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Convention Concerning the Protection of
the World Cultural and Natural Heritage

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

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TECHNICAL EVALUATION REPORTS

A. NOMINATIONS OF NATURAL PROPERTIES TO THE WORLD HERITAGE LIST

WORLD HERITAGE NOMINATION - IUCN TECHNICAL EVALUATION

BRAZILIAN DISCOVERY COAST (BRAZIL)

Note: this evaluation is based on a revised nomination of the site as submitted by Brazil on 9 April 1999.

1. DOCUMENTATION

i) **IUCN/WCMC Data sheet** (7 References)

ii) **Additional literature consulted:**

Bibby et al, 1992. **Putting Biodiversity on the Map. Priority Areas for Global Conservation**. Cambridge, UK. Biodiversity Support Program, Conservation International et al, 1995. **A Regional Analysis of Geographic Priorities for Biodiversity Conservation in Latin America and the Caribbean.** Washington, DC. Brown, KS, 1987. **In Biogeography and Quaternary History in Tropical America.** pp 175-96. Whitmore and Prance, eds. Oxford: Clarendon Press. Duellman, WE (ed), 1979. **The South American Herpetofauna: Its Origin, Evolution, and Dispersal.** Univ Kansas Museum Natural History Monogram 7. Fundacao SOS Mata Atlantica, 1892. **Dossie Mata Atlantica.** Sao Paulo: Fundacao SOS Mata Atlantica. Fundacao SOS Mata Atlantica and Instituto Nacional de Pesquisas Espacias, 1993. **Atlas da Evolucao dos remanescentes florestias e ecossistemas assaciados do Domino da Mata Atlantica no periodo 1985 - 1990.** IUCN Tropic Forest Program/Conservation Monitoring Centre, 1998. Brazil Atlantic Coastal Forests: Conservation of Biological Diversity and Forest Ecosystems. IUCN, 1996. **Centres of Plant Diversity and Endemism.** Chapter IV. Mata Atlantica. Lynch, JD. 1979. University Kansas Museum Natural History Monogram 7. pp189-215. Mori, SA. 1989. Eastern Extra-Amazonian Brazil, in **Floristic Inventory of Tropical Countries: The Status of Plant Systematics**. The New York Botanical Garden, New York. Padua, Maria Thereza Jorge, 1998. **The Atlantic Forest in Brazil.** Prance, 1987. **Biogeography of Neotropical Plants**. In Biogeography and Quaternary History in Tropical America. Whitmore and Prance, eds. pp 46-65. Oxford: Clarendon Press. Thomas, et al, 1998. Plant endemism in two forests in southern Bahia, Brazil. **Biodiversity and Conservation**, 7, p311-322. Zelinda Margarida de Andrade Nery Leau, 1996. **The Coral Reefs of Bahia - Morphology Distribution and the Major Environmental Impacts.** An. Acad. bres. Ci. 68 (3). CIFOR/UNESCO. 1999. **The World Heritage Convention as a Mechanism for Conserving Tropical Forest Biodiversity.** 54p.

iii) **Consultations:** Local parks staff; staff of IBAMA Brazil; local NGOs; staff at Veracruz station; C Maretti, IUCN-CMAP-Brazil and Forest Foundation; local and State Government representatives and external reviewers.

iv) **Field visit:** Warren Nicholls, March 1999.

2. SUMMARY OF NATURAL VALUES

The Brazilian Discovery Coast (BDC) is located in the States of Bahia and Espirito Santo in NE Brazil. The nomination consists of 8 separate protected areas which contain 111,930.5 ha of Atlantic forest and associated shrub (restingas). Elevation ranges from sea level to Monte Pascoal (536 m). Of the original 3.5 million hectares of Atlantic Forest in this region, it is estimated that less than 0.5% are intact. The nominated site comprises 78% of that which remains. Outside of the nominated area, the only remaining areas of original Atlantic forests in Bahia are scattered remnants of less than 400 ha in size.

The nominated property consists of 8 separate areas ranging from 1,145 - 24,000 ha in size and include, from north to south: Una Biological Reserve (11,400 ha); Pau Brazil CEPLAC Experimental Station (1,145 ha); Veracruz Station (6,069 ha); Pau Brazil National Park (11,538 ha); Discovery National Park (21,129 ha); Monte Pascoal National Park (13,872.5 ha); Linhares Forest Reserve (22,777 ha); Sooretama Biological Reserve (24,000 ha).

The two privately owned areas (Veracruz and Linhares) are managed totally for conservation and research and provide full protection for the forests. Both these areas are managed in accordance with arrangements appropriate for IUCN Category I reserves.

The nominated area is enclosed within a buffer zone that is mostly privately owned and used primarily for pastoral activities and forest plantations. The buffer zone is a UNESCO Biosphere Reserve of nearly 1 million ha and provides an overall management framework for the nominated core zones.

Atlantic forests are the world's richest rainforests in terms of biodiversity (along with the Choco Forests of the lower Colombian Amazon basin and the Yanomomo forests of Peru) and they are restricted to the Brazilian coastal region. Unfortunately, in Northeast Brazil the forests have suffered from clearing and abusive soil practices and only a few disjunct fragments remain (see map). Of the original Atlantic forest, which comprised over 1,250,000 square kilometres and occupied some 15% of Brazil, less than 8% (or 90,000 km^2) still remain. Partially isolated since the Ice Age, the Atlantic forests have evolved into a complex ecosystem with exceptionally high endemism (70% of the tree species, 85% of the primates and 39% of the mammals) and are considered to be among the world's richest forests for tree species (almost 300) per hectare (particularly for Myrtaceae species). It is also the region in Brazil with the greatest number of endangered and threatened species. Brazil's Atlantic forests are perhaps the most endangered forest ecosystem on earth (Mori, 1989) and have been given the highest priority for biodiversity conservation (Bibby et. al. 1992, Biodiversity Support Program 1995). It is one of the "Global 200" ecoregions and one of the "Focal 25" priorities of WWF. The exceptionally high biodiversity and level of endemism may be explained by high tropical humidity (due primarily to the oceanic influence and hillside condensation effects), and the range of altitude and geographical extension leading to the creation of a wide range of climatic and ecological conditions.

Biogeographically, the Atlantic forests have recently been split into two distinct areas: the Northeastern (Discovery Coast) and Southeastern regions. This nomination is focussed on the Northeastern region in the Bahia/Espirito Santo States. A separate nomination for the Southeast Atlantic Forests in the States of Parana and Sao Paolo has been submitted by Brazil and is the subject of a complementary evaluation.

This nomination of the BDC comprises all those protected areas that contain Atlantic forest in this NE region and which are in an intact, or near intact, condition and with appropriate and effective management arrangements in place. The site is one of 6 Atlantic forest clusters recommended as potential World Heritage forest sites at the 1998 CIFOR/UNESCO World Heritage forest meeting in Indonesia.

3. COMPARISON WITH OTHER AREAS

Despite sharing some of its flora and fauna with the Amazonian forest (Brown, 1987; Mori, 1989), the Atlantic forests have long been considered a distinct neo-tropical forest type (Mori, 1989; Lynch, 1979) and are in a different biogeographical province (Serro do Mar). Despite five centuries of severe human impact, the Atlantic Forests of Brazil exceed other tropical rainforests in their high biodiversity and the very high level of endemism. The suite of species makes it difficult to compare it with other tropical rainforests.

The BDC nomination comprises 8 protected areas within the northeast region of Atlantic forest. A separate nomination covers the southeastern region of Atlantic forest. Each nomination is complementary to the other and they reinforce each other. Each has a distinct suite of species as demonstrated by their high levels of endemism. The Atlantic forests are not homogeneous and comprise separate centres of endemism with the SE and Discovery Coast (NE) regions each containing quite a distinct suite of species. They are also considered separately in light of differing deforestation history.

The physiognomy of the Atlantic forests is similar from north to south, with high trees (20 - 30 m), rich in epiphyte orchids and bromeliaeds and dense undergrowth. The vegetation, on the contrary, is highly endemic and species composition changes radically along the range. Hence the submission of two separate nominations, each having distinct species compositions. Each group of forests represents an important, but highly individual, aspect of the Serro do Mar biogeographic province.

4. INTEGRITY

As a serial nomination, the BDC has many issues in common with other serial nominations, particularly the “Central Eastern Rainforest Reserves” in Australia (CERRA) which contains eight clusters of protected areas spread over a 600 km distance with a total size of 108,450 ha. The BDC area consists of six clusters spread along a 450 km distance with a total size of 111,930 ha.

The main question on the integrity of each property is the small size of most of the protected areas that make up the nomination. Five of the eight individual protected areas in the BDC are less than 15,000 ha. It is a general principle of the field of conservation biology that there is a minimum critical size if a reserve is to retain its biological diversity. It is known, however, that minimum size for long term maintenance of floral communities is much smaller than for that of faunal communities. Since the nomination areas’ values are focussed on floral values the question of small size becomes less of a concern. Moreover, four of the sites are contiguous and found in clusters which effectively adds to their viability.

