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 Bureau of the World Heritage Committee
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Prepared by IUCN – The World Conservation Union

5 May 2001

Cover photograph: _____

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THE WORLD HERITAGE CONVENTION

IUCN TECHNICAL EVALUATION REPORTS

5 May 2001

1. INTRODUCTION

This technical evaluation report of natural sites 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 co-ordinates activities of IUCN's World Commission on Protected Areas (WCPA) which is 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 sites as "flagships" for biodiversity 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 are comprehensively reviewed by a working session of the IUCN World Heritage Panel at IUCN Headquarters held in April. PPA then prepares the final technical evaluation reports which are outlined in this document.

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

The WCPA membership network now totals over 1300 protected area managers and specialists from 120 countries. This network has provided much of the basis for conducting the IUCN technical evaluations. In addition, the Protected Areas Programme has been able to call on experts from IUCN's other five Commissions (Species Survival, Environmental Law, Education and Communication, Ecosystem Management, and Environmental, Economic and Social Policy), from other specialist officers in the IUCN Secretariat, and from 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.

2. FORMAT

Each technical evaluation report presents a concise summary of the nomination, a comparison with other similar sites, 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 Bureau. Standardised data sheets, prepared for each nomination by UNEP-The World Conservation Monitoring Centre (UNEP-WCMC), are available in a separate document.

3. SITES REVIEWED

At the time of writing, twelve evaluation reports have been prepared by IUCN. These comprise:

- Nine (9) natural sites nominations (including one deferred site for which additional information has been received and two extensions); and

- Three (3) mixed sites (including two deferred sites for which additional information has been received);

IUCN will provide a supplementary report to the June Bureau which will include the technical evaluation of seven natural sites. The field inspection of these sites took place in April and May, after the printing of this report.

It has not been possible to review two (2) sites for presentation to the July Bureau meeting due to climatic reasons. In each case the delayed evaluation date was at the request of the State Party. These two (2) sites will be presented to the December Bureau meeting

The specific files reviewed by IUCN are as follows:

B.	**Nominations of mixed properties to the World Heritage List**	
B.1	**Palaearctic Realm**	
N/C 772 Rev	Cultural Landscape of Fertö-Neusiedler Lake	Austria and Hungary
N/C 1040	Masada National Park	Israel
N/C 766 Rev	Natural Complex “Central Sikhote-Alin”	Russian Federation
N/C 766 Rev	Karin Caves	Turkey
C	**Nominations of natural properties to the World Heritage List**	
C.1	**Palaearctic Realm**	
N 1045	Ensemble de grottes à concrétions du sud de la France	France
N 1041	The Makhteshim Country	Israel
N 1023	Natural System of “Wrangel Island” Sanctuary	Russian Federation
N 765 Bis	Volcanoes of Kamchatka, extension to include Kluchevskoy Nature Park	Russian Federation
N 1037	Jungfrau-Aletsch –Bietschhorn	Switzerland
N 1047	Holy Tops (Svyati Gory)	Ukraine
N 1048	Polissian Swamps and Slovechno-Ovruch Ridge	Ukraine
N 1049	Kenit’s Hill	Ukraine
N 1050	Karadag	Ukraine
N 1051	Podilliam Ridge	Ukraine
N 1029	Dorset and East Devon Coast	United Kingdom
C.2	**Afrotropical Realm**	
N1060	Great Rift Valley Ecosystem Sites	Kenya
	A) Rift Valley Lake Reserves	

	B) Sibiloi/Central Island National Park – Extension to include South Island National Park	
C.3	**Indomalayan Realm**	
N	Phong Nha-Ke Bang National Park	Vietnam
C.4	**Neotropical Realm**	
N 1035	Chapada dos Veadeiros National Park	Brazil
N	Galapagos Marine Reserve, extension to Galapagos National Park	Ecuador
N 1057	Kaieteur National Park	Guyana

4. REVIEW PROCESS

In carrying out the Technical Review, IUCN is guided by the Operational Guidelines, which requests IUCN "to be as strict as possible" in evaluating new nominations. The evaluation process (shown in Figure 1) involves five steps:

1. **Data Assembly**. A standardised data sheet is compiled on the site, using the protected area database at UNEP-The World Conservation Monitoring Centre (UNEP-WCMC);

2. **External Review**. The nomination is sent to experts knowledgeable about the site, primarily consisting of members of IUCN specialist commissions and networks and contacts from the region;
3. **Field Inspection**. Missions are sent to evaluate the site on the ground and to discuss the nomination with relevant authorities;

4. **IUCN World Heritage Operational Panel Review**. The IUCN World Heritage Operational Panel intensively reviews all field inspection reports and associated background material and agrees a final text and recommendation for each nomination; and

5. **Final Recommendations**. After the World Heritage Bureau has reviewed the evaluations, clarifications are often sought. Changes based on the Bureau's recommendations and on any further information from State Parties will be incorporated into the final IUCN evaluation report which is sent to the World Heritage Centre eight weeks prior to the December Bureau and Committee meeting.

In the evaluations, use of the Biogeographic Province concept is used for comparison of nominations with other similar sites. This method makes comparisons of natural sites more objective and provides a practical means of assessing similarity. At the same time, World Heritage sites 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 sites are to be selected solely on this criteria. The guiding principle is that World Heritage sites are only those areas of outstanding universal value.

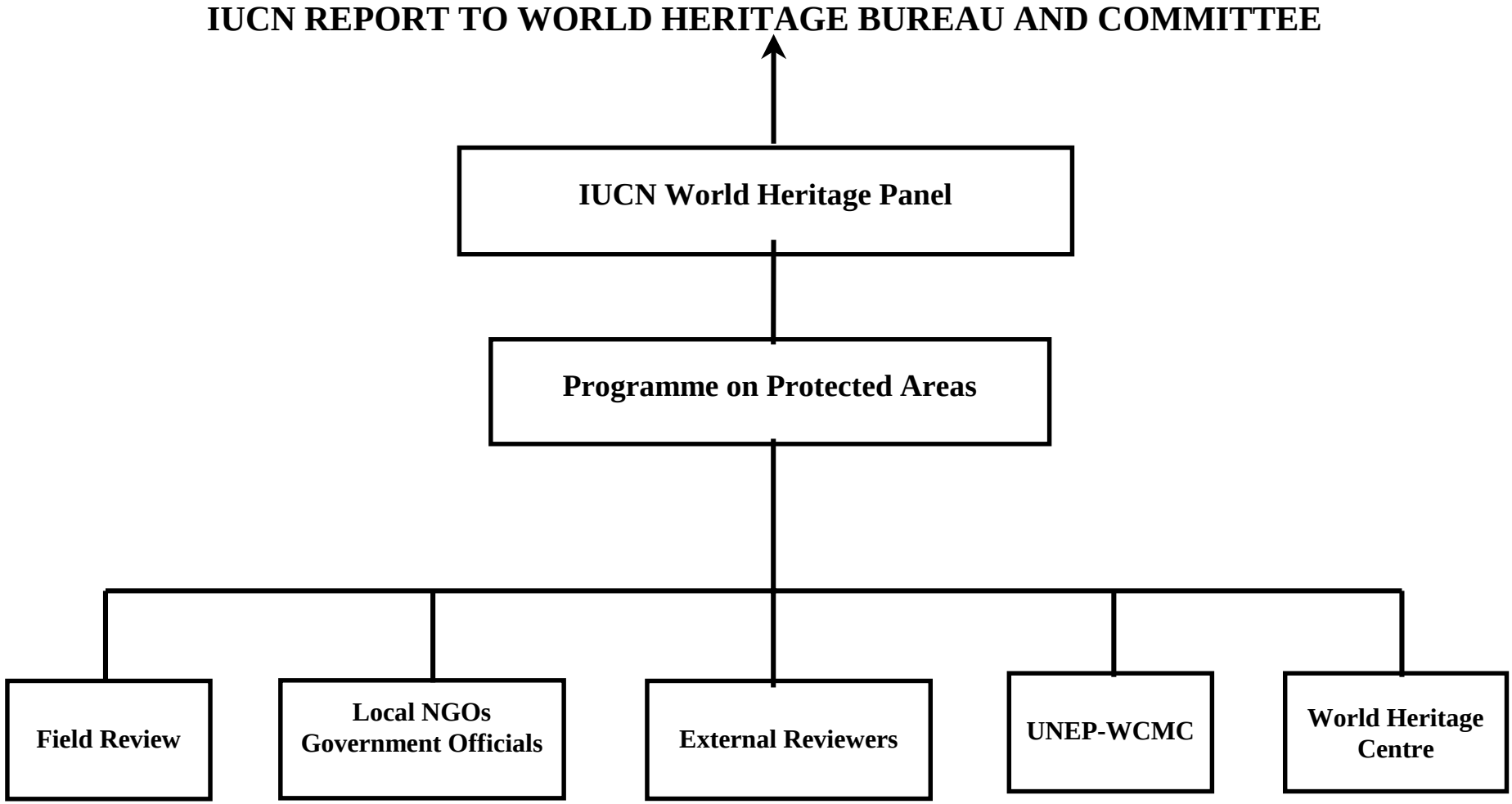
Finally, it is noted that the evaluation process is aided by the publication of some 20 reference volumes on the world's protected areas published by IUCN, UNEP, WCMC and several other publishers. These include (1) Reviews of Protected Area Systems in Oceania, Africa, and Asia; (2) the four volume directory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

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 site inspections. This support is acknowledged with deep gratitude.

This report presents the official position of IUCN.

Figure 1


IUCN REPORT TO WORLD HERITAGE BUREAU AND COMMITTEE
IUCN World Heritage Panel
Programme on Protected Areas
Field Review
Local NGOs
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Centre

TECHNICAL EVALUATION REPORTS

B. Nominations of mixed properties to the World Heritage List

B.1. Palaearctic Realm

WORLD HERITAGE NOMINATION – IUCN TECHNICAL EVALUATION

CULTURAL LANDSCAPE OF FERTÖ-NEUSIEDLER LAKE (AUSTRIA AND HUNGARY)

1. DOCUMENTATION

i) **IUCN/WCMC Data Sheet**: (7 references)

ii) **Additional Literature Consulted**: BirdLife International 2001, **Data Base for Important Bird Areas**, Wageningen, Netherlands; Grimmett R.F.A. and Jones T.A., 1989, **Important Bird Areas in Europe** ICBP, Cambridge, UK; Heath M. and Evans J (eds.) 2000, **Important Bird Areas in Europe - Priority Sites for Conservation, (vols. 1 and 2),** BirdLife International, Cambridge, UK; Patten B. (ed.), 1994, **Wetlands and Shallow Continental Water Bodies Vol. 2,** SPB Academic Publishing; Province of Burgenland 1995, **Nomination of the Neusiedler See/Seewinkel as a Natural World Heritage Site,** Eisenstadt, Austria; Ramsar Secretariat 2001, **Annotated Ramsar List,** Gland, Switzerland; Thielcke G. and Resch J. 2000, **Living Lakes**, Stadler Verlag, Constanz, Germany; Thorsell J., Levy R.F. and Sigaty T. 1997, **A Global Overview of Wetland and Marine Protected Areas on the World Heritage List, IUCN,** Gland, Switzerland; Tucker G. and Evans M. 1997, **Habitats for Birds in Europe,** BirdLife International, Cambridge, UK; UNESCO MAB Programme 2001**, UNESCO MAB Biosphere Reserve Directory**, Paris;

iii) **Consultations:** 8 external reviewers contacted. Relevant officials from Austrian and Hungarian park authorities.

iv) **Field Visit**: A. Phillips (IUCN) with A. Michalowski and B. Werner. M. Rymkiewicz, (ICOMOS) March 2001.

2. SUMMARY OF NATURAL VALUES

The Fertö-Neusiedler Lake area is located on the Austrian-Hungarian border. It is an unusual and diverse ecosystem, affected by a long period of interaction between people and nature. The shallow, steppe lake (on average only 50-60cm in depth) is the largest saline water body in Europe (about 309km^2), and the most westerly in Eurasia. It is about 20,000 years old, at a late stage of succession. Its water level is now subject to artificial control. The reeds that cover between half and two-thirds of the lake provide a crucial habitat for many nesting birds, such as the great white egret (over 1000 pairs) and bittern. The lake is internationally important for migratory birds, and many bird species rest and feed here at the base of the Alps. To the east of the lake is the important Seewinkel area, with some 80 shallow saline ponds and remnant salt meadows where thousands of geese arrive in the late autumn. The basic fauna of the lakeshore is of European or Central European origin with a few endemic species and a specifically prairie type fauna.

The flora of the nominated site is strongly affected by the convergence of four climatic zones resulting in some unique assemblages of species from different bio-geographic regions, and several rare endemics. There are various natural habitats including saline grassland and marshlands, steppe-relicts, bogs, and drought tolerant oak stands. Around the lake, viticulture is the most important land use, but there are other man-made or semi-natural habitats of ecological and landscape importance which along with some attractive villages, help to create a landscape of great appeal. Some of these surrounding lands are also included in the nomination and the rest is in the buffer zone. The landscape setting of the lake, the bird populations and the existence of so many biotopes in a relatively small area are the most important natural values of the site.

3. COMPARISONS WITH OTHER AREAS

From the standpoint of physical geography, the Fertö-Neusiedler Lake ecosystem is the most westerly of a string of saline steppe-lakes across Eurasia. It is important because of its special climatic and other conditions. However, it needs to be compared with other similar if distant lakes.

A tabular comparison may be made with several saline lakes elsewhere in the world in Central Asia, the Middle East, North America and Argentina (see table 1 below). This shows that many of these lakes are substantially larger and likely to be in a less modified condition than the nominated site. Whilst the salinity level (1700 mg/litre on average) of the nominated site is quite low, at less than half that in the oceans, the particular saline biotope complex found at Fertö-Neusiedler Lake is a unique assemblage.

Table 1 : Some features of saline lakes: nominated site and other lakes

Saline Lake (source: Thielcke and Retsch, 2000)	*Area km²*	*Catch-ment km²*	*Age (in 000 yrs.)*	*Sea level m.*	*Salinity (gm/l)*	*Human population nearby*
Neusiedlersee/ Fertö, Austria/Hungary	309	1,230	20	115	17	68,000
Lake Tengiz /Kurgald Shin, Kazakhstan	1920	94,900	?	304	30-40	20,000
Lake Mono, USA	182	1,800	176	1947	29-275	?
Dead Sea, Israel/Jordan/ Palestine	1050	42,000	12	-316	340	30,000
Mar Chiquita, Argentina	ranges 1969-5770	37,570	30	62-71	75	?

The nominated site is located within two “Udvardy” Biogeographical Provinces, Middle European Forest and Pannonian. There is no existing natural World Heritage site in these provinces. Although it occurs in a different Biogeographical Province (the Pontian Steppe), comparison with the World Heritage Site of the Danube Delta Biosphere Reserve provides a measure of the relative importance of the nominated site for species conservation. The Danube Delta is about six times larger, and it contains the only reedbed which exceeds that of Fertö-Neusiedler Lake, though it is not a saline environment. The delta contains the largest continuous marshland in Europe. The bird species list of the two sites is somewhat similar, but for many species the Danube Delta is frequented in far greater numbers. For example Purple Heron (500 in Fertö-Neusiedlersee Lake, 1,500 in Danube Delta) and Teal (20,000, and 150,000); on the other hand there are more Great White Egret at the nominated site and impressively large numbers of geese species (bean, white-fronted and greylag) migrate to it annually.

In its detailed site by site comparison of European Important Bird Areas (IBAs), BirdLife International notes that the IBA on the Hungarian side (Lake Fertö, covering 12,542ha) is "an important breeding and staging post in Europe". It describes the two Austrian IBAs within the nominated site, Neusiedler See (23,272ha) and Southern Seewinkel (14,000ha), in similar terms. Generally, using the IBA criteria, it appears that the Austrian part of the nominated site is the most important wetland area in that country; whereas the Hungarian part is among the top five such sites in Hungary. The IBA analysis identifies one species of global concern as resident at the nominated site in significant numbers, the Ferruginous Duck. This compares with the number of species of global concern found at other European wetland World Heritage sites: ten in the Danube Delta, six in Donana (Spain), and three at the Srebarna (Bulgaria). Comparison may also be made with the Hortobágy National Park/Ramsar Site, a World Heritage cultural landscape in the Pannonian Biogeographical Province in Hungary. This has a diverse range of wetland habitat types, including saline marshes. BirdLife International has described Hortobágy, which has significant numbers of eight globally threatened species, as "the most important site in Hungary for steppic birds and waterfowl" (BirdLife International, 2000).

Table 2 compares the IBA information for the nominated site and other World Heritage Sites in Europe.

Table 2 : Important Bird Areas: comparative significance of nominated site within Europe

Important Bird Area (IBA)	*A1 criterion*	*A4*	*regionally*	*Congregations of*

(source: BirdLife International 2000)	*bird spp.*	*Criterion bird spp.*	*important congregations of bird spp.*	*bird spp. of importance to the EU*
Neusiedlersee, Austria	1	3	9	13
Seewinkel, Austria		4	6	15
Ferto, Hungary	-	5	11	n.a.
Total nominated site	*1*	*8*	*13*	*24*
Hortobagy, Hungary	8	13	29	n.a
Donana (Guadalquivir Marshes), Spain	6	22	33	39
Danube Delta, Romania	10	30	54	n.a.
Srebarna, Bulgaria	3	2	11	n.a.

A1 criterion = the site regularly holds significant numbers of globally threatened species. A4 criterion = site holds globally important congregations (in most cases the site is known to hold, on a regular basis, 1% or more of a bio-geographic population of a congregatory waterbird species).

Note that many birds occur under several criteria.

Finally it should be noted that in the publication *A Global Overview of Wetland and Marine Protected Areas on the World Heritage List,* (1997) IUCN identifies only two wetland sites which appear to merit consideration for inclusion on the World Heritage gaps in the Western Palearctic Region: the Wadden Sea and the Volga Delta.

4. INTEGRITY

4.1 Boundaries

The rationale used for the boundaries of the nominated site and the buffer zone is different in Austria and in Hungary.

In Austria, the nominated site is in general aligned with the boundaries of the Ramsar site. It includes many of the vineyards and other farmed areas around the eastern part of the lake, but is generally bounded by the reedbelt on west and north; it includes the nature and protection zones of the Neusiedler See-Seewinkel National Park. Also included is the historic centre of the town of Rust. The buffer zone is identical with the Neusiedler See-Seewinkel nature and landscape reserve.

In Hungary, where the Ramsar boundaries were drawn more tightly, the nominated site is essentially that of the Fertö (western) part of the larger Fertö-Hanság National Park, including both the nature area and the protection zone of the park. To this has been added the Nagycenk and Fertö palaces and a part of village of Fertorakos.

4.2. Legal Protection and Transboundary Co-operation

National measures for conservation began in the 1920's on the Austrian side when small areas of land were taken on lease by organisations for nature protection. In the 1930s, there was a movement to create a national park. Landscape and nature protection regulations began in 1962 with the Neusiedlersee Nature Reserve. Protection was progressively strengthened until the Neusiedler See-Seewinkel National Park was gazetted in 1993.

In Hungary, the Fertö Landscape Protection Area (created in 1977) became the Fertö National Park in 1991, renamed Fertö-Hanság National Park in 1994.

In 1987, the Austro-Hungarian National Park Commission was established to oversee transboundary co-operation in the management of the two national parks. There is also an international commission dealing with the water level of the lake. Credit is due to the authorities of both countries for the excellent work now being done for conservation and for the degree of co-operation that has occurred across the international border.

As to international protection, UNESCO designated the Neusiedler See - Österreischer Teil Biosphere Reserve in 1977, and the Lake Fertö Biosphere Reserve on the Hungarian side of the border in 1979. The Neusiedler See,

Seewinkel and Hanság Ramsar Site was established in 1982 on the Austrian side, and the Lake Fertö Ramsar Site in 1989 on the Hungarian side. The lake and its surroundings are also designated as a Council of Europe biogenetic reserve (the area is almost identical to the hydrographic catchment of the lake). The Austrian side is designated as a Special Protection Area (SPA) under the EU Birds Directive of 1979 and a Special Area of Conservation (SAC) under the EU Habitats Directive of 1992. The Austrian part of the area proposed for World Heritage listing has been accepted as a Natura 2000 site, a development that will require the preparation of a management plan; the Hungarian part will be added to the Natura 2000 site when Hungary joins the EU.

4.3 Threats

As a potential *natural* World Heritage Site, the nomination of the Cultural Landscape of Fertö-Neusiedler Lake raises some serious integrity questions. These include:

- The presence of several small towns (notably Apelton, Illmitz, and the tourist resort of Podersdorf) within the Austrian part of the nominated area. The combined population of these and other settlements is 3,200; over 60,000 more live in the buffer zone;

- Some prominent tourist developments are to be found, all on the Austrian side. There is an "esplanade" at Podersdorf (the only lakeside shore free of reeds), a large hotel at the water's edge at Rust, an operetta stage on an island near Morbisch, and a number of medium-sized ferries that run between several Austrian resorts across the northern part of the lake;

- There is also an intrusive high voltage power line that crosses several kilometres of the reed beds in the north west part of the site;

- There are numerous vineyards within the nominated site, some of them planted quite recently on what were formerly floristically-important meadows. Even though wine growing has occurred here since Roman times, modern methods of viticulture are intensive, with regular use of chemicals and intrusive techniques such as the use of low flying aircraft to scare off starlings.

- Introduced fish (e.g. eels, carp) affect all parts of the nomination including the core Nature Zone within the two national parks.

- Water quality remains another concern. Despite successful strategies to reduce run-off entering the lake, the waters are still eutrophied.

More far reaching are the effects of drainage modification. The water level of the lake varied greatly in the past. Naturally it was a markedly "astatic" lake, drying out on a number of occasions (the last in 1868) - but also with floods when it was twice its present size. In times of flood, it would drain away through the Hanság Marshes to the south east, and thence, eventually, to the Danube. In order to control flooding and assist in reclamation of land for farming canals and bunds have been constructed within the nominated site. The water level is now maintained under an international agreement through an international commission.

4.4. Management

There is currently no joint management plan for the nominated site and management varies according to the protection zone involved in each country. Thus, in the core nature zone of the two national parks, there are strict controls over public access. Fishing or hunting other than for conservation purposes (e.g. control of wild boar) are forbidden. The spread of reeds is controlled so as to keep open water areas.

In the protection zone, a more active management regime is in place. For example, traditional grazing systems are being restored so as to recreate puszta (steppe) grasslands, using native Hungarian long-horned grey cattle, water buffalo, racka (long horned) sheep, Przewalskii's horse and mangaliza (hairy) pigs. Traditional methods of reed cutting are also encouraged in this zone, some of which is used to roof local buildings in the traditional style. Wetland habitats are being carefully managed and, especially on the Hungarian side, restored. The opportunity is also being taken to acquire additional areas to add to land in the management of the national parks. The positive effects of such actions on species and habitats have been observed in recent research work (e.g. recovery of rare orchid populations).

The management of the wider landscape beyond the national parks follows generally similar lines, with emphasis on supporting traditional land use and maintaining traditional village form to safeguard the integrity of the landscape setting of the lake.

Much attention is given to visitor management, with excellent visitor centres at Sarrod (Hungary) and Illmitz (Austria). The Austrian national park annually attracts some 700,000 visitors. The management of the parks in both countries emphasises eco-tourism and visitor education.

Under the auspices of the joint commission, there is considerable collaboration in the management of the two national parks (e.g. in monitoring, scientific research and visitor services). The parks use the same symbol and the two staffs wear the same uniform. The forthcoming preparation of a management plan for the Natura 2000 site should be used to consolidate the Austrian management regime and link it still more closely to that on the Hungarian side.

A further challenge to transboundary co-operation relates to the different regimes for nature and culture protection within the two neighbouring countries. This is further complicated in the case of Austria where responsibilities for nature and landscape protection lie essentially at the provincial level, whilst the Federal Government has many responsibilities for conservation of the cultural heritage. Finally there are a large number of existing national and international protection designations (on the natural side), with overlapping boundaries and some duplication of function.

5. ADDITIONAL COMMENTS

None.

