to create and improve infrastructure, which will provide jobs and training for local people, although this was only just about to start when the IUCN-ICOMOS field visit took place. The GEF project gave a grant of US$ 887,000 to an NGO established by the Richtersveld Municipality (the Richtersveld Company for Sustainable Development) to implement a broad programme called the Richtersveld Community Biodiversity Conservation Project. On the other hand, Conservation International has funded the Richtersveld Community Based Natural Resource Management Programme. Whilst these projects are important they are often oriented primarily to rural development and poverty alleviation, not to protecting and managing the values of the nominated property. The nomination document mentions that a Financial Sustainability Plan has been prepared; but there is no indication on its implementation.

The Management Plan was completed and approved by the Management Committee of the RCC in August 2004. It first outlines very general principles by which the core area will operate, and was developed in a consultative manner with the community. Somewhat more specific Marketing, Infrastructure, and Communication plans were also produced in 2004 and 2005. Some of these plans have been put into action, but it will require further efforts to effectively implement them. The preparation of other plans including a Monitoring and Evaluation Plan, Tourism Plan, Zoning Plan, Management of Cultural Assets Plan, Sustainable Management Plan, and Environmental Response Plan is reportedly in progress. These last two are not restricted to the core area of the nominated property but include the buffer zone and are part of the GEF project. All these plans need to be completed and implemented, particularly those oriented to tourism development. If more visitors are to come to the RCC, then it is urgent that roads and signage are improved as well as emergency procedures in place in case of accident.

4.4 Threats and human use

Threats to the nominated property include grazing, mining, tourism, invasive alien species and climate change. The nomination document does not adequately address the issue to what extent overgrazing has, and indeed, still is damaging the natural values of the nominated property. Herds of sheep, goats and cows, often in groups of 300, were frequently observed during the field visit. While semi-nomadic livestock farming is highlighted as an important cultural aspect for this mixed nomination, from an ecological point of view, the livestock is detrimental to the natural values of the property that are strongly associated to the natural vegetation and flora. Given the fragility of desert ecosystems, even relatively low numbers of livestock have a large impact on natural vegetation and flora, and nearly all of the areas visited in the field were damaged either lightly or severely by overgrazing and trampling.

Mining is a potential threat to the property although mining is forbidden in Conservancy regulations and the Conservancy lies reportedly outside of the diamond deposit areas of the region. It is however highly likely that other minerals occur in the site, and it is also important to note that the approval of mining rights resides with government and if the area is not officially protected under South African laws, then even the local community will not be able to stop exploration and mining.

Tourism development is also a threat to the natural values of the property. If off-road driving and plant collecting are not adequately controlled, increasing tourist numbers could cause irreparable damage. Many of the succulent plant species are commercially valuable and although collection from the wild is prohibited, control is extremely difficult to implement given the vast expanse of the area. Community-based ecotourism must take advantage of the region's scenery, plants, birds, brilliant spring flower displays and local cultures, but at the same time management regimes are not yet in place to ensure that tourism development has the expected positive effects and no negative effects.

Invasive alien species also pose a threat, although currently much less than grazing, mining and tourism. Desert ecosystems are generally less impacted by invasive alien species; however, a number of exotic species are common throughout the core area of the nominated property, primarily in sandy disturbed areas (such as Mexican poppy and Tobacco tree). Potentially the worst invader is *Prosopis glandulosa* planted by livestock farmers to feed its leguminous fruits to livestock. This tree was observed naturalised in extremely dry areas as well as planted in Kuboes, one of the four small towns which surround the Conservancy. Apparently it is invasive along water courses. In order to manage the area sustainably, a native substitute tree to *Prosopis* needs to be identified for plantation in towns, and all *Prosopis* in the area removed.

Finally, climate change is having a debatable impact on the flora of the nominated property, and studies are being undertaken on the effects that changes in temperature and precipitation are having on the growth and recruitment of tree aloes. It is expected, however, that the varied topography and climate conditions present in the nominated property might help to mitigate the effects of climate change.

In conclusion, IUCN considers that the nominated property currently does not meet the conditions of integrity as required under the Operational Guidelines.

5. ADDITIONAL COMMENTS

This property has been nominated under natural criteria and also as a cultural landscape; and livestock grazing is of central importance to both proposals. As a cultural landscape, the interest of the area is in the way grazing has modified the natural environment, in turn creating habitats on which certain plants and animals rely. The nomination stresses that grazing pressure is very light and that the landscape would not change much as a result of continued grazing at current levels. However, a number of experts have challenged this view and have noted that even if grazing were to stop immediately it would take an extremely long time for the overgrazed areas of the property to recover. Therefore, in the particular case of this nomination, there is a clear conflict: the traditional land-use practices that justify proposing the property as a cultural landscape are indeed adversely affecting the values proposed as a justification for outstanding universal value under natural criteria.

6. APPLICATION OF CRITERIA

The property has been nominated as a mixed property and a cultural landscape. Its natural values are proposed for inscription on the basis of criteria (ix) and (x).

Criterion (ix): Ecological and biological processes

The nominated property, given its range of environmental conditions and the resulting variety of habitats, contributes to maintaining the important ecological processes that characterize the rich and distinct flora, including many endemic plant species, of the Succulent Karoo. However, by itself it is not representative of the Namaqualand, let alone Succulent Karoo. Once it meets the conditions of integrity, the property has the potential to meet this criterion as part of a larger serial, potentially transnational, property that includes the full range of biodiversity values, including ecological processes, of the region and a larger representation of its localised endemic flora.

IUCN considers that the nominated property has the potential to meet this criterion only in combination with other sites representative of the larger Succulent Karoo region.

Criterion (x): Biodiversity and threatened species

The nominated property contains a variety of habitats that are important for the conservation of the rich and distinct flora, including many endemic and threatened plant species, of the Succulent Karoo. However, the Succulent Karoo covers a very large area that is ecologically much more diverse than the subset of it that is included in the nominated property. It is therefore clear that it is impossible for any one site to be representative of the Succulent Karoo as a whole. In order to fully represent and conserve the natural values of the Succulent Karoo the nomination must therefore be enlarged and include other nearby sites representative of the Succulent Karoo, possibly including sites in Namibia.

IUCN considers that the nominated property has the potential to meet this criterion only in combination with other sites representative of the larger Succulent Karoo region.

7. RECOMMENDATIONS

IUCN recommends that the World Heritage Committee **defers** the examination of the nomination of The Richtersveld Cultural and Botanical Landscape, South Africa, to the World Heritage List on the basis of criteria (ix) and (x) to allow the State Party to consider options for re-nominating the property as part of a larger serial, potentially transnational, property that includes the full range of biodiversity values of the region and meets the conditions of integrity.