Related to the question of size is the distance between the isolated fragments on the complex ecological relationships of the total rainforest ecosystem. According to the theory of island biogeography, small separated protected areas isolated by modified habitats will behave like “islands” and will lose some of their original species until the new equilibrium is reached. All of the six clusters except for two have their separate units in reasonable proximity and are joined by corridors of semi-natural habitats and buffers. In all cases, compensation for small size and scattered fragments will have to be made through intensive management. Though management plans for all sites are

completed, implementation needs to be strengthened. It is particularly important to address the need for maintaining corridors and effective buffer zones in two of the parks established in 1999.

A second point relating to integrity is the coordination of management and planning for the property as a whole. In the case of BDC, there are several management authorities responsible, but all 8 sites fall under the umbrella of the Federal Program for the Preservation of the Atlantic Forests. The nominated property is also the core of the Mata Atlantica Biosphere Reserve which is intended to facilitate buffer zone management and regional integration.

Finally, the Minister of Environment of Brazilian has written the Director of the World Heritage Centre (9 August 1999) noting the following actions relating to the BDC:

- Formation of an Executive Working Group to address conservation issues in the region;
- New initiatives to control deforestation and burning practices in the buffer zone;
- Develop an environmental education campaign;
- Provision of a R$ 13 million (around 6,7 million USD) budget for the two new parks;
- Initiate cooperation with the local Pataxo Indians;
- Implement recommendations of recent specialist meeting of the Brazilian Primatology Committee; and
- Develop a Plan of Action for all the Atlantic Forest in order to obtain increased donor support.

All of the initiatives suggest that the Brazilian authorities are giving increased attention to the Atlantic Forests and that further losses to their remaining extent will be decreased.

In conclusion, as the Brazilian conservationist Ibsen de Gusonao Camara has written, "the immense Atlantic forests in all their glory are a thing of the past, and they can never be brought back. However, wisdom and common sense can still preserve significant samples of their former splendor and we can thus avoid the future label of irresponsible vandals".

5. ADDITIONAL COMMENTS

5.1. Cultural Values

The Discovery Coast was also the first contact point with the Indians in Brazil for Europeans in 1500. It was the site of the first eye contact (Monte Pascoal), first exchange of gifts, first open air mass, first church and first colony. The name of the tree that provided the first economic wealth for the new country is Pau Brazil, the plant that gave the country its name. The region thus has significant great historical and cultural values as well.

5.2. Name

The name of the property is in need of review to be in conformity with other multi-unit sites. Brazil should be asked if they would agree to "Discovery Coast Atlantic Forest Reserves".

6. APPLICATION OF WORLD HERITAGE NATURAL CRITERIA

The nominated areas contain the best and largest remaining examples of Atlantic forest in the NE region of Brazil. The eight protected areas that make up the site combine in a forest archipelago context to reveal a pattern of evolution of great interest to science and importance for conservation. No one forest remnant would be adequate on its own. Rather, it is the collection of all six clusters

that adds up in a synergistic manner to display the biological richness and evolutionary history of the few remaining areas of Atlantic forest of northeast Brazil.

The property therefore, merits inscription under criterion (ii) for the evolutionary processes of this exceptionally diverse region as well as natural criterion (iv) for the high numbers of rare and endemic species that occur there. The fact that only these few scattered remnants of a once vast forest remain, make them an irreplaceable part of the world's forest heritage.

7. RECOMMENDATION

That the Bureau recommend to the World Heritage Committee that the "Discovery Coast Atlantic Forest Reserves" be inscribed on the World Heritage List under natural criteria (ii) and (iv). The Bureau may also wish to encourage the Brazilian authorities to complete the "Plan of Action for the Atlantic Forest Region" and other initiatives mentioned in section 4 above.

WORLD HERITAGE NOMINATION - IUCN TECHNICAL EVALUATION

ATLANTIC FORESTS (SOUTHEAST) (BRAZIL)

Note: this evaluation is based on a revised nomination of the site as submitted by Brazil on 9 April 1999.

1. DOCUMENTATION

i) **IUCN/WCMC Data sheet** (4 References)

ii) **Additional literature consulted:** Bibby et al, 1992. **Putting Biodiversity on the Map. Priority Areas for Global Conservation**. Cambridge, UK. Biodiversity Support Program, Conservation International et al, 1995. **A Regional Analysis of Geographic Priorities for Biodiversity Conservation in Latin America and the Caribbean.** Washington, DC. Brown, KS, 1987. **In Biogeography and Quaternary History in Tropical America.** pp 175-96. Whitmore and Prance, eds. Oxford: Clarendon Press. Duellman, WE (ed), 1979. **The South American Herpetofauna: Its Origin, Evolution, and Dispersal.** Univ Kansas Museum Natural History Monogram 7. Fundacao SOS Mata Atlantica, 1892. **Dossie Mata Atlantica.** Sao Paulo: Fundacao SOS Mata Atlantica. Fundacao SOS Mata Atlantica and Instituto Nacional de Pesquisas Espacias, 1993. **Atlas da Evolucao dos remanescentes florestias e ecossistemas assaciados do Domino da Mata Atlantica no periodo 1985 - 1990.** IUCN Tropic Forest Program/Conservation Monitoring Centre, 1998. Brazil Atlantic Coastal Forests: Conservation of Biological Diversity and Forest Ecosystems. IUCN, 1996. **Centres of Plant Diversity and Endemism.** Chapter IV. Mata Atlantica. Lynch, JD. 1979. University Kansas Museum Natural History Monogram 7. pp189-215. Mori, SA. 1989. Eastern Extra-Amazonian Brazil, in **Floristic Inventory of Tropical Countries: The Status of Plant Systematics**. The New York Botanical Garden, New York. Padua, Maria Thereza Jorge, 1998. **The Atlantic Forest in Brazil.** Prance, 1987. **Biogeography of Neotropical Plants**. In Biogeography and Quaternary History in Tropical America. Whitmore and Prance, eds. pp 46-65. Oxford: Clarendon Press. Thomas, et al, 1998. Plant endemism in two forests in southern Bahia, Brazil. **Biodiversity and Conservation**, 7, p311-322. CIFOR/UNESCO. 1999. **The World Heritage Convention as a Mechanism for Conserving Tropical Forest Biodiversity.** 54p.

iii) **Consultations:** Local parks staff; staff of IBAMA Brazil; local NGOs; WCPA-Brazil; local and Parana State Government representatives and external reviewers.

iv) **Field visit:** Warren Nicholls, March 1999.

2. SUMMARY OF NATURAL VALUES

The Southeast Atlantic Forests (SAF) are located in the States of Parana and Sao Paolo in SE Brazil. The nomination consists of 468 193 ha of Atlantic forest and associated shrubs (restingas). Elevation range is from sea level to 1,100 metres. The nominated property consists of 25 areas and comprises the following 6 IUCN Category I protected areas: Jureia - Itatins Ecological Station (79,270 ha); Chauas Ecological Station (2,699 ha); Guaraquecaba Ecological Station (13,638 ha); Ilha do Mel

Ecological Station (2,241 ha); Xitue Ecological Station (3,095 ha); Guaraguacu Ecological Station (1,150 ha).

The other 19 units are IUCN Category II: Superagui National Park (37,000 ha); Pariquera - Abaixo State Park (2,360 ha); Jacupiranga State Park (part of) (119,000 ha); Ilha do Cardoso State Park (22,500 ha); Carlos Botelho State Park (37,644 ha); Pico do Marumbi State Park (2,342 ha); Intervales State Park (42,926 ha); Lauraceas State Park (27,524 ha); Alto Ribeira Touristic State Park (PETAR) (35,884 ha); Salto Morato Private Reserve (1,716 ha); Serras do Cordeiro, Paratiu, Itapua, e Itinga Wild Life Zone (5,000 ha); Serras do Arrepiado e Tombador Wild Life Zone (5,125 ha); Mangues Wild Life Zone (11,070 ha); Serra do Itapitangui (e Mandira) Wild Life Zone (3,437 ha); Ilhas oceanicas Wild Life Zone (93 ha); Roberto E Lange Turistical Preservation Zone & State Park (2,698 ha); Serra da Graciosa Turistical Preservation (1,189 ha); Zone & State Park Pau Oco Turistical Preservation Zone & State Park (905 ha); Ilha Comprida Wild Life Zone (7,687 ha).

Biogeographically, the Atlantic forests of Brazil are divided into two distinct areas: the Northeastern (Discovery Coast) and Southeastern regions (Bibby et al, 1992). This nomination is focussed on the Southeastern region. The nominated area lies entirely within a much larger buffer zone of 1,223,557 ha which is managed as a UNESCO Biosphere Reserve. The buffer zone is protected by Federal legislation and provides an important corridors function.