6. APPLICATION OF WORLD HERITAGE VALUES

The Cultural Landscape of Fertö-Neusiedler Lake was nominated as a mixed site, and IUCN and ICOMOS therefore fielded a joint mission. The site was nominated under natural criteria (ii), (iii) and (iv). IUCN concludes as follows:

Criterion (ii): Ecological processes

The Fertö-Neusiedler Lake does display a number of unusual ecological and biological processes, many of which are rare, if not unique, in Europe. Overall, however, the site cannot claim to be so globally unique that it can satisfy this criterion. Other saline lakes elsewhere in the world better exemplify the bio-physical processes associated with closed lake systems. This is especially so, since the controls over the lake levels and the impact of eutrophication etc., mean that those bio-physical processes are no longer able to follow their natural course, and cannot therefore be said to be "on-going". Despite commendable efforts to restore the natural situation, the lake regime remains to some extent artificial. IUCN does not consider that the nominated site meets this criterion.

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

The natural beauty of the lake is very evident, however, its greatest appeal arises from the proximity of the reedbeds to the nearby meadows and vineyards, and the way in which the lake is overlooked by a number of attractive historic villages. It is the juxtaposition of natural and cultural values that makes for the exceptional beauty of the nominated site – but these are qualities of a cultural landscape rather than a natural site. IUCN does not consider that the nominated site meets this criterion.

Criterion (iv): Biodiversity and threatened species

Criterion (iv) is most relevant to the site's importance for bird conservation. Fertö-Neusiedler Lake is undoubtedly one of Europe's premier sites for birds, as the Ramsar, SPA and other international designations confirm. The nominated site is a key location for many birds on the major flyways for migratory birds seeking to fly around the Alpine barrier but whether it is of global significance is another question. When set alongside the Danube Delta or Donana, it is not of quite the same order, as BirdLife's detailed IBA analysis demonstrates. It

has neither the numbers nor the rarities to justify inclusion among the premier wetland sites in the world. The site has also many different kinds of increasingly rare biotopes occurring in a small area, but this is not so unusual that it can be said to be of outstanding universal value. IUCN does not consider that the nominated site meets this criterion.

The evaluation also raises a number of significant integrity questions as described above.

7. RECOMMENDATIONS

That the Bureau does not recommend the inscription of the Cultural Landscape of Fertö-Neusiedler Lake on the World Heritage list under natural criteria (ii), (iii) or (iv).

However, the Committee may wish to congratulate the Austrian and Hungarian authorities for the collaborative work that they have already undertaken in setting up and managing the adjoining national parks, and in preparing this joint nomination. The Committee should encourage this collaboration to continue in future, particularly through the framework of the requirements of Natura 2000.

It is for ICOMOS to advise on whether the site satisfies the cultural criteria as a cultural landscape. However, IUCN notes that the area has national and regional importance for nature conservation, and therefore if the Committee were to place it on the World Heritage list as a cultural landscape, IUCN would strongly support such a decision. Moreover, it would offer its continuing encouragement to both parties to ensure that the natural as well as the cultural values of the site are further protected and restored.

WORLD HERITAGE NOMINATION – IUCN TECHNICAL EVALUATION

MASADA NATIONAL PARK (ISRAEL)

1. DOCUMENTATION

i) **IUCN/WCMC Data sheet**: (4 references).

ii) **Additional literature consulted:** Mazor, E. 2001. **Masada - Geology and Interrelated Heritage**. Report to Israel Committee for UNESCO and World Heritage Committee; **Masada Management Plan** (summary outline), Israel Nature and National Parks Protection Authority (January 2001); Israel N&NPPA , 1997. **Masada - King's Stronghold, Zealots' Refuge**. 32pp. (National Park interpretation book). Israel N&NPPA. **Masada - the Northern Palace**. 15pp. (Promotional and fundraising document). Yadin, Y. 1966. **Masada - Herod's Fortress and Zealots' Last Stand**. Weidenfeld & Nicolson, London. (Principal archaeological reference based on 1963-5 excavations).

iii) **Consultations:** 4 external reviewers contacted. Onsite consultations with national park director, senior members of park management team and professional advisers.

iv) **Field Visits:** March 2001 . Paul Dingwall and an ICOMOS representative.

2. SUMMARY OF NATURAL VALUES

The nominated property is the 276ha Masada National Park (IUCN Management Category II National Park, with elements of Category V Protected Landscape), located in southern Israel, approximately 18km south of En Gedi, on the eastern fringe of the Judean Desert. Adjacent to the park is the Judean Desert Nature Reserve (IUCN Category I), 28,956ha in extent, considered as a buffer zone for the nominated site.

The national park is dominated by Mount Masada, a partially isolated massif overlooking the Dead Sea. Masada is a fault-bounded uplifted block of the earth's crust (in geological terms a horst) associated with a down-thrusted rift valley (graben), occupied here by the Dead Sea. This rift valley is the landward extension of the huge Syrian-African Rift Valley System, formed along a tectonic plate boundary zone that stretches from the Indian Ocean, through the Red Sea and the Gulf of Eliat.

Rhomboid-shaped, with a flat top some 8ha in extent, Masada stands 100-400m above the surrounding terrain. It is separated from a large fault escarpment by steep canyons cut by rivers that descend from the Judean plateau to the Dead Sea. The rocks forming Masada include massive dolomites and limestones of marine origin, forming near-vertical cliffs, overlying less resistant limestones and chalk. Palaeokarst features occur in the nearby escarpment walls. West of Masada, is a landscape of hills, terraces and wadis forming the Judean Plateau. To the east, Masada is bounded by 18-80,000 year-old lacustrine silts, gravels, sandstones and conglomerates of the Lissan Formation, deposited in a huge lake that existed prior to formation of the Dead Sea.

Towering over the surrounding terrain, Masada is a landscape feature of great scenic attraction. From its summit, unhindered vistas of largely natural rural landscapes in the surrounding nature reserve, and of the Dead Sea, also have high scenic value. Although essentially an arid site, the region is a climatic and biogeographic transition zone, intermixing desert, steppe and Mediterranean elements.

A natural fortress (its name is the Hebrew term for fortress), Masada is the site of fortified palaces built in the 1st Century BC by the Judean King Herod, and it was the scene of the last stand made by some 1,000 Jewish zealots in their revolt against Roman rule in the period AD 66-73. The ingenious use of location, topography and geology, which transformed the site into both an opulent royal palace and a zealots' fortress, captures the spirit of the people of Israel who have come to regard Masada as a national shrine. Similarly, it is the uniqueness with

which Masada intimately entwines cultural legacy and its special natural features that captures the imagination of the modern-day tourists who visit the site.

3. COMPARISON WITH OTHER SITES

The nomination document provides no information comparing Masada to other geological sites. Tectonic plate boundaries, rift valleys and horst-and-graben systems are common geological phenomena in global terms. Among existing World Heritage sites, rift valley systems are prominent in Lake Malawi National Park (Malawi) and the Kahuzi-Biega National Park (Democratic Republic of Congo); Gros Morne National Park (Canada) reveals plate boundary tectonics in a much more outstanding way, in fact this has been referred to as "a Galapagos for Plate Tectonics"; Macquarie Island (Australia) is a horst block on the boundary of the Indo-Australian and Pacific tectonic plates (two of the seven large tectonic plates of the Earth) in the southern ocean; and Tassili n'Ajjer (Algeria), Aïr and Ténèré Natural Reserves (Niger), and Uluru-Kata Tjuta National Park (Australia) all display eroded plateaux and escarpments in arid environments. IUCN concludes that Masada is an important geological site but is not of outstanding universal value. IUCN also notes that the geological values of the site are already well represented in other World Heritage sites.

4. INTEGRITY

Size and Boundaries

The boundaries of the nominated property, though somewhat arbitrary, are defined according to cultural rather than natural values. They are drawn to encompass the mountain and the entire surrounding Roman siege system, comprising eight campsites, a siege-wall and towers, and a large wood and earthen ramp. For purposes of historic authenticity, the visual integrity of the surrounding terrain in the nature reserve and the rural land is maintained by prohibiting under State law any construction within view of the mountain summit.

Management

The nominated site is a national park, protected under national conservation and antiquities statutes. Management responsibility is exercised principally by the Israel Nature and National Parks Protection Authority (NPA). That agency has planning committees and independent experts to assist in implementing management and development plans, while matters of national and international interest are subject to public hearings. The legal and administrative basis for managing the adjacent nature reserve is the same as for the national park. The area between Masada and the Dead Sea is managed as open space and agricultural land according to a masterplan under national planning legislation, administered by the regional council.

A park management plan is currently being prepared. A summary outline of the plan reveals it to be comprehensive in its coverage of management policies and operational plans, with strong underpinning support from planning, forecasting and research. A conservation development project, begun in 1995, is nearing completion. This is intended to promote the conservation and enhancement of cultural assets, guide the implementation of a park interpretation plan, and determine proper levels of visitor services and infrastructure needs. This project incorporates an impressive series of resource assessments, condition reports, research investigations, and forecast surveys. The park is well funded through the NPA, with supplementary funding for visitor services facilities from the Ministry of Tourism. A well-trained staff of 50 is employed, under a park director and senior management team.

The site is well buffered from external development pressures, and there are currently no activities that are incompatible with park objectives or that threaten park values. There are no permanent residents in the park or in the adjacent nature reserve, and the gateway city of Arad (population 25,000) is located 22km away. Pressure from tourism is considerable, but the capacity to handle current and projected visitor levels appears adequate. Masada is one of Israel's most popular tourist venues, receiving about 700,000 visitors per annum. Numbers are forecast to increase to 1.2 million per annum by 2010. The new visitor centre complex and cable car transport system are designed to cope with this level of use without compromising park values or the visitor experience. There is little management intrusion on the site. Rock walls are monitored, and pinned in places, to ensure public safety in the event of earthquake and rockfall.

5. ADDITIONAL COMMENTS

The nomination document is primarily devoted to exposition of Masada's outstanding cultural heritage values, and it gives far less attention to its natural geological character and landforms.

6. APPLICATION OF WORLD HERITAGE CRITERIA

Masada has been nominated as a mixed (cultural and natural) World Heritage site. Its natural values have been nominated under natural criteria (i) and (iii).

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

Mount Masada is an impressive landform, but it is neither unique nor outstanding in geological terms. It is a very small structural feature - a horst block, isolated by secondary faulting and stream erosion from its parent fault scarp. This huge escarpment, with a local relief of some 1,400m from the plateau summit to the shoreline of the Dead Sea (400m below sea level) is part of a truly global scale geological phenomenon - a rift valley system on a tectonic plate boundary extending from Israel for thousands of kilometers to the Indian Ocean and beyond. With summit dimensions of only 600m x 300m, Mount Masada is but an extremely tiny representation of this geological system. As such, Masada is of local significance only, and it fails to qualify as being of outstanding universal value either in geological evolutionary terms or as a geomorphological feature.

However, if Mount Masada is considered together with the surrounding buffer zone the picture changes somewhat. The adjacent nature reserve to the west incorporates a much larger representation of the uplifted component (horst) of the rift valley system, while the protected lands east of Masada National Park cover a large area of the downthrown block (graben). Beyond is the drowned portion of the graben - the Dead Sea. A huge lake that was the forerunner to the Dead Sea is evidenced by an extensive deposit of lacustrine sediments in the area between Masada and the Dead Sea. Consideration could, therefore, be given to incorporating the nature reserve and relevant parts of the open rural lands into the nomination, thereby providing a much more extensive and holistic geological representation of the rift valley system. This would impart greater geological significance to the nominated property. However, IUCN considers that such an expanded nomination would still not meet the criteria or outstanding universal value, for geological features. IUCN also notes that there would be questions of integrity associated with the incorporation of the open rural lands into any revised nomination.

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

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

Physiographically, Masada is a small and indistinguishable component of a much more prominent landform feature - a mountainous chain forming the eastern edge of the Judean Desert plateau. This upland is brought into even sharper focus by being set abruptly against the flat expanse of the Jordan Rift Valley floor. Its setting within the context of a much grander regional-scale landscape gives Masada special scenic values. Despite being physically isolated on the escarpment, what really sets Masada apart, and gives it an outstanding aesthetic quality, is the presence of ancient ruins.

Viewed either from below Mount Masada is an awesome sight. Its summit, affords spectacular vistas of the surrounding landscape. But its scenic qualities derive from an intimate combination of its physical attributes and the material remains of human occupation. Masada's aesthetic appeal, therefore, is the culmination of its natural character and associated cultural legacy.

Given that Masada is a well-displayed example of past successive human settlement intimately interrelated with the natural environment, there could be real merit in considering the site as a relict landscape within the World Heritage category of cultural landscape.

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

7. RECOMMENDATION

That the Bureau does not recommend the inscription of Masada National Park on the World Heritage List under natural criteria (i) and (iii).

WORLD HERITAGE NOMINATION - IUCN TECHNICAL EVALUATION

NATURAL COMPLEX "CENTRAL SIKHOTE-ALIN" (RUSSIAN FEDERATION)

Regrettably, an IUCN Technical Evaluation Report of this nomination is not available for the June Bureau meeting. The State Party requested that a field mission be delayed for climatic reasons. The IUCN evaluation mission will take place in July 2001 and a report will be prepared for the December meeting of the Bureau.

WORLD HERITAGE NOMINATION - IUCN TECHNICAL EVALUATION

KARIAN CAVE (TURKEY)

1. DOCUMENTATION

i) **IUCN/WCMC Data Sheet:** January 2001

ii) **Additional Literature Consulted: International Research and Application Centre For Karst Water Resources (UKAM)**, 1994, ISSN 1300 – 5359; International symposium and field seminar on Karst waters – environmental impacts, Beldibi, Antalya, Turkey, September 10 – 20, 1995 UKAM; Cave and Karst Science, The Transactions of the British Cave Research Association (BCRA) – Alpine karst speleogenesis in (F) and (A) **Caver in the Taurus Mountains**, Turkey, volume 21, Number 3, June 1995; **UKAM Present State of Karst groundwater pollution and its future trend in Antalya travertine plateau**, Cost project 65 (UKAM), May 1993, Ankara; **Expedition speleologique en Turquie**, Manaugat 92, Federation Francaise de Speleologie, Celadon; **Expedition speleologique en Turquie**, Yorük 91, Federation Francais de Speleologie, Celadon; Krška hidrologija u osam zemalja na obodu Sredozemlja, Zavod za hidrotehniku gradevinskog fakulteta u Sarajevu, Sarajevo, januar 1975, H (TURSKA); Cografya DERGISI, Darkotim, B. Tarik Öncesi yerlesme yerleri olrak Antalya magaralarinin jeamorfolojik özellikleri, Izmir – 1990, N.5, Geomorphologic Characteristics of the Antalya Caves as Dwelling Sites of the Prehistoric Man.

iii) **Consultations:** three external reviewers contacted; representatives of Government Departments, conservation agencies, research institutes and museums in Ankara and Antalya; Universities in Ankara, Antalya and Istanbul.

iv) **Field Visits:** February 2001, Albin Debevec – IUCN, Giora Solar – ICOMOS.

2. SUMMARY OF NATURAL VALUES

Karain Cave and Surroundings are located about 30kms. north-west of Antalya, in southern Turkey. It comprises a core area of 254ha, with a buffer zone of some 503ha. The Karain cave consists of several small halls separated by flowstone walls. These smaller halls are 12-15m wide, and up to 5m high near the relatively wide entrance. Larger halls, from 25 to 30m wide are situated further in, with a height of no more than 8m. The cave floor is covered with soil and small stones, and in some places by guano (animal waste). There are also two other smaller caves within the nominated site.

The Cave also contains a range of stalactites, stalagmites, cave pearls and crystals, and other typical karstic phenomena.

The property has a continuous stratigraphy from the Lower Palaeolithic to late Roman times. Whereas a sequence of 1 to 5m of stratigraphy is common in caves, Karain has more than 11m of profile. Extensive sub-fossil faunal remains and palaeo-botanical evidence from the Karain Cave have contributed substantially to understanding the palaeo-ecology of the Eastern Mediterranean.

However, its primary importance is from an archaeological point of view, with human finds dating to at least 50,000 B.P. Scientific work, based on finds made in the caves over 54 years of excavations, has thrown light on the prehistoric links between Europe and the Near East, including those concerning Neanderthal man and ancient migration routes.

The shape of the cave entrance, the walls and ceiling show that the cave developed by corrosion processes in a water filled passage. This is evidenced by smaller corrosion features in the cave, for example solution pockets,

scallops, corrosion knives (up to 40cm) and solution roof flutes of 30 to 100cm in diameter. The ceiling shows younger processes due to condensation corrosion (mineral veins in relief and deepened fissures). Visually corroded flowstone indicates that the Karain cave developed in several phases. The flowstone looks relatively old. The cave is mostly dry, well aerated and relatively open, which is why the flowstone gives a degraded appearance due to prevailing weathering processes. There are no specially important natural features in the cave which merit special safeguarding.

The area surrounding the caves is of interest from a biodiversity perspective. This arises from the contrast between two adjoining habitats: a dry karst region and a lower lying wetland area. In the karst area, there are rock goats, boars, hares, wild cats, lynx, and several species of rodents and reptiles. The wetlands contain a range of fish species, terrapins, waterbirds, and birds of prey.

3. COMPARISONS WITH OTHER AREAS

Karst landscapes, with characteristic natural features associated with limestone or other highly soluble rock, are distributed widely throughout the world. Landforms are predominantly solution in origin, and drainage is usually underground. Some of the world's most famous karst phenomena are already listed on the World Heritage List (see table below). In addition there are at least another 24 natural sites with very important karstic features. There are also ten cultural World Heritage sites with important karstic features.

While Karain is certainly a significant site when viewed from a cultural perspective, its claim to outstanding universal value from a natural point of view is much more questionable. A quick review of the main karstic World Heritage sites shows that it cannot compare in terms of size or variety of phenomena with the globally important sites listed in the table below, which summarises key features of the main cave and karst World Heritage sites:

World Heritage Site	**Main karstic feature(s)**
Cabo Cruz, Cuba	Uplifted karst and stair-terraces in coastal site
Plitvice, Croatia	Travertine lakes and barriers, producing spectacular scenery
Caves of Aggtelek & Slovak Karst, Hungary/Croatia	712 caves, including world's highest stalagmite
Gunung Mulu, Malaysia	295kms of explored caves, numerous bat and swiftlet nests
Puerto Princesa, Philippines	Underground river, spectacular scenery
Skocjan Caves, Slovenia	Dramatic underground canyon and river
Carlsbad Caverns, USA	81 caves with dramatic mineral features
Mammoth Cave, USA	World's longest cave system (306 km)
Ha Long Bay, Vietnam	Best example of marine invaded tower karst

The Karain cave and nearby smaller caves are essentially typical of many cave complexes in Turkey, where more than 600 caves are known. Most of them developed in carbonate rocks bounded by conglomerate and travertine structures, at the junction of which karst springs are usually found. The Antalya region is well known internationally for its karst and caves, and contains some of Turkey's longest and best decorated caves. The Karain cave and surrounding rockshelters are relatively small karst cavities in a semi-arid karst and as such cannot be easily compared with the major cave and karst sites already inscribed. All of the features at Karain are readily seen elsewhere, even in Turkey. The nominated area is important because of its archaeological value, and the long history of settlement of the area. It is in this essentially cultural context that the outstanding characteristics of the Karain cave are most apparent.

4. INTEGRITY

Boundaries

The area of the Karain cave itself, together with two smaller caves, is located on a steep south-east facing karst slope and is naturally well protected. The site is protected against urbanisation by a buffer zone set aside for farming. It would appear therefore that there is no special threat to the location itself.

Human Impact

There are no permanent settlements in the nominated site. The Yagca village in the buffer area has 584 inhabitants. There do not appear to be any activities that could be harmful to the protected area within this village. There is, however, a medium-sized lime plant which obtains raw material from outside the nominated site.

From all the caves in the system, only Karain cave itself is open to tourists. In 2000, the cave was visited by 19,985 domestic visitors, and 2,010 foreign tourists. Considering that the site is only 30km from Antalya, a large city and a significant tourist location, the number of visitors may be expected to increase.

The existing infrastructure in front of the cave is modest: a small information centre, a smaller museum, lavatories and limited car parking space. The access road to the entrance is 300m long. The cave entrance is suitably protected by an iron gate to control access. The cave tour is conducted by two guides. The entrance fee is 2 million Turkish liras (about US$3).

Threats

Even though tours are supervised by guides, some of the surfaces of cave walls have been damaged by signatures etc. and the archaeological excavations in the caves have somewhat altered the natural aspects of the caves. Finally, this whole area is known to be geologically unstable but this has not been addressed in this report.

Management

There is no special management plan for the protected area. Conservation is carried out on the basis of a State law and decrees adopted by Antalya Regional Council for conservation of natural and cultural heritage. A Regional Development Plan, approved by the Ministry of Planning and Reconstruction exists. This protects the landscape and regulates access to Karain caves. This plan was approved by Antalya Regional Council on 28 March 1990. A special annex of 19 December 1990 Regional Council designated Karain cave as an archaeological site. Land in the nominated site is owned by the State, while that in the buffer area belongs to private owners. The management of the cave and infrastructure is undertaken directly by the Antalya Museum. The Museum takes part in all the archaeological excavations and employs the cave guides. In view of growing tourist pressures, a management plan for the site is desirable.

5. ADDITIONAL COMMENTS

From an archaeological point of view, the Karain cave system is an important location, since it covers the entire Palaeolithic. As noted above, the site displays an exceptional vertical range of accumulated materials from over 50,000 years of continuous occupation.

There are archaeological excavations near the entrance to the cave, and two additional archaeological trenches within it. This location has revealed a rich archaeological excavation history since 1946, when the cave was discovered. All the excavations have been carried out under the direction of Ankara and other universities.

IUCN has reviewed this site in terms of its suitability as a natural site, and in this respect it is clear that it does not satisfy World Heritage criteria. However, IUCN believes that there may be a number of potential World Heritage natural sites in Turkey.

6. APPLICATION OF WORLD HERITAGE CRITERIA

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

The Karain Cave and Surroundings were nominated under natural criterion (i). As is evident from a comparative analysis, the site does not match up to the standards of those karstic sites already on the World Heritage list. IUCN does not consider that the nominated site meets this criterion.

7. RECOMMENDATIONS

That the Bureau does not recommend the inscription of Karain Cave and Surroundings on the World Heritage list under natural criterion (i). The Bureau may wish to recommend that the Turkish Government review their Tentative List with a view to identifying more natural sites which could eventually be brought forward for nomination.

C. Nominations of natural properties to the World Heritage List

C.1. Palaearctic Realm

WORLD HERITAGE NOMINATION - IUCN TECHNICAL EVALUATION

ENSEMBLE DE GROTTES À CONCRÉTIONS DU SUD DE LA FRANCE (FRANCE)

1. DOCUMENTATION

i) **IUCN/UNEP-WCMC Data Sheet:** (6 references & web sites for caves)

ii) **Additional literature consulted:** Hill, C.A. & P. Forti 1997. **Cave Minerals of the World**. Nation Speleological Society; Bourges F. et. al. 1999. L'éclairage et la protection des grottes./Mangin, A. et. al. La dynamique du milieu souterrain, concepts de base servant à la conservation des grottes. **Contribución del estudio scientifico de las cavidades karsticas al conocimiento geologico.** Cabrol, P. 1973. Nouvelles Recherches sur les Concrétions d'Aragonite. **Bulletin de la Fédération Tarnaise de Spéléo-Archéologie**. 10; Cabrol, P. 1974. Complément d'Information sur la Présence et le Fonctionnement de Disques dans un Réseau Karstique. **Bulletin de la Fédération Tarnaise de Spéléo-Archéologie**. 11; Cabrol, P. 1975. Quelques Types de Concrétions Calcitiques Très Rares Rencontrées dans les Grottes. **Bulletin de la Fédération Tarnaise de Spéléo-Archéologie**. 12; Cabrol, P. 1976. Les Aragonites Coralloïdes. **Spelunca**. 2; Cabrol, P. 1979. Trois Types de Concrétions D'Aragonite Très Rares. **Spelunca**. 3; Cabrol, P. 1989. Causes de dégradation du milieu souterrain. **Spelunca**. 35; Cabrol, P. 1989. La protection Juridique des grottes**. Spelunca**. 35; Cabrol, P. & Coudray, J. 1978. Influence des facteurs hydrogéologiques sur la localisation, la forme, la nature minéralogique et la diagénèse des concréetions carbonatées des grottes. **Implications de l'Hydrogéologie dans les autres Sciences de la Terre (I.H.E.S Symposium)**, Montpellier; Cabrol, P. & Coudray, J. 1982. Climatic Fluctuations Influence the Genesis and Diagenesis of Carbonate Speleothems in Southwestern France. **NSS Bulletin.** 44; Choppy, J & Dubois, P. (Eds). 1997. **Clamouse, Cinquante ans de Recherches**. Société G. Vila et Cie / grotte de Clamouse; Delannoy, J.J. et. al. 1999. Articulation des aspects expérimentaux, théoriques et méthodologiques de l'étude d'un système karstique à des fins environnementales: le laboratoire de Choranche (Vercors-France)/Perrette Y. et. al. Stratigraphic, image processing and spectroscopic studies of some stalagmitic samples from the Vercors. France: preliminary results. **Karst 99. Études de géographie physique travaux 1999**. Sup. XXVIII CAGEP, Université de Provence; Mangin, A. et. al. 1999. La conservation des grottes ornées: un problème de stabilité d'un système naturel (l'exemple de la grotte préhistorique de Gargas, Pyrenées françaises). **C.R.Acad. Sci. Paris, Earth & Planetary Sciences** 199; Andreo, B. (Eds). 1999. Patronato de la Cueva de Nerja. Nerja. Malaga; Perrette, Y. 1999. Les stalagmites: archives environnementales et climatiques à haute résolution. **Karstologia**. 34.

iii) **Consultations:** 16 external reviewers contacted.

iv) **Field Visit:** 23-31 March 2001. John Gunn, David Gill & Rolf Hogan.