IUCN recommends that the World Heritage Committee recommends the State Party to consider the following issues:

a) The nominated property potentially has Outstanding Universal Value under natural criteria only in combination with other sites. In order to fully represent and conserve the natural values of the Succulent Karoo the nomination must therefore be enlarged and include other nearby sites representative of the Succulent Karoo, possibly including sites in Namibia;

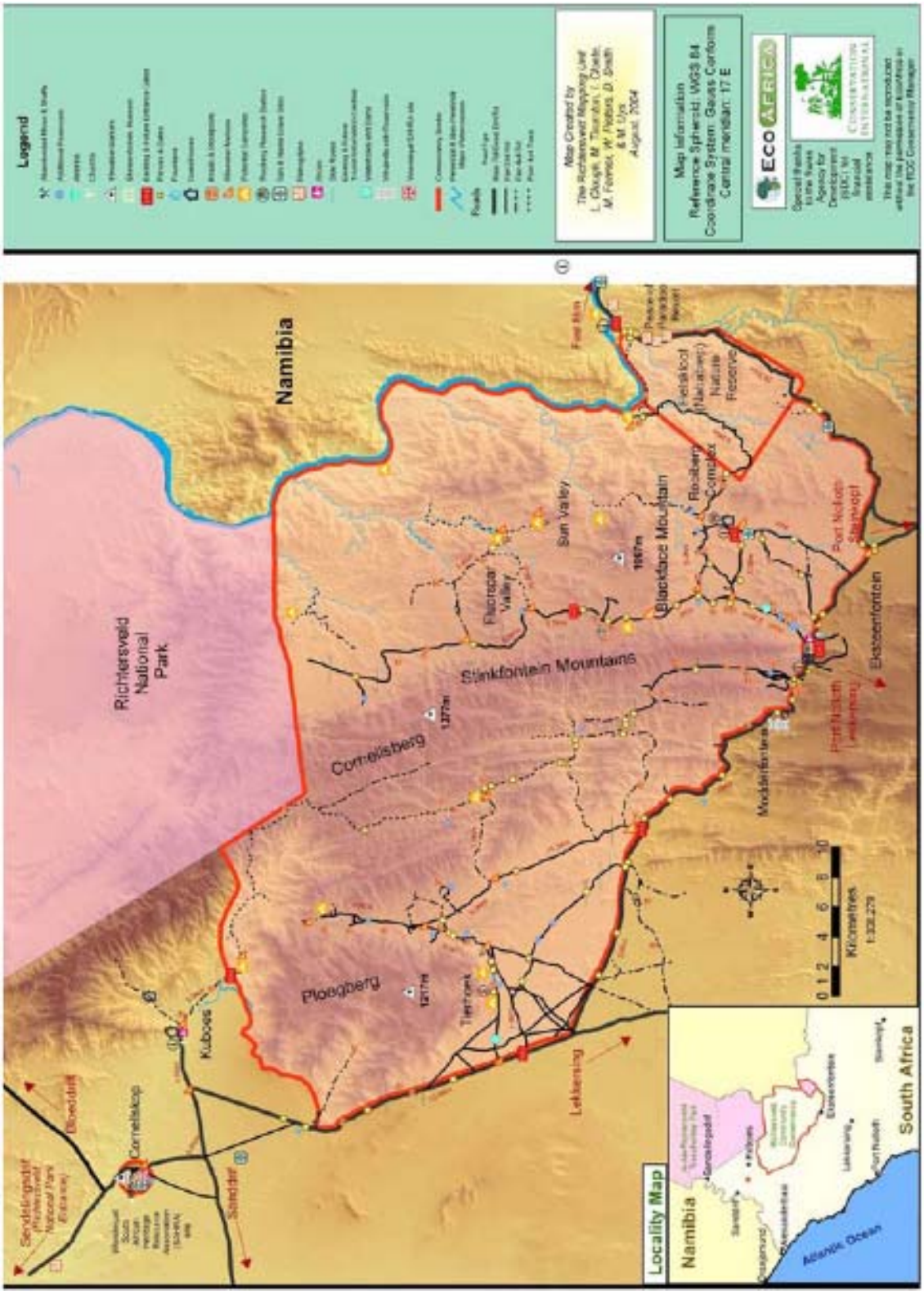
b) The legal ownership and protected area status of the nominated property should be formalised prior to re-submitting the nomination;

c) An effective and resilient management regime needs to be developed and implemented that is inclusive of all levels including the local community, SANParks, as well as other government and NGO representation to ensure the effective long-term protection and management of the natural values of the nominated property; and

d) An improved monitoring programme needs to be established, in particular to regulate livelivestock grazing, to ensure that current vegetation types are maintained or improved.

IUCN also recommends that the World Heritage Committee commends the State Party and all authorities and organisations involved for the impressive community participation that has taken place in the preparation of this nomination and the proposed implementation plans.

Map 1: Location and boundaries of nominated property



B. Nomination of Mixed Properties to the World Heritage List

B2. Referred Nominations of Mixed Properties

AFRICA

ECOSYSTEM AND RELIC CULTURAL LANDSCAPE OF LOPÉ-OKANDA

GABON

WORLD HERITAGE NOMINATION – IUCN TECHNICAL EVALUATION

ECOSYSTEM AND RELIC CULTURAL LANDSCAPE OF LOPÉ-OKANDA (GABON) – ID No. 1147 Rev

Background note: The IUCN Technical Evaluation of the Ecosystem and Relic Cultural Landscape of Lopé-Okanda, nominated by Gabon as a mixed property and cultural landscape in 2004, was presented to the 29th session of the World Heritage Committee (Durban, 2005). IUCN's evaluation noted that the property had the potential to meet natural criterion (ii) (now ix).

At its 29th session, the World Heritage Committee decided (Decision 29 COM 8B.17) to refer the nomination back to the State Party, on the basis of natural values, in order "*to allow the State Party to provide an improved comparative analysis that demonstrates the outstanding universal value of the property, considering other protected areas in Gabon and the region, and in relation to detailed inventories of fauna and flora, as available*." At its 30th session, IUCN presented a second evaluation of this property, based on an updated nomination submitted on 30 January 2006, reaffirming the potential of the property to meet criterion (ix) but noting that the case was not fully supported by the comparative analysis included in the updated nomination. The Committee decided (Decision 30 COM 8B.29) to refer the nomination back to the State Party in order to allow the State Party to provide a comprehensive global comparative analysis that demonstrates the outstanding universal value of the property and to address the need for increased management capacity. After the 30th session of the Committee, IUCN and the World Heritage Centre provided additional technical guidance to the State Party on how to enhance the comparative analysis of the nomination.