Atlantic forests are the world's richest rainforests in terms of biodiversity (along with the Choco forests of the Colombian Amazon basin and the Yanomono forests of Peru) and they are restricted to the Brazilian coastal region. Unfortunately, the Atlantic forests have suffered the impacts of colonialisation, farming, cattle grazing and urbanisation since the discovery of Brazil. Of the original Atlantic forest, which comprised over 1,250,000 square kilometres and occupied some 15% of Brazil, less than 8% (or 90,000 km^2) still remain (see map). Partially isolated since the Ice Age, the Atlantic forests have evolved into a complex ecosystem with exceptionally high endemism (70% of the tree species, 85% of the primates and 39% of the mammals) and are considered to be among the world's richest forests for tree species (almost 300) per hectare (especially for Myrtaceae species). It is also the region in Brazil with the greatest number of endangered and threatened species. Brazil's Atlantic forests are perhaps the most endangered forest ecosystem on earth (Mori, 1989) and have been given the highest priority for biodiversity conservation (Bibby et al 1992, Biodiversity Support Program 1995). It is one of the "Global 200" ecoregions and one of the "Focal 25" priorities of WWF. The exceptionally high biodiversity and level of endemism may be explained by high tropical humidity (due primarily to the oceanic influence and hillside condensation effects), and the range of altitude and geographical extension leading to the creation of a wide range of climatic and ecological conditions.

The SAF nomination comprises 25 discontinuous protected areas that contain Atlantic forest from the SE region and which are in an intact, or near intact, condition and with appropriate management arrangements in place. The nominated area is the largest continuous area of Atlantic forest with related littoral ecosystems in Brazil. From mountains covered by dense forests, down to wetlands, coastal islands with isolated mountains and dunes, the SAF comprises a natural environment of rich biodiversity and scenic beauty. Caves, waterfalls, rugged mountain ranges and sweeping coastal vistas contribute to the outstanding aesthetic values of the region.

Both the flora and fauna are extremely diverse, with over 55,000 species of plants (22% of the total found on Earth), of which some 18,000 are endemic. There are 524 species of mammals (131 endemic), 1,622 bird species (191 endemic), 517 species of amphibians (294 endemic), 468 species of reptiles (172 endemic), over 3,000 species of freshwater fish and between 10 and 15 million estimated species of insects..

The Atlantic Forest is also the place where about 80% of Brazilian mammal species are threatened with extinction. Among the rare and threatened species are the woolly spider monkey, Southern muriqui, Southern Brown Howling monkey, four species of tamarin, the ocelot, Jacutinga, Harpy eagle and the Brazilian red-tailed parrot. The SAF protects the majority of these threatened species. The site is one of 6 Atlantic forest clusters recommended as potential World Heritage forest sites at the 1999 CIFOR/UNESCO World Heritage Forest meeting in Indonesia.

3. COMPARISON WITH OTHER AREAS

Despite sharing some of its flora and fauna with the Amazonian forest (Brown, 1987; Mori, 1989), the Atlantic forests have long been considered a distinct neo-tropical forest type (Mori, 1989; Lynch, 1979) and are in a different biogeographical province (Serro do Mar). Despite 500 years of severe human impact, the Atlantic Forests of Brazil exceed other tropical rainforests in their high biodiversity and the very high level of endemism. The suite of species makes it difficult to compare it with other tropical rainforests.

The SAF nomination comprises 25 protected areas within the Southeast region of Atlantic forest. A separate nomination covers the Northeast region of Atlantic forest. Each nomination is complementary to the other and they reinforce each other. Each has a distinct suite of species and high levels of endemism. The Atlantic forests are not homogeneous and comprise separate centres of endemism with the SE and Discovery Coast (NE) regions each containing distinct species. They are also considered separately in light of differing deforestation history.

The physiognomy of the Atlantic forests is similar from north to south, with high trees (20 - 30 m), rich in epiphyte orchids and bromeliaeds and dense undergrowth. The vegetation, on the contrary, is highly endemic and species composition changes radically along the range. Hence the submission of two separate nominations, each having distinct species compositions. Each group of forests represents an important, but highly individual, aspect of the Serro do Mar Biogeographic Province.

There are few similarities between the SAF and the existing World Heritage site of Iguazu in southwestern Parana State. Iguazu is an inland subtropical forest focussed around spectacular waterfalls. It is also in a different biogeographical province.

4. INTEGRITY

As a serial nomination, the SAF has many issues in common with other serial nominations, particularly the “Central Eastern Rainforest Reserves” in Australia (CERRA) which contains eight clusters of protected areas spread over a 600 km distance with a total size of 108,450 ha. The SAF area consists of six clusters spread along a 180 km distance with a total size of 468,193 ha.

The main question on the integrity of each property is the small size of most of the protected areas that make up the nomination. Twelve of the 25 individual protected areas in the SAF are less than 5,000 ha. It is a general principle of the field of conservation biology that there is a minimum critical size if a reserve is to retain its biological diversity. It is known, however, that minimum size for long term maintenance of floral communities is much smaller than for that of faunal communities. Since the nomination areas’ values are focussed on floral values the question of small size becomes less of a concern. Moreover, seven of the sites are contiguous and found in clusters which effectively adds to their viability.

Related to the question of size is the distance between the isolated fragments on the complex ecological relationships of the total rainforest ecosystem. According to the theory of island biogeography, small separated protected areas isolated by modified habitats will behave like “islands” and will lose some of their original species until the new equilibrium is reached. All of the seven clusters have their separate units in reasonable proximity and are joined by corridors of semi-natural

habitats and buffers. In all cases, compensation for small size and scattered fragments will have to be made through intensive management. Though management plans for all sites are completed, implementation needs to be strengthened. It is particularly important to address the need for maintaining the corridors and effective buffer zones.

A second point relating to integrity is the coordination of management and planning for the property as a whole. In the case of SAF, there are several management authorities responsible, but all 25 sites fall under the umbrella of the Federal Program for the Preservation of the Atlantic Forests. The nominated property is also the core of the Mata Atlantica Biosphere Reserve which is intended to facilitate buffer zone management and regional integration.

Being a serial nomination, it is important to note that all elements of the nomination are included solely for their composition of Atlantic Forest and that they are all functionally linked and each one contributes to the overall unity. The different areas are core areas that all lie within a much larger area that is a UNESCO Biosphere Reserve. With so little Atlantic Forest left, it is considered important to include all those areas that add to the significance of the nominated area (and which have appropriate management arrangements in place), hence there are some areas of small size included because of their significance and the fact that they add to, and do not simply duplicate, the other areas.

The smallest of the nominated areas (93 ha) is an island and hence is not able to be enlarged in size while restricting the nomination to forested areas. The second smallest area (905 ha), along with the other 14 areas that are of less than 10 000 ha, all contain very significant and individually different examples of Atlantic Forest. The inclusion of each of the 25 sites is important to ensure as complete as possible representation of the full spectrum of examples of Atlantic Forest in the region.

A particularly significant area of Atlantic forest that is not included in the nomination is the Serra do Mar National Park. Unfortunately the Park is being impacted by human activities in the intensively populated corridor between Sao Paolo - Santos. This Park would make an appropriate and significant addition to the nomination when the management is able to cope with the adverse affects of the impacts.

In conclusion, as the Brazilian conservationist Ibsen de Gusmao Camara has written: “the immense Atlantic forests in all their glory are a thing of the past, and they can never be brought back. However, wisdom and common sense can still preserve significant samples of their former splendor and we can thus avoid the future label of irresponsible vandals.”

5. ADDITIONAL COMMENTS

The name of the property is in need of revision to be in conformity with other multi-unit sites. Brazil should be asked if they would agree to “Southeast Atlantic Forest Reserves”.

6. APPLICATION OF WORLD HERITAGE NATURAL CRITERIA

The nominated areas contain the best and largest remaining examples of Atlantic forest in the SE region of Brazil. The 25 protected areas that make up the site combine in a forest archipelago context, to reveal a pattern of evolution of great interest to science and importance for conservation. No one forest remnant would be adequate on its own. Rather, it is the collection of all clusters that adds up in a synergistic manner to display the biological richness and evolutionary history of the few remaining areas of Atlantic forest of southeast Brazil.

The property therefore, merits inscription under criterion (ii) for the evolutionary processes of this exceptionally diverse region as well as natural criterion (iv) for the high numbers of rare and endemic species that occur there. The fact that only these few scattered remnants of a once vast forest remain, make them an irreplaceable part of the world’s forest heritage. With its “mountains to the sea”

attitudinal gradient, its estuary, wild rivers, karst and numerous waterfalls, the SAF has exceptional scenic values and is also considered to meet natural criterion (iii). Although the geological history of the area is also interesting, these values are considered secondary to SAF's biological features and the case for criterion (i) is less convincing.

7. RECOMMENDATION

That the Bureau recommend to the World Heritage Committee that the "Southeast Atlantic Forest Reserves" be inscribed on the World Heritage List under natural criteria (ii), (iii) and (iv). The Bureau may also wish to encourage the Brazilian authorities to make efforts to restore natural conditions in the Serra do Mar State Park which could eventually be incorporated in the site.