2. SUMMARY OF NATURAL VALUES

The Ensemble de grottes à concretions du sud de la France (EGCSF) is a serial nomination made up of 18 discrete sites stretching in a band from the Alps to the central Pyrenees (see Map 1.). Of the individual clusters, 16 comprise a single cave but two include a number of caves that are treated as an individual hydrological system (see Table 1). Of the multiple cave sites, one (Cabrespine-le Pestril) includes five caves and the other (Grottes de l'Asperge-Rautely) includes three caves. Thus the nomination includes 24 individual caves and over 135km of cave passage. The sites are situated within six limestone regions in southern France: Les Pyrenees (5 sites), La Montagne Noire (8 sites), La Region Montpelieraine (2 sites), Les Grands Causses (3 sites), Le Plateau Ardechois (1 site) and Les Alpes (1 site) (see Table 1). Five of the caves have formed in limestones of Jurassic

age, two in dolomites of Jurassic age and the remainder in Cambro-Ordovician-Devonian meta-dolomites (see Table 1).

The group of 18 sites/24 caves has been chosen to include almost all possible types of speleothem (a secondary mineral deposit formed in caves by the precipitation of minerals such as calcite, aragonite and gypsum from water e.g. stalactites, stalagmites, cave crystals etc.) found in karst caves formed by meteoric (originating from rainfall/seepage), as opposed to hydrothermal (associated with igneous activity) waters.

The calcite speleothems include all the 'normal' types, straw stalactites (including some of exceptional length, up to 4.5m), massive stalactites, stalagmites (including some spectacular large stalagmitic constructions in very large chambers), flowstone, curtains/draperies, various types of helictite, pearls, rimstone pools/gours with associated crystalline precipitates and 'moonmilk'. The helictites in Aven d'Orgnac and the rimstone dams and shelfstone in La Balme del Pastre receive particular attention in Hill and Forti. There are also examples of more unusual calcite speleothems: triangular stalagmites, triangles of calcite (a rare monocrystalline variety of flowstone), plate stalagmites, black, blue and red stalactites, 'shields', welts, trays, tower coral, both triangular and rectangular monocrystalline stalactites, monocrystalline 'cups' and 'blisters'.

The aragonite speleothems include forms that have been described from other areas and rarer forms, particularly those with blue and green colourations, varieties of frostwork and spathites (a variety of tubular stalactites composed primarily of aragonite). The 'Blue Cave' (Barrencs de Fournes), listed as one of the 'Top Ten Mineralogical Caves in the World' by Hill and Forti, has been sealed since 1974 but is the reference site for blue aragonite and is said to contain unique forms. The aragonite straw stalactites in PN71 have not been reported from anywhere else in the world. The Grotte de L'Asperge contains spectacular and possibly unique acicular blue aragonite. Another cave mineral, hydromagnesite, is present in different forms in several of the caves while Le reseau Andre Lachambre, as well as containing an array of aragonite speleothems and cave pearls, is possibly the only natural karst cavity in which a large vein of talc crosses the passage.

One of the caves (La Cigalere) contains common varieties of gypsum speleothem: stalactites, stalagmites, columns, flowers and needles (some of exceptional length, up to 50cm) together with some extremely rare forms such as black gypsum, iron hydroxide and manganese hydroxide minerals. The other caves contain both calcite and aragonite speleothems but no gypsum except for the Grotte de Lauzinas which has a very unusual variety of cave blister in the form of hemispherical cups filled with gypsum, opal or sediments.

In addition to the chemical precipitates, several of the caves contain unusual clastic sediment (mud and sand) deposits. Vermiculations are found in several caves but one of the most unusual displays of mud formations in the world is found in the Grotte de Lauzinas. These include large (up to 1 m high) and extremely rare mud 'mushrooms' and smaller (c. 5 cm high) but also rare mud 'fir trees'.

3. COMPARISON WITH OTHER AREAS

Nine sites have been inscribed on the World Heritage list on the basis of their karst features (see Table 2). A further 23 natural sites and nine cultural sites have secondary karst values. The karst landscapes in which the nominated caves occur are of some ecological and geomorphological interest. For example, the morphology of the caves and the speleothems and clastic sediments they contain provide evidence of earth's history and ongoing geological processes in the development of landforms. However, the nomination is based primarily on the presence of speleothems. The aesthetic appearance and evidence of significant ongoing geological processes provided by these speleothems has been the focus of this assessment.

The sites which have been inscribed for their cave features include: Puerto-Princesa Subterranean River National Park (Philippines); Gunung Mulu (Malaysia); Carlsbad Caverns National Park (USA); Mammoth Cave National Park (USA); Caves of Aggtelek and Slovak Karst (Hungary/Slovakia); and Skocjan Caves (Slovenia). Among the World Heritage sites containing secondary cave features two are found in France. Mont Perdu (France/Spain) is close to the Pyrenean part of the nominated area. Perdu includes over 60 caves, one of which - Grotte Casteret - contains a frozen lake of over 6,000m^2. The Decorated Grottos of the Vezere Valley cultural World Heritage site contain 147 prehistoric sites and 25 decorated caves which include the cave paintings of Lascaux Cave. However, there is no record of any significant speleothems from these caves so in this respect they differ from the nominated site.

Among the World Heritage 'cave sites', Carlsbad Caverns is the site which most closely resembles the nominated area. Carlsbad includes the Lechuguilla Cave which contains world famous speleothems including distinctive gypsum 'flowers' and 'needles' of great abundance, diversity and beauty. The EGCSF nomination argues that the Carlsbad speleothems are formed by a different process and therefore cannot be used as a basis of comparison. The Carlsbad speleothems are known to be of hydrothermal origin while the sites in the nomination, and their speleothems, have been formed by meteoric waters. Caves such as Skocjan, Mammoth and the Blue Mountain's Jenolan Caves are also of meteoric water origin. However, one external reviewer noted that recent research has indicated a much wider role for hydrothermal processes in many caves, and that revisions to cave origins may be expected. This is currently a major subject of debate among cave geomorphologists.

Of the other World Heritage 'cave sites', Gunung Mulu, the Caves of Aggtelek and Slovak Karst, and Skocjan Caves contain significant speleothems. Two of these cave sites contain aragonite. Mulu contains spectacular aragonite and calcite needles and the Aggtelek and Slovak Karst includes aragonite speleothems and abundant dripstone and flowstone speleothems, but these are 'common' varieties whereas the deposits in the nominated site contain unusual forms. Most of the types of calcite speleothem present in EGCSF are also present in several of the listed sites but the triangular stalagmites, monocrystalline triangular and rectangular stalactites, shields and blue and green calcite are not present in any of the existing World Heritage cave sites. Outside of the listed sites there are several caves that have large rooms and massive speleothems comparable to the nominated site. However, in many of these the speleothem is essentially relict, having formed in wetter, and possibly warmer, climatic conditions whereas the Aven d'Armand has the greatest number and concentration of plate stalagmites of any cave in Europe and all are active, unlike many comparable sites.

The nomination indicates that this assemblage of caves provides an example of the role of karst process and the transfer of material in solution, emphasising the links between surface and underground processes that are the single defining characteristic of karst hydrological systems. These links between surface processes and underground forms provide a logical link with which to infer paleoclimatic conditions from cave deposits. The widespread speleothems provide a record of the prevailing conditions during their formation, and are amenable to isotopic and radiometric dating, which provide long-term records analogous to deep sea and lacustrine cores.

In summary, speleothems are found in caves throughout the world. The nominated area contains some speleothems of a type and colour that are globally unique and others that are very rare. Several of the caves contain aragonite speleothems in an abundance and beauty equalled only in a few hydrothermal caves. However, speleothems are merely one detailed manifestation of a much more significant geological and physiographic process, that of weathering in a subterranean environment. Therefore IUCN finds it difficult to compare one specific feature of karst geomorphology/hydrology to cave sites that have been inscribed on the World Heritage List because they represent the much broader phenomenon of karstic systems.

4. INTEGRITY

Legal Status

The extent of legal protection of the 18 sites in EGCSF is variable. Only nine of the 18 individual clusters have legal protected status (see Table 1). This includes eight sites protected as "Site classé" and one site as a "Réserve naturelle". The process for the legal protection of the other 14 caves has been started in most cases, or is currently under consideration. Though legislation allows for a management committee, only five of the nine protected sites have such a committee at present.

Management

It should be noted that although the extent of legal protection is variable and still not fully satisfactory, all caves visited had systems in place to restrict entry (substantially constructed multiple locked steel gates with ventilation systems and access for bats) and most have management regimes to control the number of visitors. These are adequate but very variable from site to site. Of the eighteen sites, seven have been developed for tourism with the usual infrastructure of pathways, lights and entrance modification. In some cases new access tunnels have been created. The tourist caves visited during the field evaluation had systems in place to restrict entry and to control the numbers of visitors. In addition, the measures taken to minimise the possibility of visitors damaging the features of interest (taping, internal gating, physical protection) were observed to be of a very high standard. At the Gouffre de Esparros extensive monitoring has been in place since 1989. This work allowed scientist to

estimate the impact of creating an access tunnel to the cave. Once the tunnel had been made further data was collected over a number of years to establish the level of visitation which would not adversely impact on the site. Monitoring has continued since the cave was opened to the public in 1995. However, the other nominated caves are not being systematically monitored, although a scheme has been devised for monitoring at Orgnac.

For the "wild" caves, access is strictly limited by the local government authority or caving club and in most instances visiting cavers must be accompanied by a guide (see Table 1). However, management plans are lacking for most of the caves comprising the nomination and/or are in the process of being drawn up. Staffing levels at the cave sites are also highly variable. One reviewer remarked that the diversity of management regimes among the 18 sites of EGCSF is probably the largest single threat to this collection of caves. Some are "wild" caves in protected areas; others are developed tourist caves, both publicly and privately owned. Individual managers will respond differently to threats to the cave sites they manage, ranging from inaction to well defined strategies to reduce impacts. If the area is to be managed at a standard expected of World Heritage sites then a unified management planning operation should be put in place.

The extent to which the speleothems are protected is not clear from the nomination, but in all the caves visited the entire catchment supplying feeder water to the speleothems is protected or scheduled for protection. During the field visit maps were supplied, or promised, to show the extent of the existing or proposed protection area for each cave. Concern was expressed by many of the Speleological Clubs controlling access to the nominated sites that the cave maps and locations of entrances should be kept confidential in order to protect these delicate sites from unauthorised entry. It appears that this was the prime reason that detailed maps were not included as part of the nomination document. The definition of the surface catchments is known for some sites but this work needs to be extended to provide a logical basis for cave catchment definition which does not rest entirely on existing cadastral boundaries.

Given the incomplete nature of legal protection, lack of integrated management and unclear definition of buffer zones EGCSF does not meet the Conditions of Integrity as set out in the Operational Guidelines.

5. ADDITIONAL COMMENTS

During the evaluation IUCN's attention was drawn to the illegal trade in speleothems. Many caves are fitted with alarms and the location of some caves is kept secret to prevent the theft of speleothems. IUCN understands that proposals are being developed for international co-operation to prevent the illegal trade in speleothems and strongly supports this initiative.

There was some confusion in reviewing this nomination because the sites are not named consistently in the documentation. In particular, the site 'La Balme del Pastre' on the nomination is named as Aven des Perles or as Les Perles in documentation subsequently supplied. There was confusion over the site listed as 'Les Barrencs de Fournes' in the nomination as this is listed in some documentation as 'Grotte Bleue' and is known internationally as 'The Blue Cave'.

There are archaeological caves within the boundaries of the nominated sites and one site - the Blue Cave – is part of a Roman copper mine complex dating back to 300 BC.

6. APPLICATION OF WORLD HERITAGE NATURAL CRITERIA

The Ensemble de grottes à concrétions du sud de la France has been nominated under natural criterion (i) and (iii).

This nomination raises an important question for the Committee: can the occurrence of a very specific feature be of outstanding universal value in terms of the World Heritage Convention?

In respect of natural values, criterion (i) from the Operational Guidelines reads: sites must "be outstanding examples representing major stages of earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features". The qualifying conditions explain that sites inscribed according to this criterion should contain "all or most of the key interrelated and interdependent elements in their natural relationships". They go on to explain, by way of

example, that an "ice age" area should include the snow field, the glacier, deposition and colonisation processes; and that a volcano nomination should include a complete series of magmatic rocks, and that all or most types of effusive rocks and types of eruptions should be represented.

In case of natural criterion (iii), the Operational Guidelines refer to "superlative natural phenomenon or areas of exceptional natural beauty and aesthetic importance". The qualifying conditions explain that sites inscribed according to this criterion should be of outstanding aesthetic value and include areas that are essential for maintaining the beauty of the site. The example that is given is of a site whose scenic values depend on a waterfall; this "should include adjacent catchment and downstream areas that are integrally linked to the maintenance of the aesthetic qualities of the site".

The conclusion that can be drawn from this guidance is that the emphasis is upon the character of natural World Heritage sites as a whole, rather than on sites selected for specific features.

There are good theoretical and practical reasons for the World Heritage Convention to take this approach:

- if a case is made for World Heritage nominations based on very specific, narrow features, the number of potential World Heritage sites is almost infinite;

- conservation in general is based on identifying and safeguarding the complex interactions of natural systems rather than the protection of individual features – i.e. it is comprehensive rather than reductionist;

- sites based on single features (e.g. a species or a small geological feature) are vulnerable to removal or damage; in effect the features are almost "movable". On the cultural side, moveable objects do not qualify for recognition.

The World Heritage Committee has in fact dealt with this kind of question on a number of occasions. For example:

- the Committee decided not to inscribe the Dobsinska Ice Cave and Ravines of the Slovak Paradise (Slovakia) in 1998 on the grounds that it was too specific a feature, though the cave itself was eventually inscribed (on IUCN's advice) as an extension to a pre-existing site, the Caves of the Aggetelek and Slovak Karst,

- the Committee did not inscribe two species-specific nominations from India, relating to the Asiatic Lion (Gir Wildlife Sanctuary) and the Wild Ass (Wild Ass Sanctuary). In both cases IUCN's advice was that these subspecies do "not on (their) own present sufficient justification for (inscription)".

- The Committee did not inscribe the 'Fossil Findings of Ipolytarnoc' (Hungary) in 1993. IUCN's advice was that " . . . the interpretation of natural criteria which focus on a very narrow entity, does not reflect the "universality" of a site. Ipolytarnoc, while geologically interesting, is a relatively obscure, scientifically esoteric and unthreatened phenomena. In this context it is neither outstanding nor does it contain the universal value required under the Convention."

The relevance of this analysis to the EGCSF nomination, with its focus on speleothems as the distinctive feature meriting inscription, would appear to IUCN to be as follows. Speleothems are detailed manifestations of a much more significant process of chemical solution and weathering in a subterranean environment. Referring back to the Operational Guidelines, the relevant part of criterion (i) is intended to address significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features, rather than very specific features or the effects of the process at local scales. The relevant part of criterion (iii) is intended to address sites with superlative natural phenomenon which are of exceptional natural beauty and aesthetic importance. While it may be argued that the series of speleothem features in the French caves are indeed exceptionally beautiful, the qualifying conditions show that the World Heritage approach to natural beauty is intended to be much more inclusive. It would appear that such an argument would apply whether the nomination is for an individual site or for a serial nomination.

IUCN concludes therefore 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.

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

The caves that comprise the nominated site contain interesting examples of speleothem development. Research in the nominated caves has provided new insights into the development of speleothems and particularly the relationships between aragonite and calcite deposition. The speleothems are in themselves important geomorphic features and the caves preserve the majority of types known globally from meteoric water caves. They exhibit multiple phases of development and preserve important evidence of past climates. However, speleothems are merely one detailed manifestation of a much more significant process of chemical weathering in a subterranean environment. Criterion (i) addresses the significant geological and physiographic features and geomorphological processes in a global context, not localised forms or effects at local scales. IUCN does not consider that the nominated site meets this criterion.

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

EGCSF comprise a variety of caves that are considered by many cavers to be of great beauty. In some of the caves the beauty is manifest only in very localised areas while in others the extent of speleothem development is more extensive. Several caves have speleothems that illustrate very good examples of crystal symmetry and contain individual examples of unusual and beautiful forms, as well as a wide range of colours, some of which are globally rare. However, the rare speleothems are restricted to a relatively small part of the nominated caves. The speleothems are merely one element of the features of the nominated caves which are in turn single features of much larger karst areas. While the nominated area is undoubtedly of national importance and significant to speleologists at a global level, IUCN considers that the speleothems are of too small a scale to meet this criterion. IUCN does not consider that the nominated site meets this criterion.

As noted in section 4. IUCN considers that EGCSF does not meet the Conditions of Integrity.

7. RECOMMENDATIONS

That the Bureau does not recommend the inscription of The Ensemble de grottes à concretions du sud de la France on the World Heritage List under criteria (i) or (iii).

TABLE 1. Overview of nominated caves

Region	Cluster	Cave	Feature of Interest	Length (Km)	Rock Type	Geological Period	Legal Protection	Annual Visitation
Les Pyrenees	Esparros	Esparros	Aragonite crystals.	2.0	Dolomite	Jurassic	Site classé	30,000 tourists
	Cigalère	Cigalère	Gypsum, aragonite & sulphur crystals.	10.0	Dolomite	Ordovician	Site classé	50
	TM 71	TM 71	Diversity of blue aragonite crystals.	9.5	Dolomite	Devonian	Réserve naturelle	Restricted access
	Aguzou	Aguzou	Gourd crystals, aragonite and triangular stalagmites.	5.0	Dolomite	Devonian	Site classé	Restricted access
	Lachambre	Lachambre	Corridor of aragonite and hydromagnesium crystals.	25.0	Dolomite	Devonian	Site classé	240
La Montagne Noire	Grotte Bleue	Grotte Bleue	Dated blue aragonite crystals.	0.5	Dolomite	Devonian	In development	0
	Cambrespine-Trassanel	Cabrespine	Subterranian river with variety of crystals. Acicular aragonite crystals.	18.0	Dolomite	Devonian	In development	100,000
		Trassanel	Many calcite 'shields'.	5.0	Dolomite	Devonian	In development	Restricted access
		Gaubeille	Large number of aragonite crystals.		Dolomite	Devonian	In development	Restricted access
		Embuc	Large number of aragonite crystals.		Dolomite	Devonian	In development	Restricted access
		Limousis	"Le Lustre" large aragonite feature.	2.0	Dolomite	Devonian	In development	30,000
	Lauzinas	Lauzinas	Reference cave for calcite concretions, variety of colours. Unique calcite 'mushrooms'.	8.0	Dolomite	Devonian	Site classé	Unknown?
	Pousselière	Pousselière	Tubes and soda-straws of aragonite. Acicular aragonite and aragonite blisters.	2.5	Dolomite	Devonian	In development	Unknown
	Grottes de l'Asperge-Routely	Asperge	Large number of speleothems.	8.0	Dolomite	Cambrian	In development	120
		PN71	Many coralloid aragonite crystals.	5.0	Dolomite	Cambrian	In development	120
		Grotte du Rautely	Many classic calcite speleothems & some aragonite.	1.5	Dolomite	Cambrian	In development	Unknown
	Mont Marcou	Mont Marcou	Geode of green aragonite.	2.0	Dolomite	Cambrian	In development	120
	Clamouse	Clamouse	Variety of calcite & aragonite concretions.	6.0	Dolomite	Jurassic	In development	150,000
	Demoiselles	Demoiselles	Large chamber entirely decorated with calcite 'flows', 'curtains' etc.	1.5	Limestone	Jurassic	In development	140,000
Les Grands Causses	Les Perles	Les Perles	Concentration of 'cave pearls'.	0.3	Dolomite	Cambrian	In development	Restricted access
	Amélineau	Amélineau	Exceptionally large soda-straws.	0.2	Limestone	Jurassic	Site classé	Restricted access
	Armand	Armand	Large chambre – forest of 'stack of plate' stalagmites.	0.3	Limestone	Jurassic	Site classé	100,000
Plateau Ardechois	Orgnac	Orgnac	Stack of plate' stalagmites, 'shields'.	5.0	Limestone	Jurassic	Site classé	130,000
Alpes	Choranche	Choranche	Large number of soda-straws.	18.0	Limestone	Jurassic	In development	200,000
		TOTAL	**LENGTH:**	**135.2**				

Table 2. World Heritage Sites inscribed specifically for their Cave and Karst Features (9)

World Heritage Site	State Party	Year	Summary of Key Features/Justification for Inscription	Criteria
Puerto-Princesa Subterranean River National Park	Philippines	1999	Spectacular karst landscape, underground river & caves (iii). Most significant forest in Palawan Biogeographical Provence (iv).	iii, iv
Gunung Mulu	Malaysia	2000	295km explored caves, Sarawak Chamber - world's largest; speleothemes with spectacular aragonite & calcite needles. 1.5 myo sediment sequence, giant doline-karst collapse, lateral planation (i); Bats & swiftlets energy transfer from forest to cave (ii); Karst, bats, pinnacle forest (iii); Forest & cave biodiversity (iv).	i,ii,iii,iv.
Desembarco del Granma National park and System of Marine Terraces of Cabo Cruz	Cuba	1999	Uplifted marine terraces and ongoing development of karst topography (i). Aesthetic value of stair-step terraces and cliffs (iii).	i, iii
Carlsbad Caverns National Park	USA	1995	81 caves. Huge caverns & decorative mineral features, scenic values esp. Lechuguilla. (Most types of limestone cave formation are found here, including long passages with huge chambers, vertical shafts, stalagmites, stalactites and gypsum 'flowers' and 'needles'. Excellent examples of karstification by sulphur acids. Rich microfauna.)	i, iii
Mammoth Cave National Park	USA	1981	Continuous cave formation (100 mya-present). Large level passages & jagged domepits. Rich troglobitic fauna.	i,iii,iv
Plitvice Lakes National Park,	Croatia	1979/ 2000	Travertine barriers and lake systems	ii, iii
Caves of Aggtelek and Slovak Karst	Hungary/ Slovakia	1995/ 2000	712 caves. Variety and concentration of cave types, speleothems and an array of typical temperate zone karst features. (Includes aragonite and sinter formations and an ice filled abyss.)	i
Skocjan Caves	Slovenia	1986	Awesome river canyons, textbook portrayal of karst hydrogeology. On-going process (ii); Collapsed dolines & caverns (iii).	ii, iii
Ha Long Bay	Vietnam	1994/ 2000	Most extensive and best-known example of marine invaded tower karst and one of the most important areas of fengcong and fenglin karst in the world.	i, iii

WORLD HERITAGE NOMINATION - IUCN TECHNICAL EVALUATION

THE MAKHTESHIM COUNTRY (ISRAEL)

1. DOCUMENTATION

i) **WCMC Data sheet:** February 2001, 7pp., including 34 references.

ii) **Additional literature consulted:** Two background reports to the World Heritage nomination *viz.* Mazor, Emanuel 2001a. *Makhtesh Country Ramon Science Centre and Natural Laboratory.* Miscell. Report Ramon Science Centre, Ben Gurion University of the Negev; Mazor, Emanuel 2001b. ***Millennia of Sustained Agriculture in the Central Negev versus Highly Preserved Ecosystems Inside the Makhteshim***. Miscell. Report Ramon Science Centre, Ben Gurion University of the Negev; Publications of the Ramon Science Centre 1987-2001. (List of 101 scientific papers) Frankenberg, Eliezer 1999. **Will the biogeographical bridge continue to exist?** *Israel J. of Zoology 45:65-74;* Zilberman, Ezra 2000. **Formation of "makhteshim" - unique erosion cirques in the Negev, southern Israel**. *Israel J. of Earth Sciences 49:127-141*. Selection of 20 geological and biological scientific reprints.

iii) **Consultations:** 4 external reviewers contacted, staff of the Israel Nature & National Parks Protection Authority and the Ramon Science Centre; senior ranger at Ramon Reserve Geological Park; mayor and councillors of the city of Mizpe Ramon; regional councillors for Negev Region; and members of the Israel National Commission for UNESCO.

iv) **Field inspections:** March, 2001. Paul Dingwall.