1. ADDITIONAL INFORMATION

The State Party submitted on 31 January 2007 a new revised nomination including a comprehensive global comparative analysis supported by detailed inventories of flora and fauna. Additional information was also provided on efforts to increase the management capacity at the property to ensure the effective implementation of the management plan.

2. EVALUATION OF ADDITIONAL INFORMATION

The new revised nomination contains a comprehensive comparative analysis of the nominated property with other protected areas in Gabon as well as with comparable World Heritage properties in the region and worldwide. This analysis is supported by detailed inventories of flora and fauna. IUCN's evaluation of the new revised nomination in relation to Decision 30 COM 8B.29 of the Committee is as follows:

The new revised nomination convincingly demonstrates the case for the outstanding universal value of the nominated property. Key arguments to highlight are:

a) The dynamic environmental and ecological processes that have led to the co-existence of forest and savannah ecosystems in the nominated property are outstanding and ongoing. Similar processes have occurred in other areas of the Congo Basin, the Amazon Basin and forest areas of East Asia, but in these areas rainforest has re-colonized almost all the space previously occupied by savannah after the Pleistocene, resulting in dense forest ecosystems. However, due to the relatively dry conditions prevailing in the area where the nominated property is located, the rainforest could not re-colonize all the space occupied by savannah; thus resulting in an unusual interface between dense and well conserved tropical rainforest and relict savannah environments, and a very important manifestation of evolutionary processes in terms of species and habitat adaptation to post-glacial climatic changes.

b) The diversity of habitats present in the nominated property is the result of natural processes and also the long-term interaction between man and nature. The property contains 6 types of savannahs and 17 types of forests in a relatively small area; adding to its uniqueness.

c) The diversity of habitats and the complex relationship between forest and savannah ecosystems have favourably influenced species richness and abundance; notably the large populations of gorillas and elephants. However, the influence of the habitat diversity has been even more important for the speciation of the flora. While a vast area of the nominated property is still to be surveyed and researched, over 1,550 plant species have been recorded to date. In the last 20 years over 40 plant species have been described, all of them never recorded before in Gabon. Based on the results of ongoing floristic surveys and research it is anticipated that the number of plant species recorded for the nominated property could reach 3,000 – 3,500, making the nominated property one of the most outstanding areas in relation to floristic

diversity and complexity in the Congo Rainforest Biogeographic Region.

In relation to the conditions of integrity the following points need to be highlighted:

a) The detailed long-term management plan (2006-2010) and zoning for the property have been finalized and adopted in August 2006. The plan has been agreed between many partners: *le Conseil National des Parcs Nationaux* (CNPN), the Ministry of Economic Forestry, Ministry of Culture, Wildlife Conservation Society (WCS), Zoological Society of London (ZSL), the EU, US Forest Service, *le Réseau des Aires Protégées d'Afrique Centrale* (RAPAC) and others. Amongst the objectives of the plan are the conservation, inventory and monitoring of the unique mosaic of habitats with their key species; multidisciplinary research synthesising biological and socio-economic knowledge about the property; resolving conflicts from competing interests; raising awareness amongst local people on the importance of conserving this property and to involve them in its management; and developing innovative eco-tourism. The basic zones are the central core zone, i.e. the existing Lopé National Park, and its extended 5 km-wide buffer zone which includes the historic complexes. These have been further divided into zones for Special Protection, Tourism and Sport Fishing, Sacred Places, Light Infrastructure, Heavy Infrastructure (for future park-related development), Research, and Natural and Cultural Sanctuaries. IUCN believes that the plan is comprehensive and will provide an excellent guide to the protection and management of the natural values and resources contained in the nominated property.

b) At the end of 2006, the number of permanent rangers working in the park was increased from 6 to 9, which adds to the 55 rangers from WCS and ZSL working in the Park. The State Party has also created a station in Iboundji that is in charge of controlling the southern sector of the park. In addition, training activities have been implemented in 2006 to enhance the capacity of the park's staff to better understand the interactions between the existing natural and cultural values, thus enabling them to enhance their performance and effectiveness in relation to conservation and environmental education activities with local communities.

c) A new national Law on National Parks is expected to be approved during 2007. This law will create a National Parks Agency and foresees increasing the number of permanent staff working in national parks, including in the nominated property. This law has provisions to ensure better coordination between the field staff working for the institutions dealing with forest conservation, water resources and the local police (which will be involved in controlling and patrolling activities in the park), and will provide additional human and institutional resources to the protection and management of the nominated property.

In conclusion, IUCN considers that the new revised nomination convincingly demonstrates the case for the outstanding universal value of the nominated property and meets the conditions of integrity as required under the Operational Guidelines.

In addition, IUCN would like to congratulate the State Party for its commitment in promoting this nomination and providing an excellent and comprehensive global comparative analysis as requested under the Operational Guidelines.

3. APPLICATION OF CRITERIA / STATEMENT OF OUTSTANDING UNIVERSAL VALUE

The property has been nominated as a mixed property and a cultural landscape. Its natural values are proposed for inscription on the basis of criteria (ix) and (x). IUCN considers that the nominated property meets these criteria and proposes the following Statement of Outstanding Universal Value:

The Ecosystem and Relic Cultural Landscape of Lopé-Okanda represents an unusual interface between dense and well conserved tropical rainforest and relict savannah environments. A greater number of threatened species of large mammals find their last refuge in Lopé-Okanda than in any other comparable rainforest area in the Congo Rainforest Biogeographical Province. The property also preserves a record of biological evolution over the last 15,000 years of the still extant rainforest-savannah transition zone.

Criterion (ix): Ecological and biological processes

The nominated property demonstrates an unusual interface between forest and savannah environments, and a very important manifestation of evolutionary processes in terms of species and habitat adaptation to post-glacial climatic changes. The diversity of species and habitats present are the result of natural processes and also the long-term interaction between man and nature.

Criterion (x): Biodiversity and threatened species

The diversity of habitats and the complex relationship between forest and savannah ecosystems have contributed to a high biological diversity particularly in relation to the property's flora, making it one of the most outstanding areas in relation to floristic diversity and complexity in the Congo Rainforest Biogeographical Province. Over 1,550 plant species have been recorded, including 40 never recorded before in Gabon, and it is anticipated that once all the floristic surveys and research are completed the number of plant species could reach over 3,000.

Conditions of Integrity, Protection and Management

The property is of sufficient size to maintain the long-term ecological viability of its habitats and ecosystems. The conservation and management of the property is guided by a management plan for the period 2006-2011 which is supported by international cooperation, particularly through a number of international and national NGOs.