WORLD HERITAGE NOMINATION - IUCN TECHNICAL EVALUATION

SYSTEM OF MARINE TERRACES OF CABO CRUZ (CUBA)

1. DOCUMENTATION

i) **IUCN/WCMC Datasheet** (6 references).

ii) **Additional Literature Consulted:** Anon. 1998. **Proyecto Decreto Ley de Areas Protegidas (Cuba)**; Centro Nacional de Areas Protegidas/Agencia de Medio Ambiente, Ministerio de Ciencia, Tecnologia y Medio Ambiente. 1999. **Plan de manejo-Reserva Ecologica Maisi/Elemento Natural Destacado Caleta, Cuba**. Havana: Agencia de Medio Ambiente, CITMA; Gaceta Oficial de la Republica de Cuba. 1997. Ley No. 81 del Medio Ambiente. July 11, 1997; Ministerio de Agricultura de Cuba. 1986**. Parque Nacional Desembarco del Granma. Plan de Manejo**. La Habana; Thorsell, J. & T. Sigaty. 1997. **A global overview of forest protected areas on the World Heritage List**. IUCN; Thorsell, J., R. Ferster-Levy & T. Sigaty. 1997. **A global overview of wetland and marine protected areas on the World Heritage List.** IUCN.

iii) **Consultations:** 7 external reviewers; Senior officials of the National Council for Cultural Patrimony; the National Protected Area Centre, Ministry of Science, Technology, and Environment (CITMA); and officials of the NPAC/CITMA Central Office. Provincial level officials and field staff.

iv) **Field Visit:** February 1999. Jim Barborak.

2. SUMMARY OF NATURAL VALUES

Following the recommendation from the Bureau the new nomination only covers the area of Desembarco del Granma National Park (DGNP) that comprises 41,863ha of terrestrial and marine areas on the south-western corner of the Republic of Cuba. The nominated area is made up of 26,180ha of terrestrial area, 6,396ha of marine area, and 9,287ha of terrestrial buffer zone.

DGNP is located within the western part of the mountainous massifs of Sierra Maestra and comprises a series of elevated limestone marine terraces extending from 360m above sea level to 180m below. The nominated area lies within a tectonically active zone between the Caribbean and North American plates. The nominated area is considered representative of semi-arid ecosystems with annual precipitation of between 700 and 1,200mm. The annual average temperature is 26^{o} C.

According to still incomplete data 500 flora species have been recorded within the area with 60% endemism from which 12 species are only to be found within this area. The nominated area is considered one of the most important centres of floral endemism within Cuba. Fauna records include 13 mammals (23% endemism), 110 birds (23% endemism), 44 reptiles (90.9% endemism), and seven amphibians (87.5% endemism).

The area of Cabo Cruz, within the Desembarco del Granma National Park (DGNP), is also characterised by a system of coral formations in very clear water including deep front reefs and coral crests. Associated fauna includes four species of marine chelonians and colonies of queen conch.

DGNP contains physical features, the system of elevated ancient reef terraces and associated biological formations, are of outstanding scientific and conservation value and which contain unique ecosystems and globally significant levels of endemism. Specific features in this area include:

- globally significant uplifted marine terraces that range from a depth of 180m to 360m above sea level. The terraces which were formed by tectonic uplift, global climate change and sea level fluctuations are well conserved;
- globally significant levels of endemism, particularly in groups like reptiles and amphibians;
- outstanding pristine scenic vistas from land and sea with cliffs up to 100m high;
- unique xerophytic coastal ecosystems on uplifted marine terraces;
- deep front reefs and coral crests in extremely clear waters on old submarine terraces;
- karst features including caves, canyons, and sinkholes (up to 77m deep);
- sizeable areas of intact tropical island forest with considerable altitudinal diversity stretching from altitudes of a few hundred meters to sea level;
- a number of important archaeological sites; and
- interesting contemporary cultural values as it includes the nationally important site of Fidel Castro's "desembarco" in 1956 where he and a group of 82 revolutionaries landed after sailing from Mexico. At the site there is a replica of his boat (the Granma, which gives the park its name).

3. COMPARISON WITH OTHER AREAS

At present there is only one natural heritage property from the insular Caribbean listed on the World Heritage List: the Morne Trois Pitons National Park in Dominica. That site (6,857ha), while possessing important volcanic features not shared by DGNP, is smaller, with much lower total species diversity or total numbers or percent of endemic species. While Morne Trois Pitons has higher peaks at 1,200m, the altitudinal diversity of DGNP, which stretches from coastal waters to a few hundred meters, is similar. Morne Trois Pitons is extremely wet (rainfall over 7,000mm per year), whilst DGNP contains semi-arid ecosystems plus offshore coral reefs found on ancient marine terraces. The reef-derived karst at DGNP is totally distinct from the volcanic rocks at Morne Trois Pitons. For these reasons, DGNP compares favourably on biological terms with the only natural World Heritage Site in the insular Caribbean, and with other potential World Heritage Sites that might be nominated for their terrestrial biodiversity from anywhere in that same region.

The site compares favourably in terms of total diversity or endemism with the recently inscribed (1997) Cocos Island World Heritage Site in Costa Rica, and with the Galapagos Islands, which although located in the Pacific Ocean, are the only other comparable World Heritage Sites in tropical America located on islands. Both Cocos and Galapagos have outstanding marine resources and evolutionary, ecological and geologic features that make them unique and globally significant; however, neither has the levels of biodiversity or endemism of DGNP. The reefs of DGNP are much smaller and less diverse than those of the Belize Barrier Reef and Sian Kaan World Heritage Sites in Belize and Mexico. However, the marine component of the DGNP is not the major focus of this nomination, and the unique aspect of the DGNP reefs, like its terrestrial ecosystems, is that they are growing on a system of ancient reef terraces.

The caves are not comparable in size or known dimensions to those of World Heritage Sites like Mammoth Cave or Carlsbad Caverns in the United States. However, the karst phenomena found in the park are important based on their associated flora and fauna, their archaeological importance, and also for the diversity of karst phenomena, including giant sinks, cliffs, dolines, canyons and caves.

In summary, the DGNP is considered to possess globally significant examples of limestone marine terraces and high levels of endemic flora and fauna.

4. INTEGRITY

4.1. Boundaries

DGNP contains most key and interrelated natural elements present in the region, including the coral reef of Cabo Cruz, sea grass beds and mangroves near Pilon, and the western part of the Park, and old sub-marine terraces up to 30m deep. DGNP has sufficient size, altitudinal and climatic diversity and ecological elements necessary for the long-term conservation of the park's terrestrial ecosystems and in-shore marine ecosystems and their biological diversity, including endemic and migratory species. The current legislative framework for the park is adequate and include marine ecosystems within the regulations on boundaries of the National Park.

4.2 Management Plan

DGNP has an old master plan, under implementation since 1986, and an updated management plan was recently finalised (1997) that provides a good level of detail for management activities. However, it might require strengthening in the area of internal zoning, marine and coastal limits, financial strategies, and planning for public use in the face of probable increases in coastal tourism to the park.

4.3. Staffing and Budget

DGNP has a well-trained and motivated staff, one of the largest of any protected area in the greater Caribbean (nearly 200 staff members, including 16 professionals). The park's operational budget is of 600,000 Cuban pesos/year plus 60,000 USD of international support from WWF-Canada. The location nearby of major existing and planned tourism development sites increases potential for at least modest levels of self-financing through visitor fees.

4.4. Invasive Species

Exotic species, while less of a problem than in other smaller islands, are nevertheless present and new introductions could have unknown consequences for native flora and fauna. Several aggressive introduced thorny trees make natural regeneration of forest cover difficult without induced reforestation; for this reason the park has an active nursery and reforestation program.

4.5. Visitation

Tourism, while currently extremely limited, has potential for significant growth at Pilon as new hotel rooms at nearby beaches are built, posing special challenges to the park staff, who up to now have not had to deal with significant visitor management issues.

4.6. Human Use

Ongoing environmental education and outreach programs with the limited local rural population in the area appear to be succeeding. There appears to be little pressure from landowners or cooperatives ringing the park to encroach on forested areas and the surrounding agroforestry systems are among the

most environmentally benign land uses in the tropics. Rural population density is low and growth rates are minimal. While logging took place some decades ago in more accessible parts of the park, it has been eliminated since the park was established. The Management Plan made a provision to allow traditional fisheries by local people near the Boca del Toro canyon mouth and in Cabo Cruz. This may have some impact on coastal and reef ecosystems but this is undetermined at present. Also effluent from nearby towns could threaten the reefs, but this impact is undetermined at present.

5. ADDITIONAL COMMENTS

The Bureau at its twenty-third session (July '99, Paris) noted that the Desembarco del Granma National Park meets natural criteria (i) and (ii). The Bureau however decided to refer the nomination back to the State Party seeking their concurrence to the adjusted boundaries, including the need for a marine extension, and inviting the State Party to update the relevant information and detailed maps focusing on the Desembarco del Granma National Park. Following this recommendation of the Bureau, the State Party submitted a new nomination document containing the additional information requested. This information adequately addresses the concerns of IUCN.