2. SUMMARY OF NATURAL VALUES

Located in the Negev desert of southern Israel, the Makhteshim Country nomination includes five geological structures termed *makhtesh* (pl. *makhteshim*) (a Hebrew term, meaning a mortar for pounding flour), surrounded by nature reserves and a buffer zone. The nominated site, which is in fact a serial site made up of four components, is focused on the five makhteshim. It covers a total area of 43,485ha, consisting of: Makhtesh Ramon (27,078ha); Makhtesh Gadol (11,605ha); Makhtesh Katan (3,275ha); and the two sites of the Makhtesh Arif Twins (1,527ha). These are protected within nature reserves covering 196,210ha, which are surrounded by a buffer zone of some 300,000ha.

The makhteshim are deep, elliptical basins situated at the crest of large folds (anticlines) in the earth's crust. Resembling volcanic or meteorite craters, they are erosional landforms drained by a single river. They are almost entirely enclosed by 200-400m high cliffs composed of hard marine limestones and dolomites overlying soft sedimentary rocks. The makhteshim are formed along large NE-SW trending anticlines that developed during Cretaceous times in the Syrian Arc Fold Belt, extending through southern Israel and the Sinai in eastern Egypt. A period of intensive tectonic upwarping in the Pliocene (3-5 million years ago), related to the subsidence of the Dead Sea Rift Valley System, caused tilting of the structures to the east and a reversal of the regional drainage from the northwest towards the east. The ensuing deep incision of the drainage systems at this time created the current landscapes of the makhteshim. Each valley was carved by the forces of water and wind erosion, and is now drained by a single narrow watercourse. Today the makhteshim are geomorphologically stable.

Although geologically similar, the makhteshim vary considerably in size, as follows: Makhtesh Ramon extends 12 x 42km and is 450m deep; Makhtesh Gadol (5 x 10km) and Makhtesh Katan (5 x 8km) are both 300-400m deep; and the Makhtesh Arif Twins are only a few hundred metres in extent. Makhtesh Ramon, the largest and most studied, is composed of Triassic-age (oldest) carbonates, shales and sandstones and friable sandstones of Jurassic and Cretaceous age, overlain by resistant, cliff-forming Tertiary marine carbonates - dolomite and limestones. Penetrating the sedimentary strata are many dikes and other volcanic features, such as sills, stocks,

tuffs, lava flows and a laccolith. Forming part of the base of the makhtesh is a series of Lower Cretaceous volcanoes and flows of basanite (a rare form of basalt from the earth's mantle), the largest of which is Mt Arod, about 1,500m in diameter and 180m high. The floor of the makhtesh is also covered by a wide range of Pleistocene deposits forming stream channels, terraces and pediments. Triassic ammonites are abundant in Makhtesh Ramon, and Makhtesh Gadol has fossilised coral reefs.

The nominated site supports a wide range of desert flora and fauna, including several important species of concern, such as: Acacia gazelle, Nubian ibex, Dorcas gazelle, and a rare small wild horse, the onager. Resident and migratory bird species include the Griffon vulture, Egyptian vulture, Sinai rosefinch, Lesser kestrel, Corncrake, White stork and Black stork . Vegetation within the nominated area is predominantly of Saharo-Steppian origin, though the Makhtesh Ramon forms a natural boundary between two major biogeographic zones, the steppe (Irano-Turanian) and the true (Saharo-Arabian) desert. Thus, the makhtesh is an important natural laboratory for the study of the ecological interaction of two floras and their associated biota.

3. COMPARISON WITH OTHER AREAS

The makhteshim are, in essence, geological oddities. To exist, they require a unique combination of lithology (rock type), structure and geomorphic evolution, such as is found in the Negev and neighbouring countries.

Little information is provided in the nomination document on comparable geological features or areas. In fact, crustal folding and the formation of anticlines and synclines is a common tectonic phenomenon, responsible for creating some of the world's greatest mountain systems, such as the Appalachian mountains of North America. Deeply dissected anticlines and structural domes are also common geological features throughout the world's continents, and the geological textbooks are replete with examples, including those from arid regions such as Utah and Wyoming in the USA. Although they are less common, elongated basins on anticlinal ridges, like the makhteshim, are known from several parts of the world, such as the Appalachian, Zagros and Jura Mountains; the Paradox Basin in Colorado, and in North Africa (Zilberman, 2000). The Makhtesh Hallal in the Sinai desert of eastern Egypt is similar in size to Makhtesh Katan, and formed from the same tectonic zone.

Among existing sites inscribed on the World Heritage list, none contains makhteshim or is dominated by fold mountain systems. However, several sites contain extensive areas of dissected mountains and plateaux in arid environments, *viz.*: Tassili n'Ajjer (Algeria), Aïr and Ténère Nature Reserves (Niger), Simen National Park (Ethiopia), Sibiloi/Central Island National Parks (Kenya), and the Uluru-Kata Tjuta National Park (Australia). The only natural World Heritage site within the Arabian Desert Biogeographic Province is the Arabian Oryx Sanctuary in Oman, focused primarily on biodiversity significance, which shares some species overlap with the Makhteshim Country.

4. INTEGRITY

Size and boundaries

The nomination is a serial site nomination, explicitly focused on geological features - the five makhteshim. It consists of four geographically separate areas (one containing two makhteshim), whose boundaries, drawn essentially to encompass the makhteshim, are defined topographically by the outer margins of the encircling cliffs. This restricted demarcation excludes from the property any extensive component of the regional-scale geological structure from which the makhteshim derive their common origin - the great tectonic fold system of anticlines and synclines. Consequently, the property lacks inclusion of the full complement of geological and geomorphological features required to convey holistically the geological story of makhteshim evolution. Also, it is not evident that it is necessary to include all five makhteshim. While it is argued that each of the five makhteshim displays different aspects of their common evolution, they are, in fact, all at the same evolutionary stage, differing mainly in size according to their physiographic setting.

Management

The nominated property has strong legal protection but a management capacity of variable quality. The makhteshim are State-owned lands protected as part of larger nature reserves under national park and nature reserve laws as well as national antiquities and planning statutes. Makhtesh Ramon is managed as a national park

complex. The central portions of the makhteshim are currently excluded from the nature reserves but are intended to be given protected status in the near future. Management is exercised by the Nature Reserves and National Parks Protection Authority of the Israel Ministry of the Environment. There is no management plan for the nominated site, but a set of management policies exists, and a 1996-98 special Government Resolution establishes the Makhteshim Country and proclaims the makhteshim as unique national and international assets of nature that have to be preserved, protected and opened to the public.

Staffing capacity and visitor facilities are variable, ranging from basic or non-existent to highly developed. Makhtesh Ramon Park has two rangers and two vehicles, with additional support from army trainees. It also has the best-developed facilities, including a modern visitor centre and outdoor ecological garden located on the rim of the makhtesh at Mizpe Ramon. A campground is available in the makhtesh along with hiking trails with interpretation displays (some in a state of disrepair). Additional interpretative trails are planned. Management is underpinned by strong science and research capacity, provided mainly by the Ramon Science Centre in Mizpe Ramon, attached to the Desert Research Institute of Ben Gurion University of the Negev. The Centre, which houses eight resident scientists, and up to six visiting scientists annually, has a high output of basic and applied research, including scientific protocols and guidelines for park management and ecological monitoring systems. Funding for park management is supplied by the State Government, and supplemented by grants from the Ministry of Tourism. There is excellent support from the local community through contact with the municipal councils, regional territorial authorities and entrepreneurs such as tourist operators.

There are no permanent residents in the makhteshim or surrounding nature reserves, but protection of the makhteshim is nonetheless subject to several internal and external pressures, though these appear to be under some degree of control. Visitor numbers are significant and growing, with more than 200,000 visitors annually to Makhtesh Ramon (80,000 at the visitor centre), but there is capacity to handle existing and projected numbers without compromising park values or visitor experience. The impact of mining is of greater concern. Currently there is mining of clay, sand, shale, gypsum and marble in Makhtesh Ramon and Makhtesh Gadol, and abandoned kaolin and bentonite mines remain in the former. Operating mines are being phased out progressively through a State ban on expansion of the mines and on exports, thereby eventually rendering mining operations uneconomic. Mine rehabilitation is required under State law, funded by taxes levied on the mining operations, and the parks authority has approval rights over the rehabilitation plans. The Makhteshim Country is a military training ground and firing range, but a Memorandum of Understanding between the park and military authorities prohibits activities in the makhteshim and limits damage in the nature reserves. Some grazing licences are held over reserve lands. Sealed highways traverse Makhtesh Gadol and Makhtesh Ramon, and the latter has communications facilities constructed on its rim.

5. ADDITIONAL COMMENTS

The nomination document briefly notes that the makhteshim are host to Israel's best preserved assemblages of flora and fauna. The area is of general ecological interest as it lies at a natural boundary between steppe and true desert ecoregions, and the same contrast is to be found locally within the 200-400m altitudinal range between the rim and the floor of the makhteshim. The resulting wide range of natural habitats produces a rich biodiversity; populations of some species are at their distributional limits. Scientists at the Ramon Science Centre consider that the separation between climatic and biogeographic zones in the Makhteshim Country is among the sharpest ecological discontinuities found anywhere in the world - especially for small rodents, lizards and invertebrates. Although the site is not nominated under natural criteria (ii) or (iv), they contend that the biological values of the makhteshim and surrounding areas are at least equal to the geological ones (however, IUCN was not able to examine this claim). Of the 101 papers published by the Centre in the past 15 years, two-thirds are on biological topics.

The Makhteshim Country contains some of the most important archaeological sites in the Negev. These include the cities of Avdat and Mamshit, founded by Nabateans and thriving during Roman and Byzantine occupation. They stood astride the ancient caravan routes (the so-called Spice Route) used to convey perfumes, spices and other merchandise from Arabia to Mediterranean ports and so to markets in Europe. Both cities are now protected as national parks. There are also the remains of ancient agricultural systems, utilising loess soils in the lower (synclinal) parts of the area; these include slope terracing and irrigation networks, evidence of sustained farming practices over some 3,000 years.

6. APPLICATION OF WORLD HERITAGE CRITERIA

The Makhteshim Country has been nominated under natural criteria (i) and (iii).

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

The five erosional basins are nominated as a serial site on the basis of their claim to outstanding geological significance. Vividly displaying their sedimentary origins and tectonic history, and with an array of associated volcanic structures and fluvial landforms, they represent more than 200 million years of geological evolution. As such, they are the subject of considerable scientific interest, and are popular tourist attractions.

The makhteshim are a specialised form of a widespread geological phenomenon - an eroded anticlinal ridge - found in mountainous regions all over the world. What distinguishes the makhteshim is a combination of geological and geomorphic circumstances. The precise conditions, and the formation of makhteshim in precisely their local form, are known only from southern Israel and from the Sinai (Makhtesh Hallal). Thus, makhteshim are unusual geological curiosities, whose development depends on a very specific set of pre-existing geological conditions and a complex geomorphological evolution. As such they are of local, even regional, interest, but IUCN contends they are not of outstanding universal value in World Heritage terms.

The makhteshim are also relict geological features, unrelated to present climatic or geomorphological conditions. They were formed essentially in Pliocene times, more than three million years ago, in a period of intensive tectonic and denudation activity relating to the opening and subsidence of the Dead Sea Rift Valley. Today the makhteshim are basically stable landforms subject to only minor geomorphic changes. In this respect, they are not representative of ongoing geological processes. IUCN considers that the nominated site does not meet this criterion.

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

The makhteshim are an important scenic attraction. By comparison with other World Heritage sites inscribed under criterion (iii), they are not globally exceptional in this respect. There are inspiring views, for example, from the visitor centre on the rim of Makhtesh Ramon, but the visual integrity is spoiled by the presence of a nearby communications (or radar) facility and a sealed highway which penetrates the cliff face and traverses the floor of the makhtesh. In the interior of the makhteshim are several mining operations that detract from the naturalness of the site. While conspicuous landforms, the makhteshim are elements in a broader rocky desert landscape which, in itself, also has great visual appeal. Thus, while the makhteshim are of undoubted scenic quality, they lack sufficient distinctiveness within their regional physiographic setting to be considered universally outstanding scenic features. IUCN considers that the nominated site does not meet this criterion.

Other Comments

As a serial nomination, it is appropriate also to consider the justification for this approach, whether the individual elements are functionally linked and contribute to the overall management framework for the sites, and if an overall management framework exists. In this case the considerations are met, as the complete "set" of makhteshim are included in the four parts of the nominated site and all are included under the same management arrangements. However, it should be noted that there are some integrity concerns, arising from the presence of mines, roads and other structures, which affect several of the individual areas. Also, while legal protection is good, the actual standards of management are variable across the nominated site.

7. RECOMMENDATION

That the Bureau does not recommend the inscription of the Makhteshim Country on the World Heritage list under criteria (i) and (iii).

IUCN understands that ICOMOS would be ready to consider favourably a new, more culturally-focused nomination. Such a nomination would contain important (but not outstanding universal) natural values.

WORLD HERITAGE NOMINATION – IUCN TECHNICAL EVALUATION

NATURAL SYSTEM OF "WRANGEL ISLAND" SANCTUARY (RUSSIAN FEDERATION)

Due to climatic reasons a mission to the site is only feasible in July/August. A report will be prepared for the December meeting of the Bureau.

WORLD HERITAGE NOMINATION – IUCN TECHNICAL EVALUATION

VOLCANOES OF KAMCHATKA (RUSSIAN FEDERATION) EXTENSION TO INCLUDE KLUCHEVSKOY NATURE PARK

Background Note: The "Volcanoes of Kamchatka" (VK) were inscribed on the World Heritage List in 1996 under natural criteria (i) (ii) and (iii). Five separate protected areas make up a serial site, which extends over a distance of 600km along the Kamchatka Peninsula and amounts to 7% of the total land area of the Peninsula. In the 1996 IUCN technical evaluation, the Kluchevskoy area was identified as a major natural feature that would significantly contribute to the rationale for the site. The local government of Kamchatka Oblast has acted to establish a Nature Park in the area and has documented its values in the extension proposal. This evaluation also addresses the request by the State Committee for Environmental Protection to list the site under an additional natural criterion (iv).

1. DOCUMENTATION

i) **IUCN/WCMC Data Sheet:** (3 references)

ii) **Additional Literature Consulted:** Simkin T. et. al. 1981. **Volcanoes of the World**, Smithsonian; Decker R. and B. **Volcanoes** Freeman; Francis P. 1993. **Volcanoes: A Planetary Perspective**. OUP; Bullard, F.M. 1973. **Volcanoes**. University Texas; Decker R. and B. 1991. **Mountains of Fire**. CUP; Krever V. et. al. 1994. **Conserving Russia's Biodiversity**. WWF; Stewart J.M. 1992. **The Nature of Russia**. Boxtree; Kirby E.S. 1971. **The Soviet Far East**. Macmillan; Berg L.S. 1950. **Natural Regions of Russia**. Macmillan; Newell J. and E. Wilson. 1996. **The Russian Far East**. FoE-Japan; Nechayev A. 1995. **Kamchatka**. Disentis; Morrow P. and B. 1994. Playing with Fire. **Equinox**. February; State of the Russian Federation for Environmental Protection, Memorandums on **Proposed addenda to Volcanoes of Kamchatka World Heritage Site**, 24 May, 2000; Satellite Atlas of the World (1998) Russian Volcanoes 1994 SIR-C radar image Published by National Geographic Society.

iii) **Consultations:** 8 external reviewers contacted. Regional Administration officials, Kamchatka Association of Greens, Institute of Volcanology, Institute of Ecology and Nature Management, Tourism and Park Development Project staff, WWF and GEF/UNDP officials.

iv) **Field Visits:** September, 1996. Jim Thorsell, J. Cassils.

2. SUMMARY OF NATURAL VALUES

Kluchevskoy Nature Park (KNP) was established in 1999 to protect and give recognition to conservation values of the Kluchevskaya group of volcanoes. This cluster of 12 volcanoes is located on the east-central part of the Kamchatka peninsula between the Bystrinsky Nature Park and Kronotsky National Park. The area of KNP is 376,000ha and it extends from 300m to 4,813m, the highest point in eastern Eurasia. Diverse volcanic features occur with many craters, lava fields and steam vents. Kluchevskoy is a classic "strato-volcano" and is one of the most active in the region exuding a flow of magma of 60 million tons/year. Over the past 300 years it has erupted explosively 73 times, most recently in 1976.

The KNP is the main centre of glaciation in Kamchatka with 47 glaciers covering 269km^2. Despite global trends of glacial retreat, several of these glaciers are advancing and interactions between glacial and volcanic activity are of high scientific interest.

The proposed addition to the existing VK site also has typical flora and fauna of the region. Vegetation is primarily rock birch, alder and larch on the lower slopes with sub-alpine meadows extending above 1,000m.

Faunal diversity is not high but brown bear, marmots, reindeer, snow buntings and crows all occur and are representative of the sub-arctic region.

With a rigorous climate, lack of road access, steep and unstable terrain, the landscape of KNP displays high scenic value and exists in an unmodified natural state. It is the dominant physical feature of the Peninsula.

Should the extension be approved, the total size of the site would increase by 10% to 3.67 mil.ha.

3. COMPARISONS WITH OTHER AREAS

The IUCN technical evaluation of VK in 1996 noted the eight World Heritage natural volcano sites that had been inscribed at that time and that over 1,300 active volcanoes existed on earth with a particular concentration around the "Pacific Rim of Fire". Since then an additional four sites have been added to the World Heritage List partially for their outstanding volcanic features (Aeolian Islands, Heard and MacDonald Islands, Morne Trois Pitons and Mount Kenya) which brings to 13 the total number of such sites.

The 1996 evaluation demonstrated that VK stand out more than any other existing World Heritage site as having the greatest variety of volcano types and set of associated volcanic phenomena. They also offered the most undisturbed and spectacular scenic features (lakes, coastline, wild rivers) and were some of the most thoroughly researched in the world. Additionally, the site contains a range of other biological values (see section 5 below). These combine to give this area a bio-geodiversity found in only a select few places in the world.

The proposal to add the KNP as the sixth unit in this serial nomination further strengthens and reinforces the outstanding universal value of this property by including the highest and most active volcanic and glacial features on the Peninsula. Its biological values are not as significant as several of the other components of the site as it does not contain salmon spawning rivers, lakes or coastline features. However, its geological features are more dramatic than those of the other five sites.

4. INTEGRITY

The 1996 technical evaluation of IUCN and subsequent monitoring reports on the site have outlined a number of threats facing different components of this serial site. These include the prospects of mining and road construction in the Bystrinsky park, a proposal for a geothermal facility near the Nalychevo park and poaching in the Southern Kamchatka reserves. Secondary issues of concern relating to the lack of management resources, staff and management plans were also outlined.

Although the threat of industrial developments and poaching still persists in parts of VK, the nominated KNP extension is not facing similar pressures. There are no settlements in the park and the regional population density is low. On the periphery of the park there has been some forest clearance and cutting of hay but these activities are very restricted in area and do not appear to affect its integrity. Tourism levels are very low (250 – 300 visitors/year).

The entire site is benefiting from several assistance projects through the European Union and the GEF. As KNP has only recently been created, it does not yet have a management plan nor any on-site visitor facilities. It does have a network of seismic stations and geological monitoring sites but because of its remoteness, inaccessibility and lack of any human pressure, it does not have resident park staff.

In summary, the proposed extension has several integrity problems in common with the other five units of the existing site. Nature conservation in the region is not a high priority for government at this point in time and management resources are very limited. On the positive side, there are no current threats to KNP and external assistance for conservation work is beginning to have effects.

5. ADDITIONAL COMMENTS

A parallel issue relating to the entire VK site is a request from the State Committee of the Russian Federation for Environmental Protection (memorandum of 24 May, 2000) for consideration of an additional criterion for the site

(criterion iv). The request is accompanied by considerable documentation supporting the case. This is a separate issue to the KNP extension proposal but it is timely to consider it at the same time and this is covered in section 6 below.

The Bureau should also note that a 'state of conservation' report for VK, as requested from the Russian authorities by the December 2000 Committee, has not yet been received.

6. APPLICATION OF WORLD HERITAGE CRITERIA

6.1Extension of VK to include KNP

The Kamchatka Volcanoes are one of the most outstanding volcanic regions in the world with both a high density of active volcanoes, a variety of types (Strombolian, Hawaiian, Pelean, Vesuvian and Plinian) as well as a full diversity of related volcanic features (geysers, mud pools, hot springs, calderas, mineralisation). The five sites that make up the original serial nomination collectively bring together many of the major volcanic features of the Peninsula. With the proposed extension of VK to include KNP as the sixth unit in the site, the highest and most active volcano is incorporated.

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

The proposed addition of KNP as the sixth component of the site further adds to the overall coverage of the range of Kamchatka's natural features. The nominated addition to the site clearly meets criterion (i) in its own right as an outstanding example of geological processes and landforms and therefore contributes in a very significant way to the expanded site as a whole meeting criterion (i).

Criterion (ii): Ecological processes

The proposed expanded site is also biologically analogous to six islands and its geographic location between a large continental landmass and the Pacific Ocean has given it unique characteristics. Natural processes continue with on-going volcanic activity and colonisation. The proposed KNP addition contributes significantly to the expanded site as a whole meeting criterion (ii).

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

The Kamchatka Volcanoes is a landscape of exceptional natural beauty with its large symmetrical volcanoes, lakes, wild rivers and spectacular coastline. It also contains superlative natural phenomena in the form of salmon spawning areas and major concentrations of wildlife (e.g. seabird colonies) along the coastal zone of the Bering Sea. The proposed KNP addition contributes very significantly to the site as a whole meeting criterion (iii).

6.2 Request for inscription of the VK under natural criterion (iv)

Criterion (iv): Biodiversity and threatened species

VK was inscribed in 1996 under natural criteria (i), (ii) and (iii). The case for the site also meeting criterion (iv) was not presented at the time. Further information relating to justification under criterion (iv) are as follows:

- The VK contains an especially diverse range of palearctic flora (including a number of nationally threatened species and at least 16 endemics).

- Although VK records only 33 mammal species, in the context of the northern palearctic biogeographic realm, this is high. A number of these are notable on the global level for the remarkable size of their populations. For instance, all species of sea mammals in the northern Pacific Ocean are found in the marine coastal component of the site including internationally significant populations of sea lions and sea otter (estimated number: 3,500 – 4,000). Kamchatka has a thriving population of brown bear (5,000+) of which over one-fifth live within VK. There are also good numbers of snow ram, sable and wolverine.

- 145 bird species have been recorded in the site, nine of which are globally threatened. Included are major birds of prey species such as the Stellar's Sea Eagle (50% of world population), white-tailed eagle, gyr falcon

and peregrine falcon which are attracted to the availability of spawning salmon. Large seabird colonies exist along the coast including over half the world population of Aleutian tern. Parts of VK also function as major migration staging areas for eastern palearctic migrants.

- The rivers inside and adjacent to VK contain the world's greatest known diversity of salmonid fish. All 11 species of Pacific salmon coexist in several of Kamchatka's rivers. Indeed, Kamchatka is the world's most important stronghold for native salmonid fish. With wild salmon declining rapidly throughout the Pacific Rim, the salmon runs in Kamchatka's wild rivers become especially important. The role that salmon play in the health of terrestrial and aquatic ecosystems is particularly well illustrated in Kurilsky Lake in VK.

For all of the above reasons, VK with its six separate components totalling 3.67 mil.ha. also merits inscription under natural criterion (iv).