Conservation and management of the property also benefits from a number of transboundary cooperation initiatives. Key management issues include the need to resolve conflicts from competing interests, and to raise awareness amongst local people on the importance of conserving this property and to involve them in its management. Control and regulation of commercial poaching is of priority as well as the need to fully enforce regulations banning commercial logging within the property. Additional financial, logistical and human resources need to be obtained to ensure the effective management of the property and its buffer zone.

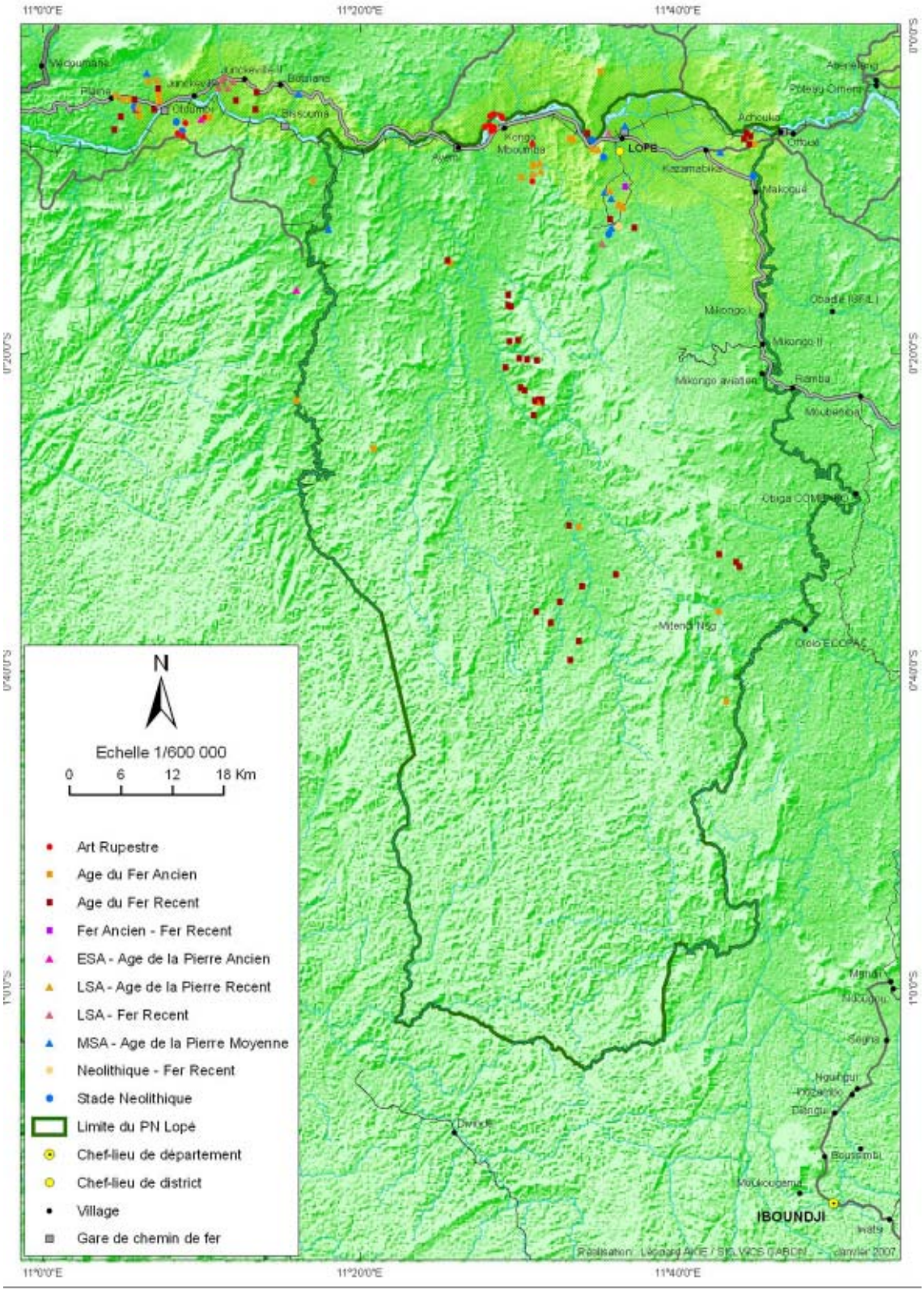
4. RECOMMENDATIONS

IUCN recommends that the World Heritage Committee **inscribes** the Ecosystem and Relic Cultural Landscape of Lopé-Okanda, Gabon, on the World Heritage List on the basis of criteria (ix) and (x).

IUCN recommends that the World Heritage Committee congratulates the State Party on its efforts to secure international support for the management of Lopé National Park and commends the support provided by the EU, through the ECOFAC programme, and NGOs, in particular the Wildlife Conservation Society.

IUCN also recommends that the World Heritage Committee requests the State Party to inform the World Heritage Centre and IUCN on the approval of the new proposed Law on National Parks and on measures taken towards its enforcement in order to enhance the effective long-term conservation and management of the property.

Map 1: Boundaries of nominated property



C. Nomination of Cultural Landscapes to the World Heritage List

C1. New Nominations of Cultural Landscapes

AFRICA

THE SACRED MIJIKENDA KAYA FORESTS

KENYA

WORLD HERITAGE NOMINATION – IUCN TECHNICAL EVALUATION

THE SACRED MIJIKENDA KAYA FORESTS (KENYA) – ID No. 1231

1. DOCUMENTATION

i) **Date nomination received by IUCN:** April 2006

ii) **Additional information officially requested from and provided by the State Party:** None.

iii) **UNEP-WCMC Data Sheet:** n/a

iv) **Additional literature consulted:** Burgess, N.D. and Clarke, G.P. (eds.) (2000). **Coastal Forests of Eastern Africa.** IUCN. Pakia, M. (1996). **An Ethnobotany Survey of the Kaya Complex in Kwale District.** CFCU/ NMK, Ukunda.

v) **Consultations:** 2 external reviewers. Extensive consultations were undertaken during the field visit with: representatives of national and local authorities, community leaders, protected area staff, national and international NGOs and other experts.

vi) **Field visit:** Edward Matenga (ICOMOS) and Stephan Doempke (IUCN), October 2006

vii) **Date of IUCN approval of this report:** April 2007

2. SUMMARY OF NATURAL VALUES

The nominated serial property encompasses 36 individual sites covering a combined area of 5,056 ha and spanning an area of 200 km along the Kenyan coast and its immediate hinterland.

The Mijikenda Kayas (remaining patches of sacred forests) are part of East Africa's Eastern Arc Mountains and coastal forests which stretch from Southern Somalia through Kenya and Tanzania to Mozambique. They belong to the East African Woodland / Savanna Biogeographical Province of the Africotropical Biogeographic Realm. This region is characterized by tropical dry forests within a mosaic of savannas, grasslands and wetlands. Generally, the forests are found just inland from the coast with outliers occurring along rivers and merging into sub-montane forests on low mountain ranges.