6. APPLICATION OF WORLD HERITAGE NATURAL CRITERIA

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

The uplifted marine terraces of DGNP, and the ongoing development of karst topography and features on them, represent a globally significant example of geomorphologic and physiographic features and ongoing geological processes. IUCN considers that DGNP meets criterion (i).

Criterion (ii): Ecological processes

While the park is an important regional example of the evolution and development of species and ecosystems on recently uplifted marine terraces and resultant karst, it is not considered to have the universal or truly exceptional value to meet criterion (ii)**.**

Criterion (iii): Superlative natural phenomena, scenic beauty

DGNP contains superlative natural phenomena and areas of exceptional natural beauty and aesthetic importance. These include the spectacular stair-step terraces and cliffs and the ecosystems that have evolved on them, which even to the untrained eye are visually extremely attractive. They also include what are perhaps some of the most pristine and impressive coastal cliffs bordering the Western Atlantic between the Canadian Maritimes and southern South America. IUCN considers that DGNP meets criterion (iii).

Criterion (iv): Biodiversity and threatened species

DGNP contains important natural habitats for in-situ conservation, including many threatened and endemic species, which are of regional importance. However, it is not considered to attain the global importance necessary to meet criterion (iv).

7. RECOMMENDATION

That the Bureau recommend to the Committee that the System of Marine Terraces of Cabo Cruz be **inscribed** on the World Heritage list under criteria (i) and (iii). For reasons of consistency with national legislation of Cuba, the Bureau may wish to recommend to the Committee inscription of the site under the name of Desembarco del Granma National Park. The Bureau may wish to commend the government of Cuba for the efforts to conserve this site in difficult economic times. The Bureau may

also wish to recommend to the State Party to submit a request to the World Heritage Fund for technical assistance to produce a tourism management plan as an integral element of the overall management plan.

WORLD HERITAGE NOMINATION - IUCN TECHNICAL EVALUATION

ST. PAUL SUBTERRANEAN RIVER NATIONAL PARK (PHILIPPINES)

1. DOCUMENTATION

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

ii) **Additional Literature Consulted:** Middleton, J. & T. Waltham. 1986. **The Underground Atlas**. 239 p; Olsen, D.M. and E. Dinerstein. 1998. **The Global 200: A Representation Approach to Conserving the Earths Distinctive Ecoregions**. WWF-US; Protected Area Management Board, Palawan. 1996. **Saint Paul Subterranean National Park Management Plan, 1996**; IUCN. 1996. **Red List of Threatened Animals**; Davis S. *et al.* eds. 1995. **Centres of Plant Diversity**, IUCN/WWF; IUCN. 1997. **A Global Overview of Forest Protected Areas on the World Heritage List**. IUCN; Villalon, A. 1999. **Profile of National Parks in the Philippines**. Protected Areas and Wildlife Bureau, Department of Environment and Natural Resources. Quezon City. 174 p; Republic of the Philippines. 1991. **An Act Providing for the Establishment and Management of National Integrated Protected Areas Systems**.

iii) **Consultations:** 5 External reviewers, relevant officials from government and non government organisation in Philippines.

iv) **Field Visit:** J. Thorsell, January 1993; D. Sheppard and H. Friederich, February 1999.

2. SUMMARY OF NATURAL VALUES

The nominated site, the St. Paul Subterranean River National Park (SPSRNP), is located in the Saint Paul Mountain Range. It is north-west of Puerto Princesa, the capital of Palawan province. Palawan itself is 490km south-west of Manila (see Map 1). The SPSRNP lies within the jurisdiction of the government of the city of Puerto Princesa. The nominated site is a revision of an earlier one deferred in 1993, due to questions about inadequate size. The 1993 IUCN Technical Evaluation noted that, while the site was suitable for World Heritage listing, the area was too small to adequately protect its underground river watershed and to ensure the long-term viability of its significant biodiversity. The original 1993 nomination, of 5,753ha was thus revised, and an expanded nomination was considered by the World Heritage Bureau in July 1999. This was further referred back to the Philippine authorities for final modification and legal definition of boundaries. The State Party submitted a draft Presidential Proclamation declaring a nominated area of 20,202ha and this adds a 14,449ha buffer zone (hereafter called the buffer zone) to the original 1993 core nomination area. The draft Proclamation noted several points of GPS coorindates, but no map was included.

SPSRNP consists of various landforms, the most impressive of which is the karst mountain landscape of the Saint Paul Mountain Range. The topography varies from flat plains to rolling hinterlands and hills to mountain peaks. More that 90% of the park comprises sharp, karst limestone ridges around Mount St. Paul which is itself part of a series of rounded, limestone peaks aligned on a north-south axis, along the western coast of Palawan. The area's natural values are significant, and have been previously assessed by IUCN as meeting World Heritage natural criteria (iii) and (iv). quality. The

focus of the area is a spectacular karst landscape containing an 8.2km long subterranean river, one of the most unique of its type in the world. The underground river includes many speleotherms, and several large chambers exist, up to 120 meters in width and 60 meters in height. The limestone mountain has extensive karst features, both surface karst (pinnacles, shafts, dolines and limestone cliffs), as well as an extensive underground river system. A distinguishing feature of the river is the fact that it emerges directly into the sea, and that the lower portion of the river is brackish and subject to tidal influences. The underground river (the Cabayugan River) arises approximately 2km south-west of Mount Saint Paul at an altitude of 100m, and flows underground for almost its entire length to an outflow into St. Paul's Bay. All rivers and associated tributaries are within the SPSRNP nomination, which is important in relation to catchment impacts on the water quality of the Cabayugan River.

Three forest formations are present: lowland, karst and limestone. Approximately two-thirds of the nomination is forested, dominated by hardwood species. The karst forest is restricted to small pockets where soils have developed. In the coastal area, mangroves, mossy forest, sea grass beds and coral reefs are also found. The significance of forest biodiversity within the nomination is discussed in Section 3 of this report. The Alugan Bay component of the SPSRNP has been noted by a number of reviewers as having national significance for its mangrove forest. The faunal diversity in the SPSRNP is moderate, especially with respect to invertebrates. Endemic mammals include the Palawan tree shrew, Palawan porcupine and Palawan stink badger. Dugong have been recorded in the marine component of the park. Monitor lizard and marine turtles are also present. The Palawan Peacock Pheasant has also been recorded in the SPSRNP (recognised as an internationally threatened species). The subterranean fauna has not been studied in detail, but comprises fish, prawns, snakes and insects. The tunnel and chambers of the subterranean river are home to abundant populations of swiftlets and bats. Eight species of bats are also found in the cave, and cave swiftlets nest on some of the underground boulder piles. Further studies are required to determine the extent and diversity of the underground fauna.

3. COMPARISON WITH OTHER AREAS

St. Paul Underground River has similar geomorphological qualities as some other limestone areas in South and Southeast Asia, notably Gunung Mulu National Park in Sarawak, Phong Nha Nature Reserve and Ha Long Bay in Vietnam, Lorentz National Park in Irian Jaya and Gomantong in East Malaysia.

The vast majority of existing World Heritage karst sites are in temperate regions. Within the tropical karst region the following comparisons can be made. Ha Long Bay in northern Vietnam contains significant karst topography and caves, in a spectacular coastal setting. This site was not nominated on the basis of these values but the potential World Heritage significance of karst values within the site has recently been reviewed. The caves in Ha Long Bay are mostly small in comparison to the St. Paul Subterranean River, but they do have ancillary value as they provide key evidence of changing sea levels on the Sunda Shelf. In Thailand, the Thungyai-Huai Kha Khaeng Wildlife Sanctuaries contains significant areas of lowland riverine forest and other forest types more typical of strongly seasonal tropical climates. This property includes low-relief limestone terrain with some caves, and karst wetlands.

The major feature of the nominated area is the 8km underground river. There are many underground rivers in other karst regions around the world. For example, the Clearwater Cave and the 37km Melinan River in Sarawak's Gunung Mulu National Park have arguably more significant underground rivers. Within the Philippines a 9km river cave exists at Callao on Luzon. The underground river in St. Paul is not as dramatic as similar features found in existing World Heritage sites in Slovenia's Skocjanske Jama, Kentucky's Mammoth Cave or the Canadian Rockies Castleguard and Maligne River Caves.

One feature that distinguishes St. Paul, however, is that the underground river flows directly into the sea amidst a tropical coastal setting. The underground river flowing into the sea, and the associated tidal influence, makes this an outstanding feature. One reviewer also noted that St. Paul warrants special consideration simply because it is one of the few such rivers which the general public can easily experience and appreciate.

There is one other World Heritage site in the Palawan Biogeographic Province: the Tubbataha Reef Marine Park. However, this protects different values from those identified for St. Paul. Palawan is an important biogeographic province, with a rich biota drawn from both Malaysian and Pacific sources. Palawan is distinct from the rest of the Philippine archipelago as it lies on the Sunda Shelf and has derived most of its fauna from Borneo during recent geological times.