7. RECOMMENDATIONS

That the Bureau recommend to the World Heritage Committee that:

1. Kluchevskoy Nature Park be added as the sixth component of the Volcanoes of Kamchatka's World Heritage Site;

2. In addition to the 1996 inscription under criteria (i), (ii), and (iii), the expanded site also qualifies under criterion (iv);

3. The authorities in Kamchatka should be commended for their efforts to compile management plans and to implement them with assistance from donors. UNDP/GEF should also be recognised for providing material support to the site;

WORLD HERITAGE NOMINATION – IUCN TECHNICAL EVALUATION

JUNGFRAU–ALETSCH–BIETSCHHORN (SWITZERLAND)

1. DOCUMENTATION

i) **IUCN/WCMC Data Sheet:** (12 references)

ii) **Additional Literature Consulted:** Chevallet, M.P. and K. Dullnig. 1991. Les Espaces Protégés de L'Arc Alpin. International Centre for Alpine Environments; Stone. P. 1992. **The State of The World's Mountains**. Zed Books; Reynolds K. ed. 1990. **The Mountains of Europe**. Oxford University Press; Price, M. 1995. **Mountain Research in Europe**. MAB Series, Vol. 14. Parthenon; Lieberman, M.. 1991. **The Alps**. Steward, Tabori and Chang; Esping, L.E. 1998. Potential Natural World Heritage Sites in Europe. Parks for Life Report; Hsu, K.J. 1995. **The Geology of Switzerland**. Princeton University Press; Messerli, B. & J. Ives. 1997. **Mountains of the World**. Parthenon; CIPRA. 1998. **Rapport sur l'état des Alpes**.

iii) **Consultations:** Meetings with Canton of Valais JAB Committee including mayors of communes, tourism representatives, NGOs and Minister of the Valais Cantonal Government; and Canton of Bern JAB Committee including commune mayors, tourism representatives, NGOs and Minister of Bern Cantonal Government; President – Patrons Committee.

iv) **Field Visit:** J. Thorsell and M. Price. March 2001

2. SUMMARY OF NATURAL VALUES

The Jungfrau-Aletsch-Bietschorn (JAB) region is located in the south central Swiss Alps midway between the cities of Brig and Interlaken. The site covers 54,000ha, 77% in the Canton of Valais and 23% in the Canton of Berne. Elevation ranges from 900m on the southern slopes to 4,274m on the summit of the Finsteraarhorn. Nine peaks in the site are higher than 4,000m.

The geology of the site derives from the "Helvetic nappe" (a large body of rock that was thrust over younger rock in Europe during the Miocene period). The folding and overthrusting of rock layers during the formation of the Alps, 20 – 40 million years ago, have produced very complex rock formations that have since been exposed by glacial activity. The summits of the Mönch and the Jungfrau, for example, consist of core crystalline rock that was overthrust on top of younger sedimentary limestone. In contrast, the Eiger, the peak located adjacent to the Jungfrau and the Mönch, is almost totally limestone. The physiography of the area is characterised by steep north-facing slopes and relatively gentle southern ones. The alpine crest acts as the watershed divide between the Rhine and Rhône rivers which respectively flow into the North Sea and the Mediterranean.

Classic examples of glacial phenomena occur in the site, such as U-shaped valleys, valley glaciers, cirques, horn peaks, and moraines. Of particular note is the Aletsch Glacier, the largest (128km^2), the longest (23km) and deepest (900m) in Europe. The Fiesch glacier is the third largest and second in length in Europe. The retreat of both has been carefully measured since 1892. A related feature is the Trummelbach canyon and waterfall where glacial runoff has formed a spectacular gorge.

Climate is strongly influenced by the dominant winds and orientation of the ranges. On the Bernese side, the climate is sub-oceanic, with higher annual precipitation (1,420mm at Grindelwald). The Valais side is sub-continental with annual precipitation of 758mm at Brig.

Vegetation and fauna are representative of the Alps and vary by slope, aspect and elevation. There is a marked difference in vegetation between the northern and southern slopes. On the north side, forests at lower elevations consist of broad-leaved species such as beech, ash, alder, elm and birch. The south side is too dry for beech,

which is replaced by Scots pine. On the northern side, the subalpine zone is dominated by Norway spruce with mountain ash, silver birch, and stone pine and, on the southern side, by more continental species, such as European larch on young soils. An especially interesting area of stone pine forest is found adjacent to the snout of the Aletsch glacier, where plant succession from the receding glacier has been studied for over 100 years. Above the treeline are extensive areas of rhododendron scrub, alpine grassland, and tundra vegetation and, on the xeric southern slopes, steppe grassland.

Fauna in the JAB region is typical of the Alps, with a wide variety of species including ibex, lynx, and red deer (all reintroduced), roe deer, chamois and marmot as well as several reptiles and amphibians (e.g. the Alpine salamander). A representative range of Alpine birds also occur, including Golden Eagle, Kestrel, Chough, Ptarmigan, Black Grouse, Snow Finch, Wallcreeper, Lammergeier, Pygmy Owl and various woodpecker species.

The Bernese and Valais Alps have been an international centre for alpine tourism and mountaineering since the 18th century. In contrast to its surroundings, the nominated area is accessible by road and cable lifts only up to its perimeter. The exception is the Jungfraujoch railway which was completed in 1912 and brings over 600,000 visitors annually to a confined viewpoint 4km inside the northern boundary of the site. A very small proportion of these enter the site by ski or foot, often using one or more of the 23 alpine huts in the area. There are no permanent human residents in the site except for maintenance staff at the Atmospheric Research Station located near the terminus of the Jungfraujoch railway. Some seasonally-occupied farms exist along the southern perimeter and in the Stechelberg valley in the north-west border of the site. Small numbers of sheep and cattle graze these alpine pastures in summer. Over 95% of the area exists in a natural state with no facilities except foot/ski trails and mountaineering huts.

3. COMPARISONS WITH OTHER AREAS

There are 46 areas inscribed on the World Heritage List in the various mountain ranges of the world. These include Huascaran National Park (Peru) which is generally accepted to encompass the most outstanding group of peaks in the Andes, and Sagarmatha National Park (Nepal) which represents "the best" of the Himalayan range. Similarly, the most outstanding portions of many other mountain ranges have been given World Heritage status (for example there is one site each in the Caucasus, Altai, Urals, Pyrenées, New Zealand Alps, St Elias Mountains and the Pacific Coast range). Three natural World Heritage sites are found in the Rocky Mountains of North America, a region larger than Europe which extends over 40 degrees of latitude.

Within the Alps, a region spanning 1,100km and seven countries, no natural World Heritage site has yet been inscribed. The Network of Alpine Protected Areas identifies over 300 protected areas within the Alpine Arc. Most of these are small nature reserves and regional parks (IUCN category V), which may have cultural landscape values but would not appear as likely candidates under World Heritage natural criteria. In the 1997 UN List of Protected Areas (IUCN/WCMC), there are seven areas listed in the Alps under IUCN categories I and II. The JAB region stands out from all of these and other mountains in the High Alps in having the following four qualities:

- The scenic and aesthetic appeal of the JAB region is one of the most dramatic of the Alps, as evidenced by the long history of international visitation to the area. The impressive northern wall of the site with the panorama of the Eiger, Mönch and Jungfrau mountains provides a 25km long signature classic view of the north face of the High Alps. There are a number of other impressive peaks such as the Finsteraarhorn, Aletschhorn, Breithorn and Bietschorn, as well as the extensive views of the Aletsch glacier basin from the Eggishorn ridge. The only other areas in the Alps that rivals the JAB region for sheer scenic splendour are in the Pennine Alps around the Matterhorn/Monte Rosa and Mont Blanc. Both these areas have been much altered by human activity and are not under protective status. High natural scenic values exist throughout the Alps but are most dramatically expressed in the JAB region.
- Glaciation within the JAB region is the most extensive in the Alps. The Aletsch is the largest glacier in Europe in terms of area (128km^2), length (23km), and depth (900m). For comparison, the longest glaciers on Mont-Blanc are less than 10km in length. The study of the Aletsch glacier began early in the 20th century and precise mass balance and runoff studies are on-going. Comparative studies on the fast-reacting small glaciers on the northern exposure have provided further indications of climatic change. Along with the extensive glacial cover of the area, an exceptionally wide suite of glacial features also occurs.

- The extensive glaciation and rugged topography found in the JAB region as well as protection measures which date back to 1933 have resulted in it being one of the most (if not the most) undisturbed natural areas in the Alps. The intact status of such a relatively large area within a long-occupied and intensively-used economic region is another distinctive feature of the site.

- For its record of productive scientific research on geology, geomorphology, climatic change, biology and atmospheric physics, the JAB region is unsurpassed in the Alps and, in certain fields, at the global level. Observations on some of the glaciers go back to the 12th century and have allowed reconstructions of historical fluctuations, particularly of the highly sensitive glaciers on the northern slopes of the site. The scientific importance of the area is also indicated by the selection of the Grindelwald and Aletsch areas as two of four study sites in the Swiss Alps for MAB programme studies in the period 1977 – 1989. As noted in a review of Mountain Research in Europe (Price, 1995), this programme was most productive and generated a substantial quantity of data with practical planning applications. The research station at the Jungfraujoch is one of a network of global sites studying astronomy, high-altitude atmospheric phenomena, radiation and air quality. The Centre for Nature Protection at Riederalp also has facilitated natural history research in the region. While other areas in the Alps and Pyrenées have been important areas for research, scientific activity in the JAB region has been particularly impressive, with a particular emphasis on monitoring and understanding glaciological, geomorphological, and ecological processes (criteria i and ii).

Although the site has not been nominated for its biological values (criterion iv) it does contain a wide range of species typical of the Alps. However, floral diversity is higher in the calcareous massifs of the western and Southern Alps where Mediterranean affinities are stronger. It is important to note, however, that the nominated area is much more than just glaciers and rocks. Almost 20% of the area is in the forest zone and these lower altitudinal belts contribute to the overall natural features of the site.

Global comparisons are difficult and would be most relevant with other sites in temperate glaciated high mountain systems. The closest comparison would be with the Western Caucasus World Heritage site which, although much larger, contains peaks of lesser elevation (3,360m at the highest) and a much lesser extent of glaciation (18sq.km). A comparison of the JAB region with the Khumbu-Everest region in the Himalaya helps illustrate the uniqueness of this much smaller region of the High Alps. The relative altitudinal difference from the last village at the boundary of the JAB region (Stechelberg) to the top of the Jungfrau is 3,000m over a distance of 5km. In the Everest region, the elevation difference between the last village Dingboche (4,358m) to Ama Dablam (6,828m) is about 2,500m. Dingboche's relative relief with Mt. Everest is 4,500m but this is over a distance of 14km. The relative elevation differences and gradients in the JAB region thus are quite substantial even compared with the highest range on Earth. Similarly, the 23km length of the Aletsch glacier is longer than the ice streams flowing from the Everest/Lhotse massif with its 17km Khumbu glacier, 16km Rongpu glacier and 8km long Lhotse glacier. Another comparison can be made with the Canadian Rockies World Heritage site where the relative relief of Mt. Robson to its base, 6km distant, is also about 3,000m. While there are other longer glaciers in temperate mountain regions, e.g., Karakorum, Pamirs, Rocky Mountains, the Aletsch rates high even on a world scale.

4. INTEGRITY

Although portions of the site have been under conservation management since 1933, the JAB region, as now defined, is a collection of different designations combined to form a single contiguous unit. Much work has been undertaken to develop a management structure since the World Heritage nomination document was submitted in July, 2000. This work is on-going but as of the field inspection in March, the early concerns of IUCN on management issues have been addressed as follows:

4.1. Legal Status

The legal basis for the JAB region is a heterogeneous mix of designations from all three levels of government. The communes which own most of the land in the site have various contracts and ordinances that provide strong guidelines on construction of roads and buildings and modification to the landscape. The two Cantons also have various ordinances that apply to portions of the site. At the national level, the entire site falls within the Federal Inventory of Sites of National Importance which requires that the Cantons and Communes give special attention to any development within the area. Additionally, the conservation NGO ProNatura is responsible for two portions of the site under lease agreements with the communes.

The end result of these various overlapping legal mechanisms is that the site has a range of measures that have kept it as an intact natural area to date. Recognising, however, that the various designations are complex and could benefit from a more coordinated approach, a process is now underway to prepare an integrated management plan. This will review the most effective options for protection legislation and suggest how the different jurisdictional responsibilities could best be harmonised. This process is expected to take 2-3 years and may also benefit from a review of protected area policy in Switzerland being conducted by the Swiss Academy of Natural Sciences. In the meantime, IUCN concludes that the existing legal basis is adequate to ensure that the site will not be affected by any activity inconsistent with its potential World Heritage status.

4.2. Management

Although the site is covered as part of regional plans by both Cantons, it does not have an integrated management plan. This is now being developed by a working committee and the planning process has commenced. The first product of this process is a "Management Guidelines" document which sets out the general objectives for the site and outlines the procedures to be followed in the preparation of the plan (which will take 2-3 years due to the intensive consultation process).

The current administrative structure which oversees and coordinates all the stakeholders in the area is given on the attached figure. This structure includes a high-level "patrons committee" (chaired by the former President of Switzerland). There also are two Cantonal committees, one in each Canton. These include the presidents of all 14 communes as well as representation from NGOs, media, the tourism sector and regional planning authorities. All have contributed to the budget for current activities.

4.3. Boundaries

The current delineation of the extent of the site was arrived at after intensive consultations, including formal voting procedures with the 14 local communities and other stakeholders. While encompassing the main features of this portion of the high Alps, several adjoining areas of high associated natural values were not included. These occur along the northeast, eastern and western boundary as well as adjacent to Riederalp. IUCN is aware that discussions over possible extensions to the site are being held and that these will take some time to mature. IUCN concludes that the current boundaries adequately cover the highlights of the area. However, further discussions during the management planning process will likely lead to some refinements.

4.4. Other Threats

The JAB region is little impacted by human use inside its boundaries except for some declining grazing and forestry activity along the southwest and northwest margins. Adjacent to parts of the site are tourist developments that, if expanded, could affect its aesthetic values . The nomination notes that an official buffer zone is not feasible or necessary as much of the site is bordered by steep topography, glaciers, or seasonally-used pastoral landscapes. While these reasons are evident, IUCN would suggest that the "pressure points" associated with downhill skiing facilities near or adjacent to parts of the site should be given particular attention in the management plan.

At a global level, climate change is certainly affecting the site as evidenced in the steady retreat of glaciers over the past century. As in all glaciated areas, this will have inevitable effects on glacial volumes and scenic attractions. This should be recognised as an ongoing geomorphological process (criterion i) of which the site provides an outstanding example.

5. ADDITIONAL COMMENTS

5.1. The preparation of this nomination is a model case study in the "bottom-up" approach. Due to the structure of the Swiss system in which most responsibility over land use is in the hands of local authorities (communes), decision-making begins at that level and then proceeds up through the Cantonal and then Federal levels. Support for the nomination at the local level was first registered in community votes in favour of proceeding with the nomination, followed by approvals by the Cantons before reaching the Federal authorities. The major benefit of such an approach is that local support for the site is assured.

5.2. Throughout the Alps there is a strong historical and cultural presence. The JAB region, while

predominantly natural, is surrounded by outstanding historical monuments and a harmonious cultural landscape. Indeed, where the site is not bordered by uninhabited precipitous topography, it abuts a landscape with a harmonious blend of pastoral uses, historical routes and small villages. The immediate regional land uses are carefully regulated and serve a *de facto* buffer function to the site.

5.3. The JAB region was one of two sites proposed as possible World Heritage nominations in the Alps at the June 2000 regional thematic expert meeting on potential natural sites in the Alps, held in Austria (the second being the Mont Blanc). This meeting noted the potential of cultural landscapes and generated a number of suggestions including the possibility of a serial site in the Alps. These discussions are evolving, but it is IUCN's view that the JAB nomination is clearly justified on its own merits as having the most outstanding combination of universally outstanding natural features in the region.

6. APPLICATION OF WORLD HERITAGE CRITERIA

The JAB has been nominated under natural criteria (i), (ii) and (iii). The rationale for inscription of each is as follows:

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

The JAB region provides an outstanding example of the formation of the High Alps which resulted from uplift and compression during the Tertiary geological period 20-40 million years ago. Within an altitude range from 900m to 4,274m, the region displays 400 million year old crystalline rocks thrust over the younger autochthonous (rocks formed *in situ*) calcareous sediments due to the northward drift of the African tectonic plate. Added to the dramatic record of the processes of mountain building is the great variety of geomorphic and glaciological features found in the site. Classic examples of U-shaped glacial valleys, cirques, horn peaks, valley glaciers and moraines are found in abundance. The JAB region is the most glaciated area in the Alps and incorporates the Aletsch glacier, the largest and longest in western Eurasia. It is thus of significant scientific interest in the context of glacial history and ongoing processes, particularly related to climate change. IUCN considers that the site meets criterion (i).

Criterion (ii): Ecological processes

Within its altitudinal range and its dry southern/wet northern exposures, the JAB region 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 in the absence of significant human intervention. Superb examples of ecological succession exist, including the distinctive upper and lower treeline 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, in turn providing new substrates for ongoing ecological succession. IUCN considers that the site meets criterion (ii).

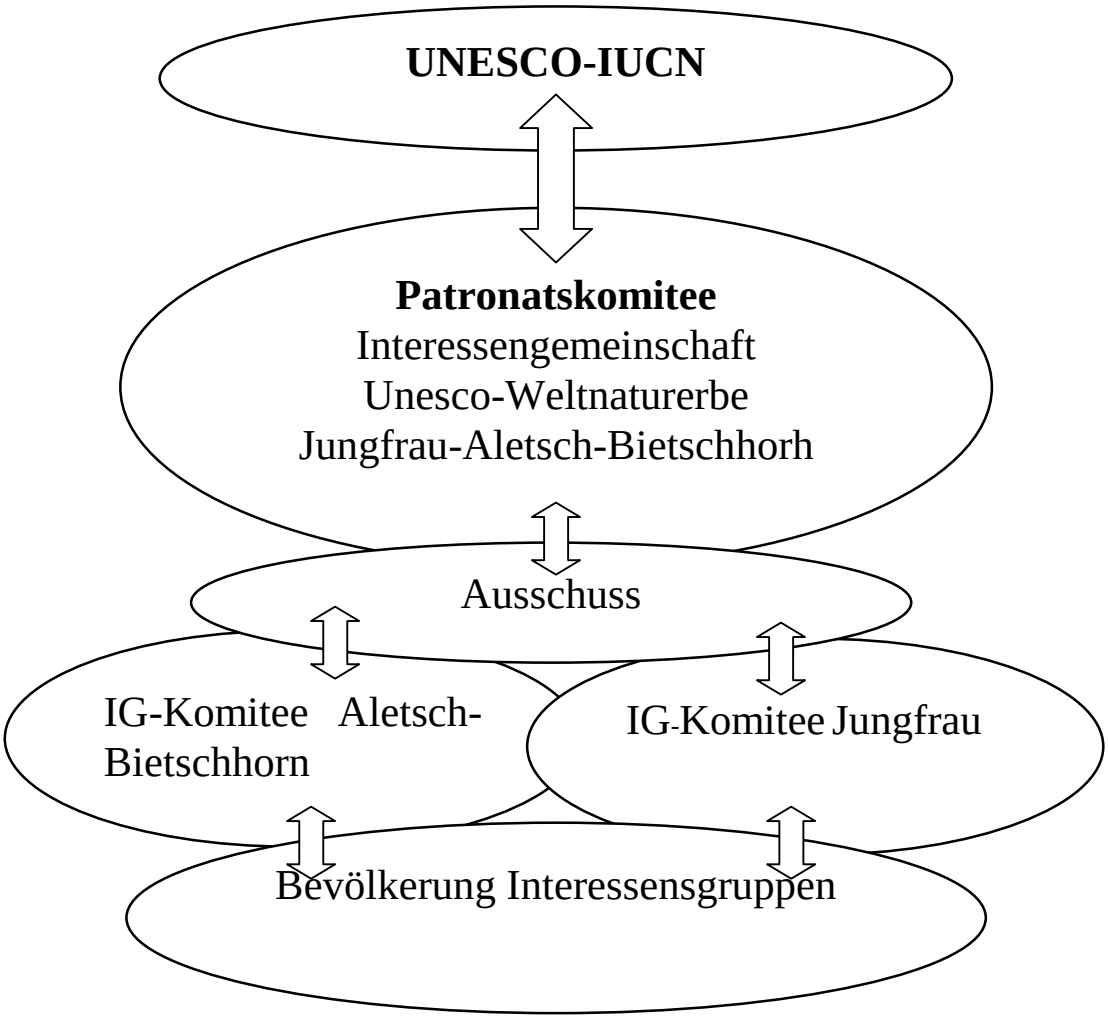
Criterion (iii): Superlative natural phenomena or natural beauty and aesthetic importance

The impressive landscape of the JAB region has played an important role in European literature, art, mountaineering and alpine tourism. The aesthetics of the area have attracted an international clientele and it is globally recognised as one of the most spectacular mountain regions to visit. The impressive north wall of the High Alps, centred around the Eiger/Mönch/Jungfrau and extending 20km in length, is a superlative scenic feature. On the southern side of the alpine divide, tectonic forces and glacial erosion have resulted in a collection of spectacular peaks and a valley system which supports the two longest glaciers in western Eurasia. IUCN considers that the site meets criterion (iii).

7. RECOMMENDATIONS

That the Bureau recommend to the Committee that the Jungfrau-Aletsch-Bietschorn be inscribed on the World Heritage List under natural criteria i, ii, and iii. The Bureau should encourage the Swiss authorities in their preparation of a management plan which, when completed, may also lead to modifications and extension to the boundaries. A mission to report on progress with the plan and to review any boundary changes should be suggested in two years time.

STRUCTURE OF THE COMMUNITY OF INTEREST



WORLD HERITAGE NOMINATION – IUCN TECHNICAL EVALUATION

HOLY TOPS (SVYATI GORY) (UKRAINE)

POLISSIAN SWAMPS AND SLOVECHNO-OVRUCH RIDGE (UKRAINE)

KENIT'S HILL (UKRAINE)

KARADAG (UKRAINE)

PODILLIAM RIDGE (UKRAINE)

The field inspection for these site is scheduled for April 2001.

The evaluation report will be included in a supplementary report for the June 2001 Bureau meeting.

WORLD HERITAGE NOMINATION – IUCN TECHNICAL EVALUATION

DORSET AND EAST DEVON COAST (UNITED KINGDOM)

1. DOCUMENTATION

i) **WCMC Data sheet:** (19 references)

ii) **Additional literature consulted:** Goudie, A. and Brunsden, D. 1997. **Classic Landforms of the East Dorset Coast**. The Geographical Association, Sheffield; and Ellis, N.V et al. (Eds.). 1996. **An Introduction to the Geological Conservation Review**. Joint Nature Conservation Committee, Peterborough.

iii) **Consultations:** 2 external reviewers contacted; relevant officials from government, protected area agencies, and public institutions; private estate owners; geological associations; tourist operators; and other interest groups.

iv) **Field visit:** February-March, 2001. Paul Dingwall,

2. SUMMARY OF NATURAL VALUES

Located on the south coast of Britain, the nominated property comprises eight sections along 155km of largely undeveloped coast and countryside between Orcombe Rocks, near Exmouth in east Devon in the west, and Studland Bay, Dorset, in the east. The total area of the site is 2,550ha, 80% of which is cliffed coastline. The property has a combination of internationally renowned geological features considered by both palaeontologists and geomorphologists to be one of the most significant research sites for their respective fields of study in the world. The nominated site includes a near-continuous sequence of Triassic, Jurassic and Cretaceous rock exposures, representing almost the entire Mesozoic Era (between 251 and 66 million years ago), or approximately 185 million years of Earth history. The Triassic succession of mudstones and sandstones is over 1,100m thick, representing 50 million years of deposition. The sequence of Jurassic strata exposed between Lyme Regis and Swanage is among the best sections of marine Jurassic-age rocks to be found anywhere in the world. All stages of the Cretaceous are represented with the exception of the very youngest.

The nominated site contains a range of internationally important Mesozoic fossil localities, including Lyme Regis, Kimmeridge Bay, the Isles of Portland and Purbeck, Durlston Bay, High Peak, Otter Point, Furzy Cliff (Weymouth), Charmouth and Axmouth. Great numbers of vertebrate, invertebrate and plant fossils have been discovered, along with fossil dinosaur footprints in quarries near Swanage. Examples of significant palaeontological discoveries not known from elsewhere include *Dimorphodon macronyx,* one of the earliest flying reptiles, and *Scelidosaurus harrisoni,* the "Charmouth dinosaur". Important among the marine reptiles are *Temnodontosaurus,* ichthyosaurs, *and Metriacanthosaurus parkeri.* The area has yielded a rich source of ammonites such as *Asteroceras obtusum, Parkinsonia parkinsoni* and *Titanites anguiformis,* which have been used to zone the Jurassic. Well preserved remains of a late Jurassic fossil forest, estimated to be more than 140 million years old, are exposed on the Isle of Portland and the Purbeck coast: many trees are preserved *in situ* with their associated soils and pollen, a boon for palaeoecologists.