The forests in this region are highly fragmented, and the few remaining primary forests are becoming even more fragmented as agriculture and other human activities are spreading. While the Eastern Arc forests once covered more than 23,000 km² in both Kenya and Tanzania, recent estimates indicate that the remaining forest cover might be as little as 2,000 km².

The East African coastal forests have long been isolated from other regions of tropical moist forests by expanses of drier savannas and grasslands, resulting in a high level of plant endemism that has recently led to part of it being classified as the Swahili Centre of Endemism. Also, Conservation International has identified the Coastal Forests of Eastern Africa as one of the biodiversity hotspots of the world. However, the nominated serial property includes only a very small portion of the forests in this region, and therefore it is insufficient to ensure the effective conservation of the high biodiversity values of this region.

Historically, the Mijikenda peoples have cleared areas within the forests (mostly on hilltops) in order to establish their villages, using the forests as protective belts forming almost impenetrable thickets. Access to the villages was possible only through a few narrow paths. Because the Mijikenda, as a founding act, buried their sacred objects (*fingo*) in certain locations within these clearings, the whole of the villages and protective forests became a sacred realm, clearly delimitated towards the outside world, and further protected through buffer zones called *chanze* where human habitation and limited land use were allowed but land could not be owned. Since the *fingos* still remain in their original places long after the Mijikenda have moved their villages out of the forests, the sacred realms, including the forests, have remained as well. It is mainly for this reason that the Mijikenda continue to be committed to the protection of the Kayas; once they would loose their *fingos*, they would loose their spiritual life and identity.

Based on the nomination document, field visit and external reviews, IUCN considers that there are five types of natural values relevant in assessing the natural component of the nominated property:

<u>Conservation of natural and semi-natural systems, and of wild species of fauna and flora</u>

The Mijikenda Kayas are a good example of how traditional land use practices have helped to maintain primary forests with their entire floral and faunal species inventory by

prohibiting any type of resource utilization. This conclusion is supported by the botanical inventories underlying the nomination which been made between 1992 and 2001. Although some Kayas have been reduced in size or affected by disturbance or development since then, the inventories can be assumed to be still valid for the larger Kayas (above 50 ha). Therefore, the Mijikenda Kayas appear to be an effective tool for biodiversity conservation in a vast region that has been almost completely cultivated and lost most of its original biodiversity. As sacred sites, no material use of the Kayas is allowed or practiced legally under the traditional Mijikenda system: no animals are hunted for either material or ceremonial use, no firewood is cut and nothing may be collected. Even herbs used for medicinal or ceremonial purposes are collected outside the Kayas.

Conservation of biodiversity and provision of ecosystem services within farming systems

The Mijikenda Kayas provide important ecosystem services to the local farming systems in which they are embedded. Although they are spatially clearly separated from the farm lands they do belong to the overall land use system of the Mijikenda. By excluding the Kayas and their biodiversity from any material use, the Mijikenda help to maintain a number of processes such as pollination, which in turn help to maintain local farming systems.

Sustainable land use

The use of the Kayas as “protective thickets” for the Mijikenda villages, and their inclusion in sacred realms where no material use of natural resources is allowed, contributes to the overall sustainability of the land use system of the Mijikenda.

Enhancement of scenic beauty

Although neither the Kayas themselves nor their setting in the wider landscape is of outstanding scenic value or beauty, they include some extremely old and big trees which offer quite peculiar sights. With very few exceptions, such giant trees cannot be found outside the Kayas because usually trees are cut before they reach this size.

Outstanding example of humanity’s inter-relationship with nature

Kayas are an example of an outstanding relationship between man and nature in two ways: (a) by being “protective thickets” for the Mijikenda villages, and (b) by being the sites of a continuing presence of the Mijikenda mythical reality - Kayas are like a womb for the Mijikenda, places of origin, protection, and reconfirmation of their identity. In addition, a 1996 ethnobotanical survey of the Kaya Complex in Kwale District has shown that the Mijikenda are both aware of the plant biodiversity in their region (as testified by the existence of local plant names) and use them for a wide range of purposes. Thus, the interaction of the Mijikenda with their biodiversity is well-established.

3. COMPARISONS WITH OTHER AREAS

The comparative analysis in the nomination recognizes that the features displayed by the Mijikenda Kayas are found in many other sacred forests around the world, but identifies other features that are considered not to be present in other areas, which thus make the Mijikenda Kayas distinct. In particular, the nomination argues that the Mijikenda Kayas historically have not only been visited from time to time for the performance of certain activities but have been inhabited on a continuing basis. However, IUCN notes that this is also true in a number of areas in the Andes, Central America and in Asia; therefore, IUCN considers that an enhanced global comparative analysis is required to clearly justify the case for outstanding universal value of the Mijikenda Kayas.

4. INTEGRITY

4.1 Legal status

Out of the 36 Mijikenda Kayas included in the nomination, 28 have the legal status of a National Monument. Their protection has recently been improved through the adoption of the National Museums and Heritage Act, which replaces the former National Museums Act of 1983 and the former Antiquities and Monuments Act of 1983. The new Act, which is included in draft form as Appendix D v. in the nomination, came into force on 8 September 2006. National Monuments are under the jurisdiction of the National Museums of Kenya (NMK).

A further four Kayas have the legal status of a Forest Reserve and are protected under the new Forests Act of 2005. Forest Reserves are administered by the Forest Department (FD) of the Ministry of Environment and Natural Resources. The remaining four Kayas have a combined status of both National Monument and Forest Reserve.

Ownership of the Kayas is diverse, but existing law requires owners to conform with restrictions placed on them through their legal status or government decrees, which guarantees full control.

4.2 Boundaries

The boundaries of the Kayas, although clear and well visible, in most cases have not been mapped and demarcated. This is mainly due to the remoteness of most Kayas and a lack of equipment and human resources. IUCN considers the boundaries to be fully adequate to encompass the natural values of the property and to ensure their effective conservation.

4.3 Management

The management of the Kayas which are under the National Museums of Kenya (NMK) is entrusted to its Coastal Forest Conservation Unit (CFCU) which has field offices in Kilifi (for the Kayas north of Mombasa) and Ukunda (for those south of Mombasa) and ensures a modest but continuing and reliable representation on the ground. However, the Kayas in the extreme north and south of the country appear too remote in order to be managed by these offices. The four Kayas under the

Ministry of Environment and Natural Resources are managed by the Forest Department (FD), which is represented by a forest officer in each of the four districts where the Kayas occur.