The biodiversity within this site is considered significant. The Palawan Moist Forest, which is represented within the nomination, is noted in WWF's Global 200 report as having the richest tree flora of Asia, with high levels of regional and local endemism. The Palawan Moist Forest also has the largest and richest examples of limestone forests in Asia. The St. Paul National Park is also noted, in a recent global overview of forested protected areas on the World Heritage List (IUCN, 1997), as a forested protected area which may merit consideration for World Heritage nomination. This was reinforced in an expert consultative meeting on World Heritage Forests, which was held in Sumatra in December, 1998. This meeting considered St Pauls to be a tropical forest site of high biodiversity value, with high World Heritage potential. The conservation significance of this forest at the international level is heightened when considered in the context of the high levels of past and current deforestation in the Philippines and in the region. For example, the Environmental Legal Assistance Centre (ELAC) of Puerto Princesa notes that: "in 1903, there were more than 21 million hectares of forest in the Philippines, or more than half of the country's total area. Today, less than 6 million hectares of forest are left. In 1994, there were only 800,000 hectares of old growth forest left". Palawan has, in fact, been described as "the last best hope" for forest conservation in the Philippines. The role and maintenance of St. Paul takes on a special urgency in this perspective.

The marine component of the property is a small but important feature of the nomination and the mangrove swamp, adjacent to the limestone hills, adds to the what is a spectacular natural setting.

In conclusion, SPSRNP has a number of features that combine to distinguish it from other areas. These include:

- The underground river flowing directly into the sea amidst a tropical forest setting, with its associated tidal influence;
- The forests within the nomination which are amongst the most significant in Asia, being representative of Palawan Moist Forest, and which have been identified in a number of expert reviews as having World Heritage potential; and
- The fact that this is the most important site for conservation in the Palawan Biogeographic Province.
- The coverage of a complete "mountains to the sea ecosystem", within the nomination

4. INTEGRITY

4.1. Boundaries

A Presidential Proclamation has declared that nominated area of 20,202ha as the St. Paul Subterranean Natural Park, under the Philippines NIPAS Act of 1992. The Proclamation includes specific GPS co-ordinates describing the nominated area. The area is shown in Map 2 and includes

land within the boundaries of three Barangays (Barangay is an administrative boundary for local purposes).

There are two relevant points which were reinforced by the 1999 field inspection. First, the reason for the deferral of the original nomination was to ensure adequate protection of the catchment of the underground river, and thus ensure protection of the natural values, particularly those related to water quality and quantity of the underground river. This river and its tributaries are all within the Barangay Cabayugan. This is thus the critical area for protecting any potential World Heritage values in the nomination. The adjoining Barangay Marufinas also has important biodiversity values, particularly for forest conservation. The natural values of the other Barangays, while still important, are less significant in the context of potential World Heritage, as these areas are not essential for the protection of the catchment values of the subterranean river, and are less important for biodiversity conservation. IUCN thus notes that the current nomination is confined to the core area of the park and to the immediately adjacent Barangays (Tagabinet, Cabayugan and Marufinas).

It should be noted also that Ulugan Bay, while considered by IUCN to not be of World Heritage status, is very important for mangrove conservation, at a national level. This significance should be recognised, possibly through designation as a Ramsar site, if agreed by the State Party.

Second, the nomination notes that consultation with key stakeholders within the nominated area occurred in December, 1997. However, the field inspection in February, 1999 noted a lack of clear agreement by relevant Barangays to the inclusion of lands within the nominated area as World Heritage. This was addressed by the State Party through further consultation. Formal resolutions have been submitted from the three Barangays surrounding the St. Paul Subterranean River National Park noting their agreement to include their respective areas within the revised nomination boundaries.

4.2. Legal Status

The previous IUCN review recommended deferral until a legal definition of boundaries is available. Clear legal protection of natural values is essential before the area could be considered for World Heritage listing. The boundaries of the nomination have been incorporated within a Presidential Proclamation, which declares the nominated site as protected area under Republic Act 7586 (NIPAS Act of 1992).

IUCN also notes that the legal owner of the Park is the City Government of Puerto Princesa, by virtue of the Memorandum of Agreement (MOA) for Devolution, between the City Government and the National Government. Under this MOA, the City Mayor is the authority with full responsibility over the property and all management decisions for the Park are made by the Mayor in consultation with the Protected Areas Management Board (PAMB). This agreement means that the area is protected at a local rather than a national level. This arrangement appears to have worked effectively to date, largely reflecting strong support at the local political level, particularly from the City Mayor. If this area is inscribed as a World Heritage site, IUCN considers it important that the status of natural values is monitored effectively over time, to ensure that these values are not compromised by any change in local management perspectives which may occur in the future.

4.3. Management

Management can be considered at two levels: the core zone and the buffer zones. Management of the core zone (comprising the Park) is currently very effective, reflecting strong local political support as well as reasonable funding and staffing levels. Funds raised from tourists visiting the site are increasing and earnings are deposited into a trust fund, with expenditures from the proceeds allocated for park management purposes. St. Paul is the only National Park in the Philippines that earns an income from fees in this way. Staffing levels are adequate but more training in park planning and

management is required. Current park management builds on the foundation of earlier work, particularly that started when the park became the subject of an internationally financed Debt-for-Nature Swap Programme in 1989, through WWF – The World Wide Fund for Nature.

There is a management plan for the Park which sets out relevant objectives and programmes to ensure effective management of the Park. The plan provides for zonation within the park boundaries. IUCN considers the management plan for the park to be a professional document, but more resources are required in order to fully implement the plan.

Management of the buffer zone is covered by management guidelines which seek to regulate activities to minimise impact on the core zone. These guidelines are presently being prepared by the PAMB with the assistance of the European Council-Palawan Tropical Forestry Programme (EC-PTFPP), which aims to establish sustainable protective measures for the agricultural land within the buffer zone. It further aims to introduce protective measures that conserve natural resources and improve the quality of life of the area's residents. IUCN considers that the existing management plans for the core zone and the management guidelines for the buffer zone should be consolidated and harmonised, in order to effectively protect the catchment of the underground river. It is noted that such harmonisation is underway at present and this is to be commended.

4.4. Threats

There are several threats to the core zone of the SPSRNP from activities in the adjacent catchment area. The main threats are from forest clearing and agricultural activities. Tourism in the area, if not carefully planned and implemented, also has great potential to adversely impact on the natural values of the core zone. At present, tourism is at low level although it is increasing. Tourism management objectives for the Park are set out in the management plan and these appear relevant and effective. It is important that a tourism development strategy be developed for the entire nomination, (core and buffer zone) which enhances visitor appreciation of nature while protecting natural values. Water quality in the underground river is invariably affected by upstream agricultural activities in the catchment area. Evidence of these activities was witnessed by the IUCN mission team in 1999. There is need for the previously mentioned management guidelines to cover issues such as removal of pollution inputs to the river.

5. ADDITIONAL COMMENTS

5.1. Regional Integration

The nominated area demonstrates the importance of integrated regional planning, if core World Heritage values are to be protected. It is noted that all of Palawan is covered by an Integrated Conservation and Development Plan. Within the nomination, the Palawan Forestry Protection Programme is currently addressing many of the issues mentioned above, within the buffer zone.

5.2. Cultural Heritage

St. Paul Cave was known to local people since ancient times, in their thoughts it was inhabited by a spirit that prevented them from entering the cave. The park's territory and surroundings are the ancestral lands of the Batak and Tagbanua communities. The needs of the local communities are being considered through the preparation of the previously mentioned management guidelines.

5.3. Ulugan Bay

This area is located within the nominated area, and it comprises mangrove forests in various conservation states. It has been estimated that 15% of the mangroves in the Philippines are in Ulugan Bay. Possible threats to Ulugan Bay from a proposal to establish a Naval base were also noted by the

IUCN mission. This area is considered nationally significant and IUCN considers that it may be suitable as a Ramsar site. This should be considered by the State Party.

5.4. Recommendation from the twenty-third ordinary session of the Bureau: July, 1999.

The Bureau noted that the site meets natural criterion (iii) and (iv). The Bureau however decided that the nomination be referred back to the State Party for amendment and legal definition of boundaries so that they include the area most important for the protection of the catchment of the underground river and for biodiversity conservation. As noted, the State Party submitted a draft Presidential Proclamation to the World Heritage Centre on 15 September, 1999, which noted a number of GPS coordinates. A map was requested but had not been received by IUCN as at 6 October, 1999.

6. APPLICATION OF WORLD HERITAGE NATURAL CRITERIA

The SPSRNP is nominated under three natural criteria. The previous IUCN evaluation report in 1993 noted that the site: "meets two natural criteria: criterion (iii) as a site with a spectacular karst landscape including its underground river and caves, and criterion (iv) with its habitat for many rare and endemic species." This evaluation report reinforces the 1993 evaluation and notes the following in relation to the three natural criteria under which the SPSRNP was nominated.