In terms of the site's geomorphological significance, a great variety of landslides have formed, some of which, such as those at Bindon, Black Ven, Hooken, East Weares and Kings Pier, are scientifically important throughout Europe. The long history of scientific study of these mass-movement systems is such that these formations have become, literally and figuratively, 'textbook' examples. The site is also renowned for the study of beach formation and evolution on a retreating coastline. Chesil Beach, stretching from West Bay to Portland, is one of the best-studied beaches in the world. The beach is famous for the volume, type and grading of pebbles. The 480ha Fleet Lagoon, enclosed by Chesil Beach, is one of the most important saline lagoons in Europe, its sediments providing evidence of late Holocene beach evolution, and changes in sea level, climate and vegetation.

Chesil Beach and the Fleet is an outstanding example of a barrier beach and lagoon system, protected by several national and European designations. The Isle of Purbeck is notable for its well developed coastal landforms, including cave-bay sequences and textbook examples of bays, stacks, and rock arches at Lulworth Cove, Durdle Door and Old Harry Rocks.

In addition to the site's palaeontological and geomorphological significance, important coastal vegetation habitats occur in the nominated area, such as the landslipped cliffs and cliff-top grasslands of W. Dorset, that support several rare plant species of national and European importance and parts of the nominated coast are protected under international designation. The Exe Estuary Special Protection Area (SPA), a Ramsar wetland, supports over 20,000 migratory wildfowl, including internationally important populations of avocet, dark-bellied brent goose and slavonian grebe. The Sidmouth to Beer Coast SSSI (Site of Special Scientific Interest) protects the westernmost example of species-rich grassland in England, with a very diverse invertebrate fauna. The Lyme Bay reefs provide one of the most easterly locations for several Mediterranean-Atlantic plants species, such as the pink seafan *Eunicella verrucos,* and has rich epifauna, especially sponges.

3. COMPARISON WITH OTHER GEOLOGICAL SITES

The site is significant in terms of geological history, palaeontology, geomorphology and the history of geological and related sciences.

In terms of geology, the Dorset and East Devon Coast is one of Britain's most significant areas, and one of two mainland sites nominated for its geology on the U.K. World Heritage tentative list. The area includes 67 nationally and internationally recognised localities in the statutory Geological Conservation Review. While sites representing the same geological time period are found throughout the world, there is no better example anywhere of a complete succession through the Mesozoic Era, a period of 185 million years. Among prominent geological World Heritage sites, Istchigualasto-Talampaya in Argentina and Canada's Dinosaur Provincial Park represent the Triassic and late Cretaceous respectively, but no site currently on the World Heritage list contains the complete Mesozoic succession. The nominated site also represents an exceptionally well-documented sedimentary basin, now one of the best-known and oft-studied of its type in the world. Only Australia's Sydney and Gippsland Basins, and the western flank of the Basin and Range Province in North America, are similar, but none is extensively protected.

In terms of palaeontology, the nomination document includes a comprehensive comparative analysis in which 12 selected fossil sites or interests are rated against the IUCN criteria for establishing the outstanding universal value of fossil sites (pp. 36-37). The results clearly demonstrate the global significance of the Dorset and East Devon sites in all rated categories, particularly in terms of the long geological time period represented; the diversity of fossil assemblages; the international significance of sites (all 12 are assessed as internationally important); and the quality of preservation of specimens, with some complete and well-articulated skeletons, three-dimensional and soft-part preservation and the presence of finely detailed plants and wood structures. The Lyme Regis (Lower Jurassic) and Purbeck Group formations (Lower Cretaceous) are the most significant fossil sites; specimens from them are found throughout the world's museums.

In terms of geomorphology, the landslides here are internationally recognized, comparable with those of the Black Sea Coast and New Zealand, which are also internationally renowned. The Bindon landslide complex, protected in the Lyme Regis to Axmouth Undercliffs National Nature Reserve, was the first to be fully described in a scientific memoir. Black Ven is the largest mudslide complex in Europe. No beach in the world is known to have been as intensively studied as Chesil Beach, and there are few that exhibit the exceptional degree of grading of the size of its sediments along the shore. The juxtaposition of concordant and discordant coastlines (i.e. those aligned with and against the grain of the geological structure) within the same geological strata, as found on this coast, is rare on a global scale.

The nominated area also has an internationally unique status in the history of geological science. Regarded for more than 200 years as among the best available research sites anywhere for geological inquiry, the resulting prodigious output of research, published in thousands of scientific papers, has fundamentally shaped the development of geological thinking. Its role in this respect continues today.

4. INTEGRITY

Site integrity

The nominated site contains all the key, interdependent elements of geological succession exposed on the coastline. It has an almost complete representation of Triassic, Jurassic and Cretaceous rocks, all within a single sedimentary basin. Regional tilting of the structures to the east means that a walk from west to east along the coast is an almost unbroken "journey" through 185 million years of geological time. The stratigraphy represents a wide range of both marine and terrestrial depositional environments and a full range of sedimentary rock types. The array of fossil faunas and floras show interrelated elements of the prehistoric record of life and environments. The site includes a series of coastal landforms whose processes and evolutionary conditions are little impacted by human activity. The boundary of the site is defined by natural phenomena: on the seaward side the site extends to the mean low water mark and on the landward side to the cliff top or back of the beach. This is also in general consistent with the boundaries of the nationally designated areas that protect the site.

The high rate of erosion and mass movement in the area creates a very dynamic coastline; the boundaries of the site, therefore, may need periodic monitoring to ensure that significant changes to the shoreline are reflected in revised boundaries.

Management integrity

The nominated site lies almost entirely within two areas designated under national conservation legislation as Areas of Outstanding Natural Beauty (IUCN Category V Protected Landscape/Seascape). Also protected under national law are thirteen SSSIs, and a large National Nature Reserve (IUCN Category IV). The site also contains areas designated as being of international importance for wildlife, either as a Special Conservation Area or SPA under European Community Directories. Chesil Beach/the Fleet and Exe Estuary are designated as a Ramsar Wetland of International Importance.

An estimated 95km of the 155km of coastline in the nominated site are owned by public bodies, conservation agencies or large private estates. While most of the site is in private ownership, mainly within four large estates, the National Trust, a major U.K. conservation charity, owns about 35km of coastline. Smaller areas are owned by County and District Councils and by the Ministry of Defence, which uses 5km of coast as the Lulworth Gunnery Ranges: the Ministry's management of this area is subject to conservation policies set out in a management plan. Privately owned SSSIs have management oversight from the English Nature agency. The bed of the Fleet lagoon and part of Chesil Beach are owned by the Ilchester Estates and managed as a local nature reserve. There are two commercially owned landholdings on the Isle of Portland.

The nominated property is currently extensively protected by a variety of designations and a range of land use and protected area management plans. A single management plan has been prepared for the nominated site, coordinated by the Dorset and Devon County Councils. The plan, which has undergone public consultation, has six prime objectives relating to the protection of the geology and landforms, conservation and enhancement of landscapes and seascapes, and visitor management and education. Significantly, emphasis is given to integrating World Heritage management with wider sustainable development objectives in the counties. Management plans for existing areas inside the nominated property: they include county development plans, local district plans, mineral and waste management plans, shoreline management plans and Environment Agency river catchment plans. The National Trust maintains plans for management of wildlife, landscape, and visitor use of its properties; all its sites are inalienably conserved for the benefit of the public. Wildlife Trust reserves, National Nature Reserve, and military lands all have management plans.

Many people are employed by landowners and agencies to undertake management operations in sites within the nominated area. More than 40 wardens and rangers are employed by the two county councils, the E. Devon and Purbeck District Councils, English Nature, the National Trust, Ilchester and Lulworth Estates and the Dorset Wildlife Trust. Two new positions - geological coordinator and tourism officer - are envisaged if World Heritage status is achieved. Management of the area is well funded on a partnership basis with more that £500,000 provided annually for staff budgets of current employees, excluding professional staff such as local government planners and tourism officers. There are many well developed and professionally managed information centres, museums, accommodation and transport facilities, and other services available to visitors. Public access to the beaches and cliff tops is available via public rights of way and permissive paths. The South-West Coastal path, one of 13 nationally designated trails, extends through part of the site. Excellent marine search and rescue

facilities are located at several sites in the area. The research capacity underpinning protected area management, provided from regional and national scientific institutions, is substantial.

Only about ten people live permanently in the nominated site, though there are some seasonally occupied beach huts and holiday chalets. The population in gateway towns is estimated at less than 200,000. The area has been a popular tourist destination since the 18th Century, and about 14 million people, mostly day-trippers, visit the nominated site and adjacent coastal areas annually. There are currently few significant threats to the site. A vigilant regime of active management will address important issues such as path erosion, and vegetation and wildlife disturbance. A voluntary code of conduct has been developed to help manage the collection of fossils by amateur and professional collectors. Two sites lie within areas where there are permissions for mineral extraction, but the local authorities believe neither will be reactivated. Coastal defence works are required in places but they are not overly intrusive on site values.

In summary, IUCN believes this nominated site has strong legal protection and is managed effectively for long-term preservation of its natural geological values. It thus meets the conditions of management integrity.

5. ADDITIONAL COMMENTS

None.

6. APPLICATION OF WORLD HERITAGE NATURAL CRITERIA

Dorset and East Devon Coast is nominated in accordance with World Heritage natural criteria (i) and (iii).

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

In relation to this criterion, the site's claim to outstanding universal value is based on the following significant values:

- The coastal exposures within the site provide an almost continuous sequence of Triassic, Jurassic and Cretaceous rock formations spanning the Mesozoic Era and document approximately 185 million years of Earth history;

- The site includes a range of internationally important fossil localities – both vertebrate and invertebrate, marine and terrestrial - which have produced well preserved and diverse evidence of life during Mesozoic times;

- The site contains a range of textbook exemplars of coastal geomorphological features, landforms and processes;

- The site is renowned for its contribution to earth science investigations for over 300 years, and has helped foster major contributions to many aspects of geology, palaeontology and geomorphology; and

- The site has continuing significance for many aspects of earth science research and is a high quality teaching and training resource for the earth sciences.

Critical examination of these elements, complemented by field inspection, discussions with protected area managers and scientists, and consideration of the views of independent reviewers and prominent scientists who have written in support of the nomination, lead to the conclusion that these claims can be fully substantiated. The site is also unlike any other geological site currently accorded World Heritage status, and it has both a scientific and conservation significance ranking it among these existing sites. IUCN considers that the nominated site meets this criterion**.**

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

The nominated property is a substantially natural coastline in a setting of attractive rural landscapes and associated seascapes. Most of the site is designated as nationally significant in terms of its scenic qualities (e.g.,

as Areas of Outstanding Natural Beauty and Heritage Coasts). The attractiveness of the site derives in particular from the classically developed landforms, whose scenic qualities are enhanced by the close association of a great diversity of landforms in a relatively confined area. Component materials of the landforms also have aesthetic appeal: stone quarried from Purbeck, Portland and Beer has been used in the construction of many great buildings in Britain, some of which (e.g., the Tower of London) are themselves World Heritage cultural sites. Moreover, the landscapes have inspired a number of authors, poets and artists of international renown, adding to the rich legacy of cultural associations with the site.

However, when compared to existing World Heritage sites fulfilling the criterion, IUCN considers that Dorset and East Devon Coast is of national importance rather than of outstanding universal value. IUCN considers that the nominated site does not meet this criterion.

7. RECOMMENDATION

That the Dorset and East Devon Coast site be **inscribed** on the World Heritage List under natural criterion (i).

C.2. Afrotropical Realm

WORLD HERITAGE NOMINATION – IUCN TECHNICAL EVALUATION

GREAT RIFT VALLEY ECOSYSTEM SITES (KENYA)

A) RIFT VALLEY LAKE RESERVES

Background Note: The nomination being evaluated here is a reformulated version of the initial "Great Rift Valley Ecosystems" that Kenya submitted in July, 2000. The original nomination was for a much larger area which was put forward under natural and cultural criteria. Subsequent to the IUCN field inspection, the Kenyan authorities decided to submit a revised nomination that focuses on three Rift Valley lakes (natural criteria) as well as an extension to the existing Sibiloi/Central Island site (letter to Director of the World Heritage Centre from Director of Kenya Wildlife Service, 25 March, 2001).

1. DOCUMENTATION

i) **IUCN/WCMC Data Sheet:** (10 references)

ii) **Additional Literature Consulted:** McClanahan, T.R. and T.P. Young. 1996. **East African Ecosystems and their Conservation**. OUP; Brown, L. 1971**. East African Mountains and Lakes**. EA Publishing. 122p; Brown, L. 1981. **Africa – A Natural History**; Howard G.W. (ed.) 1997. Conservation of the Lesser Flamingo in E. Africa. Workshop Proceedings. 120p; Engoke, J. 2000. Proposed Integrated Conservation and Development Plan for Lake Bogoia. 28p.; KWS. 2001. Lake Nakuru National Park Integrated Management Plan. Draft 68p.; Njuguna, S. 2000. Conservation and Sustainable Use of Biodiversity in the East Rift Valley Lakes. GEF Report.; Vaucher, C.A. 1973. **Nakuru – Lake of a Million Flamingos**. WWF.; Kear, J. and N. Duplaix-Hall. 1975 **Flamingos**. The Wildlife Trust; Makenzi, P et.al. 2000. Impact of Human Activities on Landscapes and Natural Resources of the Great Rift Valley Lakes. GEF report. 49p.; Myers, N. 1974. The Ecologic/Socioeconomic Interface of Wildlife Conservation in Emergent Africa: Lakes Nakuru and Nawarla. **J. Env. Econ. and Mangt**. + 319-334; Bishop, W.W. 1978. **Geological Background to Fossil Man**. Research in the Gregory Rift Valley. University of Toronto Press; Bennun, L & P. Njorage. 1999. **Important Bird Areas of Kenya**. Birdlife International.

iii) **Consultations:** 5 external reviewers contacted**,** Officials from Kenya Wildlife Service, resident park wardens, IUCN Eastern Africa office staff.

iv) **Field Visit:** February, 2001, Jim Thorsell.

2. SUMMARY OF NATURAL VALUES

The nominated site consists of three separate reserves located in the floor of the Rift Valley: Lake Bogoria National Reserve (10,700ha.); Lake Nakuru National Park (18,800ha.) and Lake Elmenteita Reserve (6,300ha.). All three lakes are shallow, alkaline and endorheic (a lake with no surface outlet). All three lakes are included among the sixty "Important Bird Areas of Kenya" by Birdlife International.

Lake Bogoria National Reserve was gazetted in 1981 and includes the entire lake and it surroundings. The Siracho escarpment rises abruptly from the lakeshore, while on the relatively flat western shore is a series of hot springs and geysers. Terrestrial vegetation is primarily thorny bushland dominated by Acacia, figs, combretum thicket and alkaline-tolerant grasslands. The lake supports a dense growth of green algae (*Spirulina platensis*) which, in turn, is a key feeding ground for the itinerant Rift Valley population of Lesser Flamingos. Congregations of up to 2 million birds have been counted. Three hundred and fifty other bird species also occur as well as a range of typical savannah woodland fauna. The area is known especially for a healthy population of Greater Kudu and also as a staging area for Steppe Eagle as they prepare to migrate to northern Europe.

Lake Nakuru National Park is centred on a very shallow, strongly alkaline lake, with surrounding woodland and grassland. The lake catchment is bounded by Menengai Crater to the north, the Bahati Hills to the north-east, the Lion Hill ranges to the east, Eburu Crater to the south and the Mau escarpment to the west. Nakuru was first gazetted as a bird sanctuary in 1960 and upgraded to National Park status in 1968. A northern extension to the park was added in 1974. The foundation of the lake's simple food chain is the cyanophyte *Spirulina platensis*, which often occurs as a unialgal bloom. At such times it can support huge numbers of Lesser Flamingos. A small introduced tilapia fish supports a number of secondary consumers. The lake shores are mainly open alkaline mud, with areas of sedge and marsh around the river inflows and springs, giving way to grassland and a belt of Acacia woodland. Rocky hillsides on the park's eastern perimeter area are covered with scrub and *Euphorbia* forest.

Nakuru is internationally famous for its populations of Lesser Flamingo; numbers can reach 1.5 million at times, though drastic and unpredictable fluctuations occur. Nakuru is a very important feeding site for this species but attempts by flamingos to breed here have not been successful. Other waterbirds have increased considerably in numbers and diversity since the introduction of fish in 1961. At times Nakuru is a major feeding ground for Great White Pelicans, which nest on rocky islets in nearby Lake Elmenteita and move to Nakuru daily to feed. Large numbers of Palaearctic waders winter at Nakuru or use the site on passage, and Nakuru (at least in the past) has been a key site in the eastern Rift Valley flyway. Nakuru is rich in birds with 480 species recorded. The park is fenced completely and has a wide range of typical African species such as black rhino (50), white rhino (40), Rothschilds giraffe, lion, leopard, and large numbers of waterbuck, gazelles and Cape buffalo.

Elmenteita is a shallow alkaline lake (maximum depth 1.9m) on the Rift Valley floor some 20km south-east of Nakuru town. It is fed by hot springs at its southern end, and two small streams, the Mereroni and Kariandusi, flowing from the eastern plateau. The surrounding landscape is characterised by dramatic rocky faults, volcanic outcrops and cones. Rainfall is erratic and less than 600mm on average per year. To the east, the lake is flanked by small-scale agriculture, while several large ranches surround the remainder. The northern and south-eastern lakeshores are open and flat, a spectacular cliff rises to the north-east, and the western shores are broken and rocky. The natural vegetation is mainly Acacia bushland interspersed with *Themeda* grassland. Patches of *Acacia xanthophloea* woodland occur near the shore, and formerly covered a large area south of the lake. The lake consistently has internationally important populations of Greater and Lesser Flamingo and Pied Avocet (according to BirdLife International (1999). At least 49 waterbird species are recorded, including 10 Palaearctic migrants. Although it lacks fish, except in the peripheral hot springs, Elmenteita at times is also host to large numbers of Great White Pelicans. Up to 8,000 pairs have bred there when water levels are high and rocky outcrops in the eastern sector are flooded to form islets, on which the birds can safely nest. The pelicans move daily to Lake Nakuru to feed. Greater Flamingos have also bred at Elmenteita in the past, but have been displaced by pelicans in recent years. The adjacent woodland and bushland feature over 400 species of birds.

3. COMPARISONS WITH OTHER AREAS

Within the Great Rift Valley of eastern Africa there are over 300 protected areas (WCMC Database). A number of these centre around alkaline endorheic lakes such as Lake Manyara National Park in Tanzania. Existing World Heritage sites that are found in the Rift Valley (including both the eastern and western rifts) are: Lake Malawi, Virunga, and Sibiloi/Central Island National Parks. Others exist near the Rift but these are the only three within or partially within it. The lakes in Virunga and Malawi are freshwater while Sibiloi/Central Island National Parks are part of Lake Turkara, an alkaline but very deep lake in northern Kenya.

The soda (alkaline) lakes in the Rift Valley of eastern Africa are among the world's most productive natural ecosystems (McClanahan and Young. 1996). A conspicuous feature of these lakes are enormous flocks of lesser flamingos feeding on thick green suspensions of blue-green algae. Flamingos exist elsewhere in Africa (Ethiopia, Namibia, South Africa, Uganda) but in nowhere near the concentrations found with the nominated sites, with the exception of Lake Natron in Tanzania during breeding season. The main soda lakes in the region are the three nominated sites as well as Magadi and Logipi in Kenya; Natron and Eyasi in Tanzania and Langano Awass and Abiata-Shala in Ethiopia. The three nominated lakes – Bogoria, Nakuru and Elmenteita are considered the most diverse and most natural and support the largest and most diverse bird populations.

In conclusion, the soda lakes (in contrast to saline lakes) of the Rift Valley of Africa "…are of extraordinary interest and are biologically unique; there is nothing quite like them in the world" (L. Brown, 1971). Within the

relatively small size (36,000ha. in total) exists one of the most diverse and spectacular avifaunal assemblages in the world. As summarised more recently in an overview of the soda lakes of the Rift Valley: "Soda lakes in the Rift Valley of eastern Africa are among the world's most productive natural ecosystems. A conspicuous feature of these lakes are enormous flocks of lesser flamingos grazing on the thick green suspensions of algae. In contrast to such prolific biological activity are the harsh physical and chemical conditions and a depauperate fauna". (J.M. Melack in **East African Ecosystems and their Conservation**. McClanahan and Young eds. 1996)

4. INTEGRITY

4.1. Legal Protection

Each of the three sites is under a different form of protection: Lake Nakuru is a National Park (managed at the national level by the Kenya Wildlife Service); Lake Bogoria is a National Reserve (managed by two local County Councils but under national policy set by Kenya Wildlife Service; and Lake Elmenteita consists of the existing Soysambu Wildlife Sanctuary (private land) also managed under the national policy set by Kenya Wildlife Service and the lake itself which is awaiting gazettement as an addition to Soysambu. Although National Park status for all three sites would be a more ideal form of protection, existing realities of local grazing rights and private land justify the reserve designations for Bogoria and Elmenteita. Nakuru is also a Ramsar site and Bogoria has been proposed.

4.2. Management

Both Nakuru and Bogoria have resident wardens in charge with a sufficient budget and complement of staff. A new management plan for Nakuru is nearing completion and an initial draft has been prepared for Bogoria. Elmenteita does not have a staff person directly responsible as most of the area is under private ownership (except the lake surface which is owned by the government). A local landowners association, however, provides a local management structure and entry is closely controlled. The only exceptions here are some soda and salt extraction (done by hand) along the northwestern shore and grazing by nomadic pastoralists in the south. Preparation of a management plan for the site is in the early stages.

There is no single management authority for the three components of the nomination nor is there a particular need for one as all are under general supervision of the Kenya Wildlife Service in cooperation with three District Councils.

4.3. Boundaries and Justification

Individually each of the three sites has particular and closely related natural values. The lake levels fluctuate greatly and there are strong migratory connections between each of the sites even on a daily basis. All three are thus strongly linked in what could be referred to as a "flamingo system" after the dominant species using the lakes. One major missing link in this system is Lake Natron in Tanzania, the breeding location for the entire flamingo population of up to four million birds. In terms of Conditions of Integrity iv which notes that seasonal breeding and nesting sites for migratory species should be protected, Lake Natron should ideally be nominated for inclusion as part of this serial site . The Kenyan authorities have written the Director of the World Heritage Centre (26 Feb, 2001) to note that "discussions with Tanzania will also be initiated on the protection measures at Lake Natron and the possibility of incorporating that site in future to form a transboundary World Heritage within the Rift Valley Lakes". Meanwhile, Tanzania is considering putting forward Natron as a Ramsar site. Other lakes of secondary but significant importance for flamingos in Kenya are Magadi and Logipi. Neither of these lakes are protected and there are no current proposals to do so. In neither case is birdlife threatened.

4.4. Threats

As evident from the pronounced shifts in species composition and abundance that have occurred in response to natural water level variations, the ecology of the shallow soda lakes is particularly sensitive to hydrologic changes. Although each of the lakes faces a range of management issues, Bogoria and Elmenteita do not face serious threats. In contrast, Nakuru National Park has long been an area where conservation has been in conflict with development. Nakuru is an important and expanding agricultural and industrial centre. It is also a major tourist attraction, with up to 300,000 foreign and local visitors per year. Lake Nakuru town is an important industrial and agricultural centre (500,000 people) whose growth directly affects the lake. Three major rivers, the

Njoro, Makalia and Enderit, drain into the lake, together with treated water from the town's sewage works and the outflow from several springs along the shore.Until recently, treatment of waste water entering the lake from the town was inadequate. An expanded sewage treatment works is now in operation but concerns about industrial pollution and surface runoff persist. The Lake Nakuru Conservation and Development Project, supported by WWF, has been working for some years to improve urban environmental standards and encourage sustainable land-use in the catchment. Nearly half the catchment is now under cultivation, and river flows have reduced markedly while silt loads have risen. This problem will be exacerbated by recent deforestation in the Eastern Mau Forest Reserve which provides the catchment for much of Nakuru's water. Encroachment and settlement in this forest (reportedly by as many as 28,000 people) needs to be reversed and natural vegetation allowed to regenerate, or the lake may have little future.