Section 40 of the National Museums and Heritage Act stipulates that the National Museums may enter into management agreements with any person or persons for the protection or preservation of a monument. Part IV of the Forests Act, regulating community participation, foresees the formation of registered Community Forest Associations to whom the management of Forest Reserves can be transferred. Thus a legal basis has been established for co-management of the Mijikenda Kayas with local stakeholders such as the Elders Councils.

Given the large number of Kayas, the vast area of their distribution and their general remoteness, neither authorities such as the CFCU, FD and local administrations nor national and international NGOs can be expected to have the financial and human resources necessary to exert efficient control over the Kayas for the foreseeable future. Therefore, practical day-to-day protection of the Kayas is, and will be, depending almost entirely on the Elders Councils of the nearby villages.

The Elders Councils appear to be alive, active and committed – mainly for spiritual motivation, but with the practical effect that they do protect the forests. In addition, they report that they adopt new, young members every year, which shows that the Kayas are a matter of continuing importance not only for the elders, but for the entire local communities. However, the elders do not have the capacity (and sometimes physical ability) to prevent firewood cutting, livestock grazing and waste dumping – the main local threats – and they lack the resources to employ guards who could complete this task.

The Elders Councils appear to make strong efforts to protect the Kayas, and all of them confirmed to have good cooperation with the authorities. However, the Elders Councils' rights, roles and responsibilities have not been legally established. Some of them have registered as NGOs, and most of the others are in the process of doing so – a process actively supported by the CFCU. While this will help to define who are their representatives and members, and will make them eligible for funding, they will remain dependent on the good-will of the government. Their full recognition as guardians of the Kayas through legal agreements with the NMK and/or FD is urgently required. Knowledge about the implications of a potential World Heritage status, in particular concerning the increased obligations, appears to be insufficient among the local elders and is probably almost non-existent among the general village populations.

A strong commitment on the part of nature conservation NGOs can be stated. The two major NGOs involved are WWF and Nature Kenya. Both organizations have demonstrated a long-standing commitment for the Kayas, have support from their respective international offices (BirdLife International in the case of Nature Kenya), and have incorporated the Mijikenda Kayas in their long-term strategies. For this reason, watchdogs can be expected to be in place that will independently monitor developments in and around the Kayas. Relationships between the authorities and the NGOs appear to be very friendly and mutually beneficial.

The budget available for the Kayas is part of the overall budget of the NMK and FD; there are no special budget lines for the protection of the Kayas. WWF, who have been covering operational costs of the CFCU, have given an explicit confirmation to IUCN that they will continue their financial commitment for the Kayas. Further funding has come through a project under the Critical Ecosystem Partnership Fund (US$ 7 million between January 2004 and December 2008 for the entire Eastern Arc Mountains and coastal forests of Kenya and Tanzania).

A general framework management plan for the overall nominated property has been developed, but no special management plan exists yet for any individual Kaya.

4.4 Threats and human use

Although the last decade has seen an increase in conservation efforts in the region, threats, problems and pressures still persist. Threats are not arising from the traditional use of the Kayas for spiritual purposes, but from the surrounding local communities, outside interests and the small size and isolation that threatens their ability to function as effective conservation areas.

Individuals from local communities use the Kayas for cutting firewood. While the number of incidents may be only a few per year, this is a problem of major concern for the elders, who suggest employing guards. Grazing by goats, although by no means a general practice, was observed during the field visit in one severe case: among one of two stands of globally threatened endemic trees (*Cynometra greenwayi*) on the edge of Kaya Waa, one of only two places in Kenya and the world where this species can be found. This is a clear example where better practical protection must be ensured in order to conserve the natural values of the Kayas.

In particular the Kayas along the coastline south of Mombasa are under heavy pressure from tourism development, including illegal land allocations by local politicians (a practice which is now actively forestalled by the CFCU), acquisition and development of (parts of) Kayas which do not have gazettement or legal title, and spill-over effects from existing developments such as trespassing, disturbances, dumping of waste, etc.

Overall, IUCN considers that the nominated property meets the conditions of integrity as required under the Operational Guidelines.

5. ADDITIONAL COMMENTS

The Kayas visited all exhibit a high degree of physical and visual integrity. No artificial structures were observed in any of the Kayas except small structures for spiritual purposes and the traditional huts in Kaya Fungo, which themselves are prime examples of cultural integrity in that they are built completely in traditional style and only with natural materials.

6. CONCLUSIONS AND RECOMMENDATIONS

IUCN considers that the nomination does not adequately justify the case for the outstanding universal value of this serial property and suggests that the World Heritage Committee therefore **defers** the examination of the nomination of the Sacred Mijikenda Kaya Forests, Kenya, to allow the State Party to prepare an enhanced global comparative analysis.

IUCN also suggests that the World Heritage Committee recommends the State Party to:

a) Enter into legal agreements with the local Elders Councils to establish them as the responsible guardians of the Kayas;

b) Ensure practical protection of the sites from cutting firewood, grazing livestock and dumping waste through building human and financial capacity of the Elders Councils; and

c) Adopt a special management plan for each individual Kaya, including demarcating and mapping of their boundaries.

IUCN finally notes the impressive long-term efforts of the Coastal Forest Conservation Unit of the National Museums of Kenya as well as WWF, which are evident from this nomination and reflected in a consistent commitment to the nomination encountered at all levels throughout the field visit. IUCN congratulates all of the authorities, NGOs and communities involved in achieving this level of consensus and commitment.

EUROPE / NORTH AMERICA

THE MEDITERRANEAN COAST OF THE PYRENEES

FRANCE / SPAIN

WORLD HERITAGE NOMINATION – IUCN TECHNICAL EVALUATION

THE MEDITERRANEAN COAST OF THE PYRENEES (FRANCE AND SPAIN) ID No. 1261

1. DOCUMENTATION

i) **Date nomination received by IUCN:** April 2006

ii) **Additional information officially requested from and provided by the States Parties:** IUCN requested supplementary information on 17 November 2006 after the ICOMOS / IUCN Evaluation Mission. The States Parties responses were submitted on 1 December 2006 and 21 February 2007, including an enhanced comparative analysis, information on the influence of the Catalan culture worldwide and responses to all the issues raised by IUCN.