Criterion (ii): Ecological processes

The SPSRNP provides examples of important on-going ecological processes. IUCN considers this importance to be of regional rather than international significance and considers that this nominated site does not meet natural criterion (ii).

Criterion (iii): Superlative natural phenomena, scenic beauty

The Saint Paul Mountain Range features a spectacular limestone karst landscape. The underground river, flowing into the sea, and its associated tidal influence, make this a significant natural phenomena. IUCN considers that the nominated site meets criterion (iii).

Criterion (iv): Biodiversity and threatened species

The nominated area represents a significant habitat for biodiversity conservation. The SPSRNP contains a full mountain to the sea ecosystem and protects the most significant forest area within the Palawan Biogeographic Province. IUCN considers the nominated area meets natural criterion (iv).

7. RECOMMENDATION

That the Bureau recommend to the Committee that the St. Paul Subterranean River National Park be **inscribed** on the World Heritage list under natural criteria (iii) and (iv), subject to a signed Presidential Proclamation and a map of the site being available by the time of the November 1999 Bureau Meeting. The Bureau should commend the Government of the Philippines on two issues:

- Their consultative process undertaken with relevant authorities, specifically the affected Barangays; and

- Their approaches to integrated regional land use planning which aim to ensure that the World Heritage values of the nominated site are maintained.

WORLD HERITAGE NOMINATION - IUCN TECHNICAL EVALUATION

WESTERN CAUCASUS (RUSSIAN FEDERATION)

1. DOCUMENTATION

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

ii) **Additional literature consulted:** V. Akatov et al. (eds.) **Adygea: Nachhaltige Entwicklung in einer Bergregion des Kaukasus**. Grüne Liga/NABU, Berlin, 1999. A.M. Amirkhanov et al (eds.) **Biodiversity Conservation in Russia**. State Committee of the Russian Federation for Environment Protection, Moscow, 1997; I.V. Chebakova (ed.) **National Parks of Russia: A Guidebook**. Biodiversity Conservation Center, Moscow, 1997; S.D. Davis et al. (eds.) **Centres of Plant Diversity: A Guide and Strategy for their Conservation, Volume 2, Asia, Australia and the Pacific**. WWF/IUCN, Gland, 1995; V. Krever et al. (eds) **Conserving Russia's Biological Diversity: An Analytical Framework and Initial Investment Portfolio**. WWF, Washington DC, 1994; N.M. Zabelina et al. (ed.) **Zapovedniks and National Parks of Russia**. LOGATH, Moscow, 1998; documents relating to review of Kavkazskiy State Biosphere Reserve by UNESCO Advisory Committee on Biosphere Reserves, 1998; maps of geology, soils, and forest taxa in Kavkazskiy State Biosphere Reserve.

iii) **Consultations:** 2 external reviewers, relevant officials from government organisations in Russia, consultant from NABU, Greenpeace Russia, WWF Russia, IUCN Russian office.

iv) **Field visit:** M. Price, June 1999.

2. SUMMARY OF NATURAL VALUES

The nominated site is at the far western end of the Greater Caucasus mountains within Krasnodar Kray and the Republics of Adygea and Karachevo-Cherkessia (see Map 1). It includes a number of units, totalling 351,620ha (see Map 2). The largest of these is the Caucasus (Kavkazskiy) state biosphere reserve (275,841ha), together with its buffer zone (6,000ha), most of which is 1km wide and runs along much of the perimeter of the reserve except in the Republic of Karachevo-Cherkessia and where the reserve abuts Georgia (Abkhazia). A further 56,910ha of the nominated site comprises the three elements of the most strictly protected zone of Sochi National Park (all in Krasnodar Kray). The remainder of the nominated site comprises four small areas in the Republic of Adygea: the Bolshoy Thach nature park (3,700ha); and the nature monuments of Buiny Ridge (1,480ha), the headwaters of the Tsitsa River (1,913ha) and the Pshecha and Pshechashcha Rivers (5,776ha).

The region is mountainous, ranging in altitude from 250m to peaks over 3,000m, of which the highest is Akaragvarta (3,360m). The geology is very diverse, including sedimentary, metamorphic, and igneous rocks from the full span of periods from the Precambrian to the Paleozoic; it is also very complex, reflecting the origin of the Caucasus mountains. The north part of the site is characterised by karst limestone massifs with many caves, including 130 in the Lagonaki massif alone. Over the majority of the site, the landscape has a typical glaciated relief, with high peaks, 60 remnant glaciers (total area 18km^2), moraines, and over 130 high-altitude lakes. The main rivers on the north side are

the Bol'shaya Laba and Belaya, which feed into the Kuban; on the south side, the rivers are shorter, flowing into the Black Sea. There are numerous waterfalls, up to 250m in height.

The flora of the area is characterised by clear zonation, both vertically and from west to east. The western part has oak-hornbeam and beech and beech-fir forests; the higher central parts have fir-spruce forests with birch and maples at high altitudes; and the eastern parts have both fir-spruce and pine-cedar forests. Above the timberline at c. 2,500m are endemic rhododendron thickets as well as subalpine and alpine meadows. In total, 1,580 vascular plant species have been recorded on the site, including 967 in the high mountain zone, of which about one third are endemic. Of the forest plant species, about one fifth are relict or endemic. About 10 percent (160) of the vascular plant species are considered threatened with extinction in the Russian Federation, the Republic of Adygea, and Krasnodar Kray. There are over 700 species of fungi, including 12 which are threatened in Russia.

The fauna is also rich, with 384 vertebrate species. The 60 mammal species include wolf, bear, lynx, wild boar, Caucasian deer, tur, chamois, and reintroduced European bison which is globally endangered. Signs of snow leopard area occasionally seen (globally endangered). There are 246 species of birds, including many endemics, 24 of which are threatened in Russia, and 24 which are globally threatened. There is also a high species richness of amphibians, reptiles, and fish, with many rare species. About 2,500 insect species have been recorded; the projected total is 5,000.

3. COMPARISON WITH OTHER AREAS

The site is part of one of the major mountain ranges of Europe, and needs to be compared both with these and with other mountain ranges around the world. With a total length of 1,100km, the Greater Caucasus is the third longest mountain range in Europe, exceeded only by the Scandinavian mountains (1,500km) and the Urals (2,000km). It is longer than the Alps or the Carpathians. The Caucasus rises higher than any of these other European ranges; its highest peak is Elbrus (5,642m). However, the site does not include the highest peaks of the range. Its scenery is also not as spectacular as in the higher parts of the Caucasus, being more reminiscent of the Alps or Rocky Mountains than the high mountain ranges of Asia or South America.

The Caucasus as a whole is isolated from other mountains by seas and plains, and this high degree of isolation – together with its transitional position between Europe and Asia – is responsible for a high level of endemism. The vascular plant species richness of the entire Greater Caucasus is estimated at 6,000 species, and the site includes nearly one-third of these, including Tertiary relicts, Mediterranean and Asiatic Turano-Iranian elements, and many endemic species.

The Greater Caucasus may be subdivided into three subunits, each with different ecological conditions. On the territory of the Russian Federation, there are four other reserves of national park or reserve (zapovednik) status, of which three are in the central Caucasus (Prielbrussky national park and Kabardino-Balkarsky and Severo-Osetinsky zapovedniks). The only other reserve or national park in the warmer, humid western Caucasus is the Teberdinsky zapovednik/biosphere reserve (85,000ha), at altitudes from 1,260 to 4,042m. The vascular flora includes 1,260 species and there are 224 vertebrate species. The geology includes only crystalline rocks. Before 1935, the area was used for intensive grazing, logging and hunting. In comparison, the nominated site is much larger, encompasses a greater range of vegetation zones, and has a greater species diversity and a greater geological variety. It has also had a very limited human influence. Around its edges, there have been some pressures from grazing, logging, and hunting – and these have led to some boundary changes. Some of the areas taken out of the zapovednik are now either under strict protection in Sochi National Park (established in 1983), or nature parks or monuments established by the President of the Republic of Adygea; these are all included in the proposed site. Overall, the site is remarkable because it primarily consists of natural ecosystems with minimal or no human influence.

A principal reason for the establishment of the zapovednik in 1924 was to re-establish the mountain sub-species of the European bison. Hybrids of the sub-species were reintroduced to the wild in the 1940s, and have gradually recolonised much of the northern part of the zapovednik, which provides a reservoir from which animals have spread into adjacent areas. The current population in the zapovednik is about 350, down from a high of c. 700 in the early 1990s primarily due to bad winters. Local scientists aver that the morphological attributes of the present herd are very similar to those of the original sub-species.

In conclusion, although the site is not in the highest part of the Caucasus, it has a remarkable diversity of geology, ecosystems, and species. It is of global significance as a centre of plant diversity (WWF/IUCN, 1995). Apart from the Virgin Komi forests of the Urals, it is probably the only large mountain area in Europe that has not experienced significant human impacts, containing extensive tracts of undisturbed mountain forests that are unique at the European scale, and subalpine and alpine pastures that have only been grazed by native animals. No mountain World Heritage site in Europe has a comparable range of habitats, from lowland forests to glaciers. The forests include very large specimens, including possibly the largest trees in Europe: specimens of Abies nordmanniana (Nordmann fir) 85m high with a diameter of more than 2m. The site also provides core habitat for the endangered mountain sub-species of the European bison (even though these derive from hybrid populations) and is occasional habitat for snow leopards. Finally, there are no existing World Heritage sites in this particular biogeographic province (Udvardy's Caucaso-Iranian Highlands province).