The lake's ecology, though relatively simple, is fragile. Populations of *Spirulina*, and the invertebrates, fish and flamingos that feed on these species, can only be supported under specific, narrow ecological conditions. Severe declines in waterbird numbers (other than flamingos) since 1993 point to major changes in the food chain – specifically, a lack of fish and invertebrates – associated with a period of low lake levels. Lake Nakuru's levels fluctuate naturally due to little understood interactions between hydrology, meteorology and geology. It is unknown how human pressures may have influenced the natural cycle. The National Park is now entirely surrounded by a 74km electric fence that prevents movements of animals in or out. Large mammal populations in the Park are expanding, and careful management will be needed to avoid ecological imbalances – for instance, giraffe are currently destroying the *Acacia* woodland through de-barking of trees.

Nakuru, thus, is under pressure from threats mostly outside its borders. The management plan now in preparation fortunately takes a regional view and is proposing a number of initiatives within the watershed to better ensure the integrity of the park. Whether or not Nakuru has a future will very much depend on the implementation of measures outlined in this plan. The effectiveness of these measures requires on-going assessment and evaluation.

In summary, IUCN concludes with the following:

- The serial nomination is justified as no one of the three sites on its own would adequately display and protect this unique Rift Valley "flamingo system";

- One major component of this system, however, is missing which is the breeding grounds for the Lesser Flamingo at Lake Natron in Tanzania. The inclusion of Lake Logipi should be investigated in future by the state party;

- Both Nakuru and Bogoria have well-established management regimes while Elmenteita has not advanced to this point as yet; and

- While Bogoria and Elmenteita are not currently under serious threat, Lake Nakuru is facing significant management challenges that will require major efforts to address.

5. ADDITIONAL COMMENTS

A separate report provides an evaluation of the proposed extension of the Sibiloi/Central Island National Park to incorporate South Island National Park. As noted, this has been proposed as a separate site by the State Party.

6. APPLICATION OF WORLD HERITAGE CRITERIA

These three Rift Valley lakes – Bogoria, Nakuru and Elmenteita – are internationally important for three reasons:

Criterion (ii) Ecological Processes

The shallow alkaline endorheic lakes of the Rift Valley are of great scientific interest to limnologists studying the high productivity of these distinct ecosystems. The low species diversity and abundant resident population make soda lakes especially appealing environments in which to conduct investigations of trophic dynamics and ecosystem processes. The production of huge biomass quantities in these distinctive soda lakes and the food

chain that this green algae supports are also of international scientific value. IUCN considers that this site meets World Heritage natural criteria ii.

Criterion (iii) Superlative natural phenomena or natural beauty and aesthetic importance

The presence of up to 4 million lesser flamingos which move between the three lakes is an outstanding wildlife spectacle. The natural setting of all three lakes surrounded by the steep escarpment of the Rift Valley and associated volcanic features provides an exceptional scenic backdrop. IUCN considers that this site thus also meets natural criterion iii.

Criterion (iv) Biodiversity and threatened species

Within the relatively small size of each of the Reserves some of the highest levels of bird diversity in the world are recorded. Although the soda lakes themselves do not support an especially diverse fauna, the woodlands and freshwater habitats surrounding them do. Along with the high populations of flamingos that the three lakes support, the site is a critical habitat for a diverse assemblage of other avifauna. IUCN considers that this site meets criterion iv.

In terms of the Conditions of Integrity as provided in the Operational Guidelines, there are three issues of concern:

- Most bird species are migratory (or vagrant) and, in this case, the three lakes do not contain the seasonal breeding and nesting sites for the millions of flamingos that spend most of the year in the nominated site. The breeding area is Lake Natron in Tanzania which, although unprotected, is fortunately not threatened. Discussions between Kenya and Tanzania on protection measures have been initiated.
- One of the three reserves – Lake Nakuru – is under threat from pollution and de-forestation in its catchment basin. If corrective actions are not taken, the water quantity and quality will continue to decline to the point that resident bird populations will suffer large losses. The new management plan and the WWF project are addressing the difficult issue of influencing external urban, agriculture and forestry issues but great efforts will be required to implement corrective measures. This situation needs to be carefully monitored.
- The gazettement process in one of the three reserves in the nomination – Elmenteita – is not yet complete. The existence of a privately owned ranch in the site is a secondary concern despite it being under "Wildlife Sanctuary" status at present. Gazettement is expected soon but the Kenyan authorities still need to clarify the controls this designation has over private land and the adequacy of the legislation. Inscribing the site without including Elmenteita would not be sufficient as it is a key part of the three lake system.

7. RECOMMENDATION

That the Bureau recommend **referral** of this nomination back to the State Party for confirmation from the Kenyan authorities of the timing and effectiveness of the Wildlife Sanctuary status for Lake Elmenteita. The Bureau may also wish to contact the Kenya Wildlife Service to urge them to complete the process of preparing management plans for each of the three reserves, to underline concerns over threats to Lake Nakuru and to encourage them in their discussions with Tanzania over the need to ensure that Lake Natron receives adequate protection.

WORLD HERITAGE NOMINATION – IUCN TECHNICAL EVALUATION

GREAT RIFT VALLEY ECOSYSTEM SITES (KENYA)

B) SIBILOI/CENTRAL ISLAND NATIONAL PARK – EXTENSION TO INCLUDE SOUTH ISLAND NATIONAL PARK

1. DOCUMENTATION

i) **IUCN/WCMC Data Sheet:** (3 references)

ii) **Additional Literature Consulted:** McClanahan F.R. and T Young. 1996. **East African Ecosystems and their Conservation**. OUP.

iii) **Consultations:** Kenya Wildlife Service staff.

iv) **Field Visit:** January 1997. J. Thorsell.

2. SUMMARY OF NATURAL VALUES

Lake Turkana (formerly Lake Rudolph) is located in the arid hot region of northern Kenya's Rift Valley near the boarder with Ethiopia. It is 265km in length with an average width of 30km. In the Turkana basin, the existing World Heritage site of Sibiloi/Central Island covers 157,585ha and was inscribed in 1997 under natural criteria (i) and (iv). South Island, the proposed extension, is the largest island in the lake found 100km to the south of Central Island. It was established as a National Park in 1983 with a size of 3,900ha including a 1km extension into the surrounding lake. Similar to Sibiloi/Central Island, South Island National Park (SINP) is a breeding ground for crocodile, hippopotamus and a range of venomous snakes. It is key stopover point for palearctic migrant waterbirds with a population of some 220,000, about half of which are the Little Stint. SINP is one of Kenya's Important Bird Areas as defined by BirdLife International. Lake Turkana waters are the most saline of all the major lakes of East Africa but the waters surrounding the Park support 47 species of fish, 7 of which are endemic to the lake. The SINP is a part of Mount Kulal Biosphere Reserve which extends over the southern part of Lake Turkana

3. COMPARISONS WITH OTHER AREAS

Lake Turkana with its unique geochemistry and geological history is one of Africa's most important breeding areas for the Nile Crocodile. Its avifauna are shared with other Rift Valley parks in the region including Samburu, Kulal and Awash. Sibiloi has the additional feature as the locality for the rich source of hominid and invertebrate fossils at Koobi Fora. As the third national park in the Turkana basin, South Island is the largest of the 3 islands in the lake. It's much larger size than Central Island make it a more important site for birdlife and other terrestrial wildlife (particularly snakes).

4. INTEGRITY

As an island, the boundaries of the proposed extension are clear. The inclusion of the surrounding 1km lake frontage is similar to other components of the existing World Heritage site. A management plan (with support from the World Heritage Fund) for all 3 of the Turkana parks is now in preparation. Although the island is visited by local artisanal fisherman, its remote location and lack of freshwater has discouraged human occupation and it exists in a relatively undisturbed state. The inclusion of SINP in the site would add to the representivity of

the Lake Turkana ecosystem by complementing the natural values of the existing World Heritage site. If approved, the total size of the site would increase from 157,585ha to 161,485ha, or 2.4%.

5. ADDITIONAL COMMENTS

The original nomination of Sibiloi/Central Island was submitted on the basis of both natural and cultural criteria. The Committee deferred inscription on cultural criteria but ICOMOS is expected to reassess the nomination with new data from a theme study of hominid fossil sites.

6. APPLICATION OF WORLD HERITAGE CRITERIA

Similar to the rationale for the inscription of the existing site, South Island reinforces both criterion (i) and (iv). It adds further to both the representation of volcanic features of the Rift Valley and the waters of Lake Turkana. It is particular important for avifauna, particularly waterbirds, as well as providing more crocodile nesting habitat.

7. RECOMMENDATIONS

That the extension to Sibiloi/Central Island by the addition of SINP be recommended to the Committee by the Bureau. As requested by the State Party, the new name of the site would be “Lake Turkana National Parks”. The Kenyan authorities should be encouraged to complete the management plan for the 3 parks as an integrated unit.

C.3. Indomalayan Realm

WORLD HERITAGE NOMINATION - IUCN TECHNICAL EVALUATION

PHONG NHA-KE BANG NATIONAL PARK (VIETNAM)

IUCN has not had a response from the State Party or request to organise a mission to this site. The World Heritage Centre and IUCN are continuing efforts to work with the State Party to field an IUCN mission to the site.

C.4. Neotropical Realm

WORLD HERITAGE NOMINATION - IUCN TECHNICAL EVALUATION

CHAPADA DOS VEADEIROS NATIONAL PARK (BRAZIL)

1. DOCUMENTATION

i) **IUCN/WCMC Data Sheet: (**12 references).

ii) **Additional References Consulted:** Dinerstein, E. *et. al.* 1995. **A conservation assessment of the terrestrial ecoregions of Latin America and the Caribbean.** Washington D.C.; MMA/Funatura/CI, 1999. **Priority areas for the Conservation of Biodiversity of Pantanal and Cerrado regions.** Brasilia; IBAMA and PROAVES. 1998. **Priority actions for the conservation of biodiversity of Cerrado and Pantanal**, Brasilia; Minister of the Environment, CI and Funatura. 1999. **Plano de Manejo, Parque Nacional da Chapada dos Veadeiros,** Brasilia; Governo do Estado de Goiás. 2000. **Reserva da Biosfera do Cerrado – Fase II**, Goiania; Governo do Estado de Goiás, WWF, and Oficina de Ciências e Artes. 2001. **Área de Proteção Ambiental Pouso Alto**, Goiania; Dardenne, M. D. and J.E. Guimarães Campos. 2000. **Geological and Paleontological Sites of Brazil: Chapada dos Veadeiros National Park, Goiás;** WWF. Ano II - Número III – December, January and February, 2001.**Veadeiros Jornal,** Alto Paraíso**;** WWF. 2001. **Chapada dos Veadeiros: estabelecimento de um projeto integrado de conservação e desenvolvimento no Cerrado (PICD).**

iii) C**onsultations:** 5 external reviewers contacted, National, State and Municipal Government officials, park staff, local NGOs and community representatives.

iv) **Field Visit:** March, 2001. Allen D. Putney.

2. SUMMARY OF NATURAL VALUES

The "Cerrado" is a tropical savannah formation only found in Brazil with a limited portion in Bolivia. This formation corresponds to the Biogeographic Province of Campos Cerrados (Udvardy, 1975) and ranks among the world's richest in biological diversity (CI, 1999). Within Brazil the Cerrado Ecoregion is the second largest after the Amazon basin. The WWF/World Bank conservation assessment of terrestrial ecoregions of Latin America ranked the Cerrado as "vulnerable", "globally significant" and of "highest priority for conservation action". Much of the Cerrado has been converted to agriculture, cattle ranching, and urbanization, and very few large contiguous areas of undisturbed natural ecosystems remain.

The Chapada dos Veadeiros National Park (CdVNP) is located in the geographical centre of the Brazilian Cerrado Ecoregion where 14 other protected areas have been established. The park varies in altitude from 400 to over 1,600m and contains a rich mosaic of landscape and habitat types including: wooded savannah; grasslands; scrublands; dense wooded savannah; gallery forest; semi deciduous forest; wetlands; and exposed rock. This mosaic of landscapes and habitats, which overlays a variety of geological structures (including some of the oldest rock formations in the world) gives the CdVNP its high biological diversity. Endemism is high in the park, especially in areas above 1,200m. A biodiversity survey conducted in the park in 1997 revealed 1,476 species of vascular plants, 50 of which are rare or endangered; 45 species of mammals, 8 of which are rare or endangered; 306 species of birds, 20 of which are rare or endangered; 49 fish species of which 38 could not be identified at the species level and are probably highly localized endemics; 34 species of amphibians, of which 8 are possibly new species; approximately 1,000 species of moths; and 160 species of native bees of which 6 are new to science. The CdVNP contains populations of several large mammals, including the giant anteater, giant armadillo, maned wolf, spotted jaguar, and pampas deer. However, it is questionable whether the park itself, with its 65,515ha, is of sufficient size to guarantee the long-term viability of these populations.

3. COMPARISON WITH OTHER AREAS

The Cerrado Ecoregion is partially represented in two existing World Heritage Sites, the Pantanal Conservation Complex in Brasil, and Noel Kempff Mercado National Park (NKMNP) in Bolivia. Both of these areas are on the fringes of this ecoregion, largely isolated from the core area where CdVNP is located. NKMNP contains a large portion of Cerrado and thus its comparison with CdVNP is more appropriate. As noted in Table 1, NKMNP is much more biologically diverse than CdVNP.

Table 1. Comparison of key biodiversity values between Noel Kempff Mercado National Park (NKMNP) and Chapada dos Veadeiros National Park (CdVNP).

SITE	Vascular Plants	Mammals	Birds	Amphibians	Fish
NKMNP	2,700	125	600	87	246
CdVNP	1,476	45	306	34	49

In more general terms CdVNP can be also compared with Canaima National Park (Venezuela) which includes a large area of tropical savannah (the Gran Sabana) but of different biogeographic characteristics than Cerrado. However, the flora of the Gran Sabana area in Canaima National Park includes close to 5,000 species and is thus much richer floristically than CdVNP.

As mentioned above there are other protected areas within the Brazilian Cerrado. The largest, and scenically most attractive, national park in the Ecoregion is Chapada Diamantina National Park (State of Bahia) with 152,000ha. Though poorly studied, it probably contains high diversity because of its altitudinal variation, and because it contains elements of both the Caatinga and Atlantic Forest Ecoregions. Das Emas National Park with 131,000ha, (State of Goiás) is the second largest park in the Brazilian Cerrado. Being relatively flat, the area is less diverse than areas with greater altitudinal variation. It is well managed and largely intact, but is partly surrounded by areas of high input, intensive agriculture. A biological and highly scenic corridor formed by the Nascentes do Alto Taquarí State Park (30,000ha) and the strictly protected Coxim Scenic River (15,000ha) connects Das Emas National Park with the Pantanal. Grande Sertão Veredas (84,000ha) is the third largest of the national parks in the Brazilian Cerrado. CdVNP (65,000ha) is smaller in size that the above mentioned sites, and the difficulty of maintaining biological diversity in such a limited area has been noted by reviewers (see section 4).

In addition, the Central Cerrado area, in which CdVNP is located, does not rank highly as a priority area for biodiversity conservation in the Cerrado Ecoregion. Table 2 shows the three top priority areas, as identified by the Minister of the Environment of Brazil, FUNATURA, and Conservation International (1999), in relation to the conservation of key biodiversity components. As clearly shown on Table 2 the Central Cerrado area does not rank as one of the top three priority areas for flora, bird, reptile/amphibian or fish biodiversity.

Table 2. Three top priority areas for the conservation of key biodiversity components in the Cerrado ecoregion

FLORA	MAMMALS	BIRDS	REPTILES/AMPHIBIANS	FISH
Cerrados south of Barreiras	Serra do Roncador	Cerrados south of Goiás	Serra da Mesa	Cerrados of central Rondônia
Chapada Diamantina	Central Cerrado area (includes CdVNP)	Northwest of Goiás/Tocantins	Cerrados of Brazilia Federal District	Cerrados of Alto Rio Araguaia
Chapada das Mangabeiraras	Cerrados west of Bahia	Cerrados south-west of Maranhão	Chapada dos Guimarães	

It is evident that the CdVNP does not compare favourably with the other South American grassland World Heritage Sites such as Canaima in Venezuela or Noel Kempff Mercado National Park in Bolivia. Within the Cerrado Ecoregion there are other more important areas such as Chapada Diamantina National Park and Das Emas National Park (part of Cerrados of Alto Rio Araguaia). The latter is considered to be of 'urgent priority' (by the Minister of the Environment, FUNATURA, and Conservation International) for the conservation of this Ecoregion and for the development of a Cerrado-Pantanal ecological corridor (CI, 1999).

4. INTEGRITY

Size and Diversity

CdVNP was established by federal Decree in 1961. The Park was reduced to 72,492ha in 1972, and in 1980 a second degazettment reduced the park to its present size of 65,515ha. It is unlikely that the park now has sufficient size to conserve a representative array of species, especially large predators. However, the recent creation of 7,200ha of private nature reserves as well as the 872,000ha Pouso Alto Environmental Protection Area (Category V, IUCN) in the area which surrounds the park, serve to lessen the human pressures within the immediate region. A proposal for the establishment of a 2,916,000ha Cerrado Biosphere Reserve has been approved by the UNESCO/MAB Programme, in which CdVNP is one of the two core areas. However, management and conservation programmes for the Biosphere Reserve are not yet in place.

Planning

A management plan was prepared for the CdVNP in 1998 by a team from the Brazilian Environmental and Natural Resources Institute (IBAMA) and PROAVES, an NGO based in Brasilia. However, the plan is general and theoretical with two thirds of it referring to the national and regional context. Even so, it appears that major portions of the plan have not been implemented, though it is difficult to be precise because the monitoring programme, annual operational plans and year-end reports are not routinely prepared. A plan for expanded visitor use is currently under review.

Human and Financial Resources

The CdVNP has a relatively small, but highly motivated, staff of 5 persons on-site. The park's staff is supported by personnel from WWF/Brasil, the Chapada dos Veadeiros Tourist Guide Association and the Flower Collectors Association. This team has built constructive relationships with surrounding communities. This has paid off in the development of good working relationships that have made it possible to reduce threats to the park. While the level of cooperation with surrounding communities is impressive, opinion is divided as to how significantly this has actually lessened threats from fires, hunting, cattle grazing, and commercial flower collection. The park has an entrance station, a visitor centre, housing for staff and researchers, a garage and storage area, guard posts, perimeter fences, and trails to major visitor attractions.

Financing of park management depends on the budget received from IBAMA for operations, and park staff salaries funded by the National Treasury. The annual budget for the CdVNP has varied between US$60,000 and US$120,000 in recent years. However, a large proportion of this budget is dedicated to salaries and is not sufficient to maintain and operate the park at current levels of activity nor to implement the more ambitious programs outlined in the park management plan. While entrance fees are collected in the park, these funds are remitted to IBAMA in Brasilia.

Local Populations

There are no human inhabitants within the park, and important segments of the local population in the 8 surrounding communities are effectively involved with park management activities. The mining of quartz and amethyst crystals was at one time prevalent in the park, but this activity has been reduced by the involvement of local people in tourism activities. This was initially promoted by requiring visitors to the park to be accompanied by local guides, and the formation of the Chapada dos Veadeiros Guides' Association as the sole service provider. Those who had traditionally made a living by the mining of quartz crystals in the park found it less demanding and more lucrative to serve as a tourist guide. Tourism activity has also stimulated the development of campgrounds, small hotels, bars, shops, and restaurants in nearby communities and provides strong incentives to limit uncontrolled fires, flower collecting, and hunting. The commercial collection of flowers is a major source of income in the region, but considerable effort has been made to divert this activity to areas outside the park where sustainable management practices are being pursued. Opinions differ as to whether there is still some illicit flower collecting within the park.

Public Use

The greatest current threat to the park's integrity is the increasing level of visitation which requires careful planning in future. In the past, uncontrolled public use damaged the park. However, the closing of access roads

and imposition of strict controls have improved this situation. Since 1995, when the monitoring of visitor numbers began, park visitation has varied from 8,000 to 26,000 people per year. Most are from Brasilia, but increasingly visitors come from São Paulo and Rio de Janeiro. Public use is limited to the park's major attractions, which occupy only 2% of the park's area. The focus is on the spectacular rapids, waterfalls, natural pools, and canyons of the Preto River. Visitors are not permitted in the park unless accompanied by a guide, and there are over 200 self-employed guides in the Chapada dos Veadeiros Guide Association. Their services include interpretation, garbage collection, fire control, trail maintenance, and visitor safety, but they have no law enforcement authority. There are, however, some complaints from a small proportion of park visitors who object to the intrusive presence of a guide. A plan for expanded park visitation, which is currently under review, makes provisions for viewing points along the paved highway on the eastern border of the park; a trail that will cross the park from the southeast to the northwest; and additional visitor sites, including a number where guides will not be required.

Legal and Institutional Framework

The Brazilian legal and institutional framework for protected area management is comparable to most Latin American countries. Over the years, the National Park category (Category II, IUCN) has been shown to be a relatively robust management tool which, with proper human and financial resources, can achieve fairly rigorous protection. IBAMA is responsible for the management of national parks with coordination at the national level by the Department of Conservation Units in Brasilia. The management of each protected area is carried out by an IBAMA field management team, as is the case for CdVNP.

Land Tenure

Lack of government land ownership is a problem in many of Brazil's protected areas. In the case of CdVNP only 30% of the area is federally owned. The remaining area is still under private ownership and even though all incompatible land uses have been reduced or eliminated, IBAMA is planning to bring the entire park under government ownership.

Research

Research activities are carried out intermittently in the park, mainly on highland grasslands, by the University of Brasilia. A small research centre provides support for these activities. There is considerable scope for the expansion and formalization of research as outlined in the park's management plan.

Threats

The threats to the park (cattle grazing, fires, mining, flower collecting, hunting, and uncontrolled tourism) have been reduced significantly in recent times. This has been accomplished mainly by positive interaction with local communities rather than law enforcement or effective management. Perhaps the most effective strategy has been to give local communities an effective financial stake in the park's tourism activities.

5. ADDITIONAL COMMENTS

It is widely believed in the region that the quartz crystals, which are found in the park and surrounding vicinity, are a potent source of bioenergy that has therapeutic and restorative effects on humans. The community of Alto Paraíso, on the eastern boundary of the park, caters to visitors seeking guidance in meditation, enlightenment, and physical and spiritual renewal. They have thus created a specialized niche in the tourism market for "spiritual" tourism. Park management has now recognized the potential and requirements for this specialized form of tourism. Discussions are being held to develop special management arrangements for park visitation by these groups. There is also an effort underway to harness the potential of this type of tourism for developing innovative environmental education and visitor interpretation programmes.

6. APPLICATION OF WORLD HERITAGE NATURAL CRITERIA

The site has been nominated under all four natural criteria.

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

While the area contains a variety of geomorphological features that are important to study the origin and evolution of the region, these features are not comparable to those of other World Heritage sites inscribed on the World Heritage List under this criterion, for example, Ischigualasto-Talampaya in Argentina. There are also other sites within the Brasilian Cerrado that are more important with regard to this criterion. IUCN considers that the nominated site does not meet this criterion.

Criterion (ii): Ecological processes

One of the reasons the Cerrado Ecoregion is globally significant is because it is perhaps the oldest of the major tropical ecosystems. Changes in world climate over geological periods have moved central South America's ecosystems south to north and east to west, and back again, several times. Within the Cerrado Ecoregion, the CdVNP and surrounding highlands are centrally located, both in longitude and latitude and, because of their altitudinal range are one of the few areas where species have had the alternative of following habitat modifications by changing altitude rather than longitude or latitude. This has permitted the survival of rare and relict life forms, and encouraged the development of endemics. However, this is a common characteristic of Cerrado areas and there are other protected areas in this ecoregion of greater importance for the maintenance of these processes, particularly those that are linked to the ecological transition with the Pantanal ecoregion. In addition the CdVNP itself is a relatively small area, and it is questionable whether, in the long run, it is large enough to play the role of "genetic repository and repopulation centre". IUCN considers that the nominated site does not meet this criterion.