iii) **UNEP-WCMC Data Sheet:** n/a

iv) **Additional literature consulted:** Association des Amis de la Massane (2005). **Reserve Naturelle Forêt de la Massane: Une Forêt aux Épreuves du Temps.** France. Brown, J., Mitchell, N. and Beresford, M. (eds.) (2005). **The Protected Landscape Approach: Linking Nature, Culture and Community.** IUCN. Budó i Ricart, J. and Ribas i Pallisera, J. (2006). **Valoració de la Diversitat Faunística del Vessant Sud de L'Albera.** Centre D'Estudis I Protecció de L'Albera. Generalitat de Catalunya (2006). **Projecte del Pla Director Territorial de l'Alt Empordá.** Catalunya. IUCN (2006). **The World Heritage List: Guidance and Future Priorities for Identifying Natural Heritage of Potential Outstanding Universal Value.** IUCN. Lucas, P.H.C. (1992). **Protected Landscapes: A Guide for Policy-Makers and Planners.** IUCN and Chapman and Hall, London. Von Droste, B., Plachter, H. and Rössler, M. (1995). **Cultural Landscapes of Universal Value: Components of a Global Strategy.** UNESCO. Thorsell, J. and Hamilton, L. (2002). **A Global Overview of Mountain Protected Areas on the World Heritage List.** IUCN.

v) **Consultations:** 3 external reviewers. Extensive consultations were undertaken during the field visit with: representatives of local governments and authorities, local communities as well as tourism and wine-making industries; representatives of conservation NGOs; technical staff working in the different nature parks and reserves; and technical staff involved in urban and land use planning.

vi) **Field visit:** Luisa De Marco (ICOMOS) and Pedro Rosabal (IUCN), September 2006

vii) **Date of IUCN approval of this report:** April 2007

2. SUMMARY OF NATURAL VALUES

The nominated property, *Le Rivage méditerranéen des Pyrénées* (LRMP), is located in the eastern part of the Pyrenees Mountains where they border the Mediterranean Sea. The nominated property comprises a total area of 157,010 ha which includes a core zone of 63,839 ha (from which 60,010 ha are terrestrial and 3,829 ha are marine) and a buffer zone of 93,171 ha (from which 55,080 ha are terrestrial and 38,091 ha are marine). This is a transnational nomination submitted jointly by Spain and France, including 31 communes in Spain and 19 communes in France. The nomination excludes the highly urbanised areas of Argelès-sur-Mere (France) and La Junquera, the marina of Empuriabrava and the centre of Rosas (Spain).

LRMP comprises a combination of three distinct landscapes: those associated with the eastern part of the Pyrenees which is known as the Albère Massif, the coastal area, and a marine area that covers parts of the continental shelf down to 35-40 m deep. Thus the nominated property includes a representative sample of all key ecosystems and habitats existing in this area.

The Albère Massif is characterized by the presence of low mountains, with a main average altitude ranging between 600-800 m above sea level, and the highest mountain being Neulós Peak (1,256 m). The northern part of these mountains is characterised by steep slopes whilst the southern part has gentle, more accessible slopes. The area is highly fragmented by a number of rivers which have played a key role in supporting agricultural development but also in supporting the North-South and East-West access to and through the area. The majority of the area is used for vineyards, some of them on very steep slopes that reach into the coastal area, creating harmonious landscapes of important aesthetical value.

The coastal area is characterized by the presence of cliffs alternating with sandy and rocky beaches. The cliffs associated to Cap de Creus are particularly interesting

due the variety of the forms and colours in response to the aeolian and marine erosion in an area of complex geology. This variety of colours and forms has been reflected in many famous paintings of Salvador Dalí.

There are a number of protected areas within the nominated property such as the Natural Reserve of la Massane (France, 336 ha) which protects a mountain forest area ranging from 600-1,156 m above sea level in the Albère Massif; the Natural Park of Aiguamolls de l'Emporda (Spain, 4,784 ha); the Natural Park of Cap de Creus (Spain, 13,860 ha of which 3,073 ha are marine areas) and the Marine Reserve of Cerbère-Banyuls (France, 650 ha of marine areas). These areas offer protection to a number of important ecosystems and species; however they are not pristine natural environments but the results of interaction between man and nature over a long period of time, and their management corresponds to that of IUCN Category V protected areas.

3. COMPARISONS WITH OTHER AREAS

Following a request by IUCN, the States Parties provided an enhanced comparative analysis which compares the nominated property with comparable World Heritage properties and other comparable landscapes: the Madriu-Perafita-Claror Valley (Andorra), Pyrénées - Mont Perdu (France and Spain), St Kilda (United Kingdom), the Amalfitaine Coast (Italy), areas along the Danube and Rhine rivers, mountain areas in the Himalayas, the terrace system of Portovenere, Cinqueterre and Palmaria, Tino and Tinetto Islands (South of Liguria, Italy), the Island of Ibiza (Spain) as well as other sites in the Mediterranean basin.

The key points that, according to the enhanced comparative analysis, differentiate the nominated property from these other landscapes are:

- Higher ecological variability, representing a complete transect from the mountains to the sea; including a number of rivers and wetlands.
- Higher variability in the use of land and water resources including vineyards, agricultural areas, olive tree plantations, forestry, fisheries, and a number of protected areas.
- Higher geo-strategic importance because the nominated property, due to its accessibility, has been an essential entry point to the European continent from the Mediterranean Sea as well as a key pass for East-West commercial exchanges and military campaigns. This is supported by the high number of military and defence systems that exist in this area.
- The nominated property has been continuously occupied by different civilizations since the Neolithic period, which has favoured the development of a common culture and language and traditional land use practices and irrigation systems that remain in use to date. The additional information received from the States Parties discusses in detail the influence of the Catalan culture, language, land and water use planning and management, civil law and customary law in relation to natural resource management and protected areas, giving unequivocal evidence on the impact of the Catalan culture at the regional level beyond the nominated property.
- The presence of the so-called "white villages" which are harmoniously integrated with the surrounding landscape and add aesthetical value to the mountain-sea scenery.

The enhanced comparative analysis provided by the States Parties, whilst much broader in its global scope than the original one included in the nomination document, fails to compare the site with other relevant World Heritage properties worldwide such as the Rice Terraces of the Philippines, Mount Qingcheng and the Dujiangyan Irrigation System in China, Champasak Cultural Landscape in Lao P.D.R., and the Loire Valley in France. This makes it difficult to assess the global significance of the nominated property versus its regional importance.

4. INTEGRITY

The nominated property is protected by a number of laws and regulations, both in Spain and France, which aim to ensure the protection of the cultural and natural values existing in the area. These laws and regulations are included in the nomination document and additional information has also been provided by the States Parties in response to a number of issues raised by IUCN.

4.1 Legal status

All protected areas included in this nomination are in public lands and have adequate legal and institutional protection. In both States Parties, local governments and NGOs are actively implementing a campaign to acquire private lands that can be added to the existing protected areas in the future to enhance their coverage and protection.