4. INTEGRITY

4.1. Ownership and legal status

The site consists of land under three types of ownership and legal status:

1) Caucasus State Biosphere Reserve (CSBR): created in 1924 and now under federal jurisdiction through the State Committee for Environment Protection (Goskomehkologia) under the federal law on protected natural areas (15.02.95);

2) Sochi National Park: created in 1983 and under federal jurisdiction through the Ministry of Forestry under the federal law on protected natural areas (15.02.95);

3) the buffer zone of the CSBR, the Bolshoy Thach Nature Park, and the Nature Monuments of Buiny Ridge and the headwaters of the Tsitsa, Pshecha, and Pshechashcha rivers which are protected territories of regional importance, under the jurisdiction of the Forests Committee of the Republic of Adygea. The buffer zone was declared in 1981 and the other protected areas in the 1990s, by decree of the President of the Republic of Adygea.

4.2. Management

The various parts of the site are under different management regimes. Totals for staff are given for the entirety of both the CSBR and Sochi National Park, although both of these include areas outside the nominated site.

1) CSBR. The director-general is in Adler, with a sub-director in Maikop responsible for the part of the reserve in Adygea (about one-third of the CSBR). There are regulations for the reserve, and a management plan was prepared in 1997. The reserve is divided into six regions, each with a head ranger and other rangers under him. The total staff of the reserve is 199, including 15 administrative staff, 45 scientific workers, 95 rangers, 8 people in the department of ecological education, and 44 technical personnel.

2) Sochi National Park. The director is in Sochi; as well as the federal Ministry of Forestry, the Forest Committee of Krasnodar Krayhas some influence over activities in the park through its complex programme of nature protection. In 1987, a project for the forest management of the park was produced, with detailed maps showing four zones: protected, landscape protection (zakaznik), extensive use, and intensive use. A proposal has been made to change these zones, and to have a five-fold zonation. However, no decision has been made in this regard, and it was not possible to obtain a map of current or proposed zonation during the field visit or subsequently. The total staff of the park is 169, including 17 in administration, and 15 forest guards. The remainder are guards, technicians, and other workers.

3) Buffer zone, nature monuments and nature park in Adygea. There are no personnel allocated to the management of these areas, but they are managed to some extent by staff of the CSBR, under agreement with the government of the Republic of Adygea. While these areas have had regulations for two years, there is no management plan for any of them, though they fall within the scope of the complex programmes of social-ecological development and of tourism for the Republic. According to the regulations, all human uses (particularly logging and hunting) are forbidden in the nature monuments. No logging takes place in the Bolshoy Thach Nature Park.

During the field visit and subsequently in Moscow, the issue of formulating and implementing a single management plan for the entire site was discussed with officials from all of the agencies responsible for managing the various elements of the site. The management of the CSBR and representatives from the Republic of Adygea indicated that they did not see a difficulty with having one management plan for the land under their jurisdiction, though it was noted that the State Committee for Environment Protection would have to pay for its preparation. However, there are questions as to whether the National Park management is prepared to have parts of the park included in a management plan for the entire site and this is still unresolved. Discussion with officials of Krasnodar Kray and the federal Ministry of Forestry determined that the director has a certain degree of autonomy in making such a decision. IUCN considers that development of an integrated management strategy for the entire site is important, that it should involve all relevant agencies and that it should be undertaken as quickly as possible.

4.3. Human use of the area

Human use of most of the area is very limited, apart from employees of the CSBR and the national park and a small number of visiting scientists. Approximately 2% of the area of the CSBR is allocated to the rangers to grow crops and for grazing their animals; rangers are also allowed to remove small quantities of wood for fuel and for bridges. All of these areas are around the edges of the reserve. There are a few wooden buildings in the reserve to provide shelter for rangers and scientists.

Part of the reserve – the Lagonaki plateau (16,500ha) – was not included in the nomination because of past high levels of grazing and continuing tourist use. The area was within the initial boundaries of the CSBR but later removed. Until 1955, 50-60,000 head of livestock (cattle, horses, sheep) were grazed on the plateau each summer. This led to significant changes in vegetation as well as some soil erosion. By the end of the communist era, numbers of cattle had declined significantly, not least because of lowered primary productivity. In 1992, the area was returned to the CSBR, and currently no more than 1,000 head of cattle (and some horses) graze the area each summer, all owned by local farmers.

Lagonaki is also the starting point for Federal Trail 30. This starts at the end of the only asphalt road to enter the reserve (but only for a few hundred metres). The trail passes through the CSBR, crossing the main ridge of the Caucasus on the way to the Black Sea. In the communist era, 10-15,000 people used this trail, in organised groups. In recent years, only 1-3,000 people a year have used the trail. It

is likely that the forests along this trail have been used to some extent to provide firewood and shelter. There are also other trails on the Lagonaki plateau.

Apart from the road to Lagonaki, the only other road reaching the northern part of the reserve goes to the small settlement of Guzeripl, where the reserve has a museum which attracts about 3,000 visitors a year. On the south side of the site, the parts of Sochi National Park included in the nomination are not accessible by road. No information is available on numbers of tourists to these areas, although an official in the federal Ministry of Forestry noted their attractiveness.

4.4. Threats

Overall, the site is characterised by a very high degree of naturalness. Four types of threats can be recognised: hunting, a potential road, tourism, and logging.

Hunting. The nomination document includes a table which shows significant decreases in the numbers of game animals over the period 1990-97: deer 2500 -> 1300; tur 6331 -> 2900; chamois 2800 -> 2090; bison 733 -> 350; roe deer 300 -> 200. During the field visit, considerable time was spent in exploring these declines. The principal reason appears to have been severe winters in the early 1990s, when the majority of the losses occurred; numbers have subsequently been reasonably stable. Another reason given by CSBR staff was that funds for providing salt for animals in the reserve (formerly placed by helicopter) have decreased, so that less salt has been placed – while over the same period, the same amount (if not more) salt has been placed in hunting reserves (zakazniks) and domestic grazing areas adjacent to the CSBR. At the same time, the numbers of animals permitted to be shot each year in these reserves has increased; a decision of the Department for Hunting of the federal Ministry of Agriculture. Thus, it would seem that some animals are being drawn out of the reserve and then shot, decreasing overall populations.

There is also some illegal hunting within the reserve. This is mostly by local people from Adygea, for food; each year, rifles are confiscated and a few people are imprisoned and fined. More critical has been hunting by people from Abkhazia, who sometimes spend considerable periods in the CSBR killing animals and preparing meat to take back. There have been gunfights with CSBR staff, and some people have been killed. Another possible threat to wild ungulates is posed by wolves, which were shot from 1975 until 1982. However, there was general agreement that these pose more of a risk to the livestock of rangers than to wild ungulates. The general consensus was that populations of ungulates are stable in spite of undoubted pressure; and the size of the site is one of its guarantees of integrity in this regard.

Potential road. At present, no roads cross the site. Roads reach the northern boundary at Guzeripl and Lagonaki, where the road then becomes the one major long-distance hiking trail across the main ridge of the Caucasus to the Black Sea. A road has been proposed more or less along this route (to Dagomys on the coast), and initial technical and engineering studies have been undertaken. The Republic of Adygea has asked the Federal Road Service for funds for the economic and environmental evaluation of the proposal. There appear to be two main reasons for this proposal: 1) to provide better access from Adygea to the Black Sea coast; and 2) to facilitate the development of tourism in the mountains around the road (see section below).

With regard to the first reason, there is already a road which connects Adygea to the Black Sea coast at Tuapse. This road is serviceable, but needs upgrading. However, once upgraded, it would be usable all year, as it crosses only low mountain passes. In contrast, the road through Lagonaki would cross a high mountain pass, and would probably be open only c. 4 months a year because of the high snowfall in the area. It would run through difficult terrain, and would be likely to have substantial environmental impacts both directly (e.g., road construction, habitat loss, animal mortality from traffic, increased numbers of landslides) and indirectly through increased access potentially leading to

hunting, increased tourist use, and possibly logging on the southern slope. These impacts are of concern when considered in the context of the nomination of this area as a World Heritage site.

There has been significant public outcry against the Lagonaki-Dagomys road, coordinated by the Socio-ecological Union of the Western Caucasus. The issue was raised during the field visit with the President of the Republic of Adygea, who was not willing to give an assurance that the road would not be built. It is noted that the Republic's Minister of Environmental Protection is against the construction of the road, as is the government of Krasnodar Kray.

IUCN considers that the status of this road in relation to the nominated area should be clarified before a final decision is made on the World Heritage nomination.