Criterion (iii): Site containing superlative natural phenomena or exceptional natural beauty

The CdVNP contains a variety of features, such as waterfalls, cliff faces, inselbergs, and a meteorite crater that are interesting landforms which contribute to the natural beauty of the site. However, these features are not comparable to those existing in other World Heritage sites, such as the Pantanal Conservation Complex in Brazil and Canaima National Park in Venezuela. In addition, other national parks within the Brasilian Cerado, such as Chapada Diamantina and Chapada dos Guimaraes, are considered more spectacular and of higher aesthetic value than CdVNP. IUCN considers that the nominated site does not meet this criterion.

Criterion (iv): Biodiversity and threatened species

While CdVNP contains important biodiversity values and a number of threatened species, these are less significant than those existing in Noel Kempff Mercado National Park (Bolivia) which also protects important areas of the Cerrado Ecosystem. The study on priority areas for the conservation of biodiversity of the Cerrado Ecosystem (CI, 1999) does not rank the nominated site highly but notes other areas within this Ecoregion with higher biodiversity values. The relatively small size of the CdVNP calls into question the sustainability of the biological diversity within the park itself. IUCN considers that the nominated site does not meet this criterion.

7. RECOMMENDATIONS

That the Bureau does not recommend the inscription of Chapada dos Veadeiros National Park on the World Heritage list under natural criteria (i), (ii), (iii), and (iv). However, noting the high importance of the Cerrado ecoregion for the conservation of biological diversity and the need to enhance representation of this ecoregion in the World Heritage List, the Committee may wish to recommend to the State Party to explore the possibility of nominating other relevant sites which more adequately address World Heritage criteria. This should make full use of a number of studies and assessments of priorities for the conservation of this Ecoregion which are currently available.

WORLD HERITAGE NOMINATION - IUCN TECHNICAL EVALUATION

GALAPAGOS MARINE RESERVE (ECUADOR)
EXTENSION TO GALAPAGOS NATIONAL PARK

Background note: The Galapagos Marine Reserve (GMR) was nominated in 1994 as an extension of the Galapagos National Park (GNP) which was inscribed in the World Heritage List in 1978. The importance of extending this site to cover the marine environment was emphasised in the original evaluation of GNP as to enhance the protection of the whole islands as a number of species in GNP have string linkages with the marine environment for their survival. In 1994 IUCN evaluation considered that GMR did meet natural criteria (ii), (iii) and (iv) but its inscription was deferred conditional to the solution of a number of integrity problems.

1. DOCUMENTATION

i) **IUCN/WCMC Data Sheet:** (38 references)

ii) **Additional Literature Consulted:** Fundación Natura/WWF. 1997, 1998, 1999, 2000. Galapagos Report. (Annual Monitoring Reports); Fundación Natura/TNC. 2000. Galápagos – Dinámicas Migratorias y sus Efectos en el Uso de los Recursos Naturales, 226p; BirdLife International. 2000. **Endemic Bird Areas of the World**; Davis, J. (ed.) **MPA News**. (various feature articles on Galapagos); Anon. 1999 – 2000. Marine Reserve Problems. **Galapagos News**; Ben-Yami. 2001. Managing Artisanal Fisheries of Galapagos. WWF Consultant Report; Benstead-Smith R. 2001. Conservation of Biodiversity and Sustainable Use of Resources in the Galapagos Marine Reserve. Status, Investment Needs and Long-Term Financial Needs. CDF Internal Document. 10p; Anon. 1999. Plan de Manejo – Reserva Marina de Galápagos. Publicado en el Registro Official 173, 150p; Roberts. C.M. and J. Hawkins. 2000. **Fully Protected Marine Reserves – A Guide**. WWF; Jackson. M.H. 1985. **Galapagos**. U. Calgary Press; Sullivan Sealy, K. and G. Bustamante 1999. Setting Geographic Priorities for Marine Conservation in Latin America and the Caribbean. TNC. 125p; Anon. 1999. Projections of the Charles Darwin Foundation; Bradus, J. et al. 1984. Coastal and Marine Resource Management for the Galapagos. Woods Hole Technical Report; Bustamante R.H. 2000. Marine Conservation and Human Conflicts in the Galapagos Islands. **MPA News**. March; Jenkins, M. & T. Mulliken. 1999. Ecuador's Sea Cucumber Trade. **Traffic Bull**. 17(3), 17(1), 18(1); UICN-SUR et. al. 2000. Diseño final del Subprograma de Manejo de la Reserva Marina de Galápagos. IDB Project.

iii) **Consultations:** 14 external reviewers contacted, Minister of Environment, Congress Deputy for Galapagos Province, Mayor and Vice Mayor of Santa Cruz, Directors and Staff of Galapagos National Park, Director and staff of Charles Darwin Research Station, Director of Ministry of Tourism, Association of Galapagos Tour Operators, Secretary General of Charles Darwin Foundation, Ecuadorian Conservation NGO's (WWF, Fundación Natura, TNC, CEDENMA), Director UICN-SUR, Youth of the World Galapagos Representatives, Santa Cruz Fishing Cooperative.

iv) **Field Visits:** February, 1994 – J. Thorsell, D. Elder, B.Ortiz;
March, 2001 – J. Thorsell, C. Maretti

2. SUMMARY OF NATURAL VALUES

The Galapagos Marine Reserve (GMR) comprises the waters around the 120 islands of the Galapagos National Park (GNP). While the size of the park is 76,651km^2, covering all terrestrial parts of the islands, the boundary of the GMR extends 40 nautical miles offshore and covers an area of 133,000km^2. The GMR was formally

established in March, 1998 when the Special Law for the Galapagos (SLG) was passed. Before this Law the area had been a "Marine Resources Reserve" since 1986. Since 1996, responsibility for managing the GMR rests with the GNP. The entire GMR is proposed for extension of the existing World Heritage site (GNP).

The Galapagos marine environment is a "melting pot" of species that biogeographers have recognised as a distinct biotic province. The convergence of three distinct ocean currents has transported marine biota from tropical and subtropical regions of Central and South America and the Indo Pacific. The level of endemism is quite high, averaging 20-25% of marine species, mainly fish. Due to the cool waters of the Humboldt Current 4 to 6 months per year, the Galapagos is considered a marginal environment for coral reefs. Corals, however, are found in some localities where warmer waters prevail. There are some 447 species of fish representing 92 families. At least 51 species (17%) are endemic to the Galapagos. There are large numbers of dolphins (8 species), sea lions and fur seals (both endemic sub-species). Sharks (12 species) and rays (6 species) are common and the Galapagos are internationally important for two species of sea turtles: green turtle and hawksbill turtle. They are common in the surrounding waters, with the former nesting on sandy beaches. Several species of Baleen whales occur (fin, mink, humpback) as well as toothed whales (pilot, killer) and sperm whales are regularly encountered. The interaction between the terrestrial and marine environment is particularly important for the marine iguana and for 27 of the islands 57 bird species especially the flightless cormorant, the Galapagos penguin and large numbers of nesting seabirds.

Geologically the area is also a "hot spot" being at the meeting point of the Nazca, Pacific and Cocos tectonic plates. The islands have been formed by volcanoes rising out of a submarine platform at a depth of 1,300m. In outer waters, ocean depths fall to 4,000m except for the existence of several seamounts which rise to less than 100m below sea level. Climate is strongly influenced by the annual cycles, upwellings and convergence of the ocean currents and undercurrents which meet in the region. Average precipitation varies from 300 mm along the coast to over 1000mm at higher elevations. El Niño events cause wide annual variations in rainfall and temperature.

The GMR is a multiple use area where artisanal fishing only is allowed under the SLG. About 1200 people are employed by the fishing industry with sea cucumbers, lobsters and various fin fish being the predominant catches in recent years. The Management Plan for the GMR defines about 17% of the Galapagos coastline (2 miles out to sea) as "no-take" zones. The extension of the “no-take” zones has been defined through a long process of consultation between local communities representatives, fishermen, researchers from CDRS, GNP staff, and representatives of the tourism sector, thus representing an strong commitment from all key stakeholders involved in the management of this area. Nevertheless it should be noted that a recent meeting of Biodiversity of the Marine Environment in Galapagos discussed the possibility of “no-takes” zones eventually being extended to cover 35% of GMR.

3. COMPARISONS WITH OTHER AREAS

There are currently 6 marine reserves on the World Heritage List: Aldabra (Seychelles); Great Barrier Reef (Australia); Vizcaino Whale Lagoons (Mexico); Cocos Islands (Costa Rica), Belize Barrier Reef, and Tubbataha Reef (Philippines). There are several other World Heritage sites where adjacent marine features are protected (e.g. Fraser Island, Scandola, East Rennell, Komodo, Shark Bay, Lorentz) and several other islands where the marine part of the system has not been included (St. Kilda, Henderson). After the Great Barrier Reef, and the NW Hawaiian Islands, the Galapagos is the third largest marine reserve in the world. With its whales, sea lions and seabirds it has certain affinities with El Vizcaino Whale Sanctuary and Cocos Islands National Park. Likewise it compares in many ways with the Aldabra site with its sea turtles and tortoises. Galapagos shares many features with the Northwestern Hawaiian Marine Reserve and with the Key Largo and Channel Island marine sanctuaries in USA as well as the Kermadec Island Reserve in New Zealand. Biologically it is significantly more diverse than the other eastern Pacific islands of Clipperton, Cocos Islands, or Juan Fernandez.

A number of unique features distinguish the Galapagos from all the above:

- **High diversity** – a rich and varied flora and fauna compared to other marine insular environments in the Eastern Pacific.

- **High degree of endemism** in the marine biota – around 25 % of most groups occur nowhere else on earth.

- **Complex and unusual system of oceanic currents** – cool currents, upwelling areas, and water masses of different origins transporting bioelements from tropical and subtropical regions of the American continent as well as from the Indo-Pacific biotic province.

- **Unusual mixed biogeographic affinities** – strong phyto and zoogeographical affinities with the Tropical and Subtropical American continent, with many elements representing the Peruvian/Chilean and West Pacific Provinces.

- **Large habitat-type diversity and highly complex marine communities** relative to other insular marine areas in the Eastern Tropical Pacific. The variety of geomorphological characteristics offer a high density of marine habitats isolated from the continent. Comprises rocky, vertical cliff face, mangrove, sandy beach, lagoon, embayment, and hypersaline panne habitats.

- **Critical importance to a large number of terrestrial organisms** which are dependent on the marine environment for survival. Many animals such as the penguin, fur seal, sea lion, flightless cormorant, waved albatross, and marine iguana – not to mention the large array of bird species – are directly dependent on the marine environment for their existence. Of 57 resident bird species in Galapagos, 27 depend on the surrounding ocean.

- **A long tradition of scientific research** with the active presence of the Charles Darwin Research Station (CDRS) since 1960.

It is recognized that the Galapagos coral fauna is depauperate compared to western pacific reefs and that its diversity of fish (307 species) is much lower than the Hawaiian islands (471 species). However, taken as a whole, the Galapagos Marine Reserve is clearly one of the most unique, scientifically important and biologically outstanding marine areas on earth. This conclusion parallels the case made for the Galapagos islands (inscribed in 1978) and the establishment of the surrounding marine reserve make the archipelago one of the world's most important natural areas.

4. INTEGRITY

When the Galapagos Marine Resource Reserve was nominated in 1994 (see Background note) the IUCN Technical Evaluation concluded that the area did meet World Heritage natural criteria but that integrity issues were such that the immediate inscription on the World Heritage List was not considered. The 18th Session of the World Heritage Committee deferred a decision noting that it: "…was seriously concerned that the proposed Marine Reserve and the Galapagos Islands faced the following threats to their integrity:

- Over fishing and illegal fishing of a wide range of species;
- Human pressures from the local population (growing at an estimated rate of 8.5% per year, mainly due to immigration) and tourism on both terrestrial and marine resources;
- Inadequate management capacity and infrastructure;
- Adverse impacts of introduced animals and plants;"

Further, "these threats call for mitigative action vis-à-vis:

- Augmenting management capacity;
- Encouraging institutional cooperation;
- Stepping up law enforcement, and
- Conducting research on sustainability of resource use in the Marine Reserve."

The World Heritage then sent a high-level monitoring mission consisting of the Chair of the Committee and the Director of the World Heritage Centre which formed the basis of further discussions in 1996, 1997, and 1998. In response to this on-going attention from the World Heritage Committee as well as other conservation

organisations, the Ecuadorian authorities have made a significant effort to improve management of the site, as has been reported in various State of Conservation reports. Solid progress has been made on the following aspects:

Legal Framework

The foundation for management of the GMR is contained in the "Special Law for the Galapagos" passed in March, 1998. Under this law, the Galapagos National Park Service (GNPS) is the government institution responsible for managing the GMR under the supervision on an Inter-institutional Management Authority (IMA). The law defined the GMR as a multiple use area and as part of Ecuador's system of protected areas. The Special Law gives a measure of autonomy to the islands allowing 40% of the visitor fees collected to go directly to the Park plus another 5% for the marine reserves. The Ministry of Environment has been leading preparation of the long overdue specific regulations on fisheries, tourism, environmental control, and introduced species/agriculture. The fifth set of regulations controlling human migration is being prepared by National Institute for Galapagos (INGALA). Each of the above sets of regulations, especially the fisheries, will be important for providing the basis for management. Drafts of the regulations are in an advanced state and are expected to be approved before July, 2001.

Boundaries

Limits of the GMR now extend 40 nautical miles offshore (instead of the 15nm originally proposed) and encompass 133,000km^2. This is a much more demanding area to manage but it encompasses important marine features such as the offshore sea-mounts.

Local Involvement

Since 1996 the CDRS and GNPS have invested major efforts in resolving chronic conflicts between fishing, tourism and conservation interests by developing a participatory approach to management. A Core Group is composed of representatives of GMR stakeholders from the tourism, fisheries and conservation sectors. Regular meetings of this Core Group resulted in many agreements that were incorporated into both the Special Law and the GMR Management Plan. Without this participatory process at the local level, very limited progress would have been achieved in resolving conflicts. In spite of the progress achieved in reducing conflicts there is still a good deal of social tension, particularly with the fisheries community that has repeatedly ignored adherence to the fisheries quotas established for the GMR, despite the fact that the quotas were proposed through a participatory process.

Management Plan

Although a plan for previous marine resources reserve existed, it was in need of updating in light of the new legal basis and the expanded size of the GMR. The new Plan defines a zonation system including "no-take" zones amounting to 17% of the island's coastline. The Participatory Management Board has now been institutionalised and meets on a regular basis. The Plan also limits extractive use to "artisanal fishing" by local residents and was officially approved by Government in 1999.

While the management plan for the GMR rightly gives emphasis to fisheries issues, it also considers how to better regulate tourism activities. According to a number of reviewers, tourism could become a major problem in the future. There is no overall limit established for marine tours and the carrying capacity for diving sites in the Marine Reserve area is not yet defined. The Marine Conservation Strategy for GNP includes this issue as a priority activity (see Annex 1).

Management Capacity

Staff working on marine issues in both the GNP and CDRS have increased from only 3-4 in 1994 to some 75 in 2001 (including 25 who work on patrol boats) plus 15 volunteers. Equipment in the form of patrol boats is crucial and this too has been augmented.

Research

The CDRS in now much actively engaged in research on the GMR with a marine section consisting of 25 staff. Most of these people are employed in monitoring fishery catches. Research has expanded on inshore marine

biodiversity and on the heavily-exploited species, notably sea cucumber and lobster. An international marine biodiversity workshop was organised in 1999 by WWF and the CDF. This work has aided in the negotiations in annual fishing schedules and quotas. The CDRS has prepared a plan for its investment needs to further expand its marine program in the future.

Management Resources

Substantial funding has been identified to support this extra effort. This has been found through the share of gate fees, additional subventions from the Ecuador Government and grants and donations from the private sector, foundations and conservation groups. A project to obtain a loan from the IDB was prepared by IUCN's Regional Office for South America in the amount of $10 mil. plus $3 mil. from Government. This project will focus on implementation of the GMR management plan and approval is anticipated in April, 2001. Additional funds from the GEF ($18 mil.) and UNF ($4 mil.) have also been arranged but will focus on the terrestrial environment over the next 5 years.

Enforcement

Without the regulations in place, progress has been limited in controlling immigration, limiting fishery seasons and catches, and preventing illegal commercial fishing. Both the Navy and the marine unit of the GNP have intercepted a number of vessels and discouraged others but prosecutions have been few and illegal fishing continues. Even worse, the Navy has allowed the release of several seized vessels which has implicated them in the illegal fishing business and reduced the Government's credibility in enforcing the law. This was further weakened during the fisherman strike of November 2000 where intimidation of park staff and violent action lead to the Government backing down on quota limits.

Annual monitoring reports on the illegal commercial fisheries in the GMR show that many thousands of sharks have been taken out of Galapagos waters and that long-lining for other finfish has had severe effects on many other species. Moreover, the loosely regulated controls on sea cucumber harvesting have led to a precipitous decline in the population which may never recover to sustainable levels. Despite all the other areas of progress, the lack of sufficient enforcement has led to a continued over-fishing which is a major threat to Galapagos marine environment.

In sum, although there has been substantial effort and progress in addressing integrity issues in the GMR as identified by the 1994 World Heritage Committee, the marine resources of Galapagos continue their downward negative trend. Monitoring and research show that harvests of high value species (black coral, sea cucumber and lobster) are proving to be non-sustainable. For example, the total capture of different species of white fish has declined in 37% between 1997 and 1999, for the same period the total capture of lobsters has declined in 17% (Informe Galapagos 1999-2000, Natura Foundation). Even the former bacalao fishery has declined. The illegal capture of sharks has resulted in high losses and the growing numbers of fishers immigrating to the islands (from 300 in 1994 to 1200 in 2001) is greatly adding to pressures on the marine environment.

On the positive side, two key actions are expected soon that will set a much firmer basis for addressing the issues. First is the passage of the regulations which will clearly specify what limits are on fisheries, immigration, etc., and will allow more effective application of the Special Law. Second is the IDB loan for implementing the GMR plan which devotes $4 mil. to strengthening the control and security system. There is also a growing public sentiment within Ecuador to address illegal fishing activities more firmly, which, with the added resources and resolve of the GNPS, could lead to a reduction in further damage. Commitment at the central political level, however, is a fundamental prerequisite. Any revisions to the Special Law that would weaken it would be very detrimental to the participatory group process that agreed to it as well as affect the conclusions of IUCN's evaluation.

A summary of what needs to be done to make the GMR a model of a marine protected area is given on (Annex 1) which outlines the marine conservation strategy of the CDF and GNPS.

5. ADDITIONAL COMMENTS

International media attention on the GMR was given when an oil spill resulted from the grounding of the tanker "Jessica" on 16 January, 2001 on San Cristobal Island. Initial reports of damage were alarming but through a

combination of manpower, technology, ocean currents and favourable weather conditions, the spill appears only to have caused minor short-term damage. Wildlife mortality was low when wind and current took the fuel out to sea where it dispersed. Full effects on the marine resources of the area will not be known until longer term monitoring studies are completed but damage to date appear to be minimal.

The accident, that has proved to be caused by negligence, triggered the preparation of work on a contingency plan for future emergencies and has led to efforts to improve the regulatory framework to minimise future hazards. Handling of the spill cost the Ecuador Government several million dollars, part of which was covered by external assistance. The Jessica remains stranded, the Captain has been charged, and insurance compensation is being sought. Suggestions have been made by WWF and others that the Ecuadorian Government designate the GMR as a "particularly sensitive sea area" (PSSA) under the International Maritime Organisation (IMO). The benefits of such an initiative are being studied by INGALA and Ecuador Maritime authorities.

6. APPLICATION OF WORLD HERITAGE CRITERIA

The importance of extending legal protection to the seas around the Galapagos Islands and managing the archipelago as one unit has been recognised for many years. Since 1994 when Ecuador initially nominated the marine reserve as an extension, efforts have been made to better define the limits, document the values and institute a management system.

Similar to the inscription of the terrestrial component on the basis of all four natural criteria, the GMR would meet the criteria as follows:

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

The geology of the archipelago is clearly apparent above sea level but also extends to the sea floor where processes are equally continuing. The meeting of three major tectonic plates – Pacific/Nazca/Cocos – is the basis for the existence of the islands and is of significant geological interest. The site demonstrates the evolution of the younger volcanic areas in the west and the older areas in the east. On going geological and geomorphological processes (lava flows, underwater gas flows, small seismic movements, and erosion) also occur in the marine environment although not easily studied. The GMR includes key elements as well as on-going processes that conforms the geological puzzle that originated the Galapagos Islands, almost no other site in the world offered protection of such a complete continuum of geological and geomorphological features.

Criterion (ii): Ecological processes

The islands are situated at the confluence of 3 major eastern Pacific currents and this convergence has had major evolutionary consequences. The Galapagos marine environment is a "melting pot" of species that biogeographers have recognised as a distinct biotic province. The direct dependence on the sea for much of the island's wildlife (e.g. seabirds, marine iguanas, sea lions) is abundantly evident and provides an inseparable link between the terrestrial and marine worlds.

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

The GMR is an underwater wildlife spectacle with abundant life ranging from corals to sharks to penguins to marine mammals. No other site in the world can offer the experience of diving and admire such a diversity of marine life forms that are so familiar with human beings that accompanied divers for most of the time. The diversity of underwater geomorphological forms are an added value to the site producing a unique diving experience not to be found anywhere else in Earth. The GMR has justifiably been rated as one of the top dive sites in the world.

Criterion (iv): Biodiversity and threatened species

With a great diversity of species of fish, sea turtles, invertebrates, marine mammals and sea birds, the GMR is the major stronghold for wildlife in the eastern Pacific. In additions, there is a high rate of endemism in marine life and many species are internationally threatened.

The islands and the surrounding marine environment of the Galapagos are thus inextricably linked and together from a unit that meets all four World Heritage criteria.

7. RECOMMENDATIONS

As does the GNP, GMR meets natural criteria (i), (ii), (iii) and (iv). The addition of the marine reserve is thus complementary to and adds substantially to the justification of the GNP as one of the premier nature reserves on the planet. However, until the essential legal work is completed (i.e. passage of the Regulations to allow enforcement of the Special Law for the Galapagos) and fully enforced with strong government support, the Conditions of Integrity are not yet met. The Bureau should thus recommend **referral** until official approval of the Regulations for the Special Law are passed.

The Bureau may also wish to recognise all the effort made over the past 7 years by the Ecuadorian authorities to extend protection to the marine environment. Noting that there are even greater pressures on GMR resources today that there were when the Committee deferred a decision in 1994, and that significant losses in integrity have occurred since then, the Bureau should also express the urgency for further strengthening of management, particularly on enforcement activities. Pending satisfactory passage of the Regulations, the site would eventually be inscribed under the name "Galapagos National Park and Marine Reserve".

Annex 1: Marine Conservation Strategy of the Galapagos National Park and Charles Darwin Foundation

1. ***Develop the participatory management system***

- Establish a secure legal and institutional framework and take part in the established participatory forums
- Develop a Marine Reserve management plan and supplementary plans for specific resources, habitats, etc.
- Develop the capabilities of stakeholder groups
- Strengthen the functioning of the Participatory Management Group. Communicate technical information appropriately to the Group and the Interinstitutional Management Authority, among others
- Build understanding of and support the participatory management structure

2. Strengthen the capability of the management authorities

- Develop effective regulations and procedures and ensure that the law is applied
- Build GNPS capabilities in control, patrolling, and judicial procedures. Develop collaboration on law enforcement with the Navy, government bodies, and stakeholder organizations
- Develop the capabilities of the GNPS in marine management and of the CDF in marine research

3. ***Ensure that ecosystem structure and function are maintained***

- Establish, protect, and monitor zones for research and, in some cases, non-extractive economic use
- Control and monitor extractive use
- Control and monitor land-based impacts
- Monitor species representative of the ecosystem's diversity of biological communities and their functioning
- Monitor variables of the physical environment .Study the functioning of the ecosystem

4. ***Conserve key species, including exploited species, vulnerable species, and species important for science and tourism***

- Study the biology, ecology, abundance, and distribution of each key species .Protect each species against actual or potential threats
- Prepare contingency plans for the conservation of species at risk

5. Monitor and control the use of the Marine Reserve

- Develop and apply regulations for fisheries, tourism, and scientific and educational activities in the Marine Reserve
- Monitor fisheries and use the results in fisheries planning
- Monitor tourism in marine sites and use the results in tourism planning

Source: Charles Darwin Foundation. 2000 Projection. 1999 Annual Report

WORLD HERITAGE NOMINATION - IUCN TECHNICAL EVALUATION

KAIETEUR FALLS NATIONAL PARK (GUYANA)

The field inspection for these site is schedule for May 2001.

The evaluation report will be included in a supplementary report for the June 2001 Bureau meeting.