4.2 Boundaries

The boundaries of the nominated property are well defined by administrative and physical boundaries; thus they are easy to follow in the field. The established protected areas are well demarcated in the field and the size of the existing terrestrial protected areas is sufficient to maintain the integrity of the natural values that they protect. However, this is not the case for the existing marine protected areas: the Marine Reserve of Cerbère-Banyuls (France, 650 ha), whilst well demarcated by a system of buoys, is too small to offer effective protection to the existing marine biodiversity. On the other hand, the marine part of the Natural Park of Cap de Creus (Spain, 3,073 ha) is much larger and, whilst not adequately demarcated, is easy to identify as the limits of the marine reserve are linked to easily recognizable coastal features.

The proposed terrestrial buffer zone follows on the French side the administrative limits of the municipalities, giving strong coherence to the buffer zone. However, on the Spanish side the buffer zone only includes the pre-hills of the Albera Massif and a large part of the alluvial plain of

the Alt Empordá, but excludes other areas that are under the same land uses and also contain harmonious landscapes. Thus greater coherence of the buffer zone on the Spanish side could be achieved by extending it to the physical limits associated to the highway and the urban area of Figueres. This extension could also facilitate the control of inappropriate infrastructure and urban development that could affect the values for which the property is nominated and its conditions of integrity.

The limits of the proposed marine buffer zone extend from the coast to the isobath of 100 m in order to offer protection to the key marine habitats and species existing in this area. This limit is extended in the northeast area of Cap de Creus to include the existing submarine canyon where important species of white and yellow deep-water coral exist. Therefore, the boundaries of the marine buffer zone are considered sufficient to offer effective protection to the existing marine biodiversity as well as to enhance the conservation of the coastal areas included in the nomination.

4.3 Management

The protected areas within the nominated property are well protected and managed and they have adequate levels of staffing and funding. The management of these areas is reaching out to the local communities which are actively contributing to protection and management activities. All protected areas have management plans that are legally binding documents and that are at different stages of implementation. The marine buffer zone, whilst not having a specific legal status, is protected and its use regulated by a number of existing regulations in both Spain and France. There is also a project to declare the French part of the marine buffer zone as a Marine National Park.

Land use planning, landscape protection and restoration, urban planning and infrastructure development is governed by a number of specific laws and regulations in both countries, most of which are in fact sharing the same goals and objectives, thus offering an adequate framework for landscape management. In addition, an integrated Transboundary Management Plan for the nominated property has been drafted and it is *de facto* under some level of implementation as transboundary cooperation already exists in relation to preventing and controlling forest fires, research, cultural activities and festivities, and the development and promotion of specialized markets for local products.

The implementation of the proposed Transboundary Management Plan for the nominated property will be promoted and coordinated by a Group for Transboundary Cooperation which will be legally established based on the European Commission Regulation No. 1082/2006 (adopted by the European Parliament on 5 July 2006; with its full application starting in August 2007). This Regulation established the rules for creating European Groups for Territorial Cooperation (EGTC). In the meantime, there is effective transboundary cooperation in place between the Consell Comarcal de l'Alt Empordá (Spain) and the Conseil de Développement du Pays Pyrénées Méditerranée (France).

The management capacity appears to be sufficient for the present status of the nominated property. However, the States Parties should be encouraged to provide additional dedicated funds to support implementation of the proposed Transboundary Management Plan once it is formally adopted as well as for the work of the Group for Transboundary Cooperation.

4.4 Threats and human use

The nominated property enjoys in general, as noted above, a good level of protection and management which is supported by a number of laws and regulations in both States Parties. There are however a number of important threats to be considered:

- European agricultural policy: Both in discussions with representatives of local communities during the field visit and by reviewers this was noted as the main potential threat to maintaining the existing traditional uses that are paramount to the survival of the landscape. Economic incentives to develop large agricultural areas focusing on few products can negatively affect the local markets that maintain the different traditional uses. The key challenge for both States Parties will be to ensure a balanced land use planning and development that respects and enhances traditional land use practices.

- Wind energy development plans: Due to its topographic characteristics, the nominated property is well suited for the development of windmill parks which are supported by economic incentives that are an attractive way for local governments and municipalities to obtain additional financial resources. During the field visit it was noted that there is a general opposition from local communities, both in Spain and France, to these projects. IUCN requested additional information on this matter from the States Parties and it was officially informed that at present there is no such proposal under discussion on the French side and that the only windmill park proposed on the Spanish side, in La Junquera, is not going to be authorized due to the strong opposition from local communities. The States Parties have also submitted a map showing that current proposals for the development of windmill parks are all outside the nominated property.

- Tourism and urban development: These activities are closely related and their combined force has been an important factor in the massive destruction that has affected most coastal areas in the European part of the Mediterranean. During the field visit it was noted that local communities have a strong sense of identity and pride that is closely linked to the natural and cultural values of the nominated property. Most people interviewed during the field visit are against massive development plans and strongly advocate for maintain the quality of the landscape. However, a few representatives from local governments were more inclined to support further urban and tourism development. Whilst the existing laws and regulations governing land use planning and the protection of cultural and natural values can

prevent such problems, this can only be achieved through strictly enforcement.

IUCN considers that the nominated property meets the conditions of integrity as required under the Operational Guidelines.

5. ADDITIONAL COMMENTS

None.

6. CONCLUSIONS AND RECOMMENDATIONS

The property has been nominated under criteria (ii), (v) and (vi). Whilst it is the responsibility of ICOMOS to assess whether or not the nominated property meets these criteria, IUCN would like to contribute to this assessment with the following comments:

- At this point in time, and even considering the enhanced comparative analysis provided by the States Parties, IUCN is not convinced of the global significance of the nominated property.

- In relation to criterion (ii) IUCN considers that the nominated property exhibits developments of technology and landscape design that are the result of the ongoing adaptation of different cultures to the environmental characteristics of this area. A remarkable example is the development of complex irrigation systems that support the vineyards and of engineered water supply systems in towns and villages that are still working in an efficient way and have contributed to surviving serious periods of droughts. This is supported by a communal water governance regime that is still in place and has been further supported by national laws and regulations. Both examples of irrigation and water supply systems are in line with modern concepts of sustainable use of water resources.

- In relation to criterion (v) IUCN considers that the nominated property exhibits the results of long term adaptation of land use practices to the local environment, shaping a living and evolving cultural landscape. The agricultural, forestry and fisheries practices have been substantially influenced by the knowledge of the different cultures that have lived in the area and/or passed through it. This exchange of cultures and knowledge has in turn been facilitated by the accessibility of the area and its role as an entry point to the Mediterranean basin and the European continent as a whole, and has resulted in the development of a common culture and language – the Catalan – which has survived any sort of political conflicts and goes beyond the existing political boundaries by creating a strong unified identity.

IUCN would like to note that, in the event that ICOMOS recommends to the World Heritage Committee the inscription of this nominated property on the World Heritage List, such recommendation will be supported by IUCN based on the points noted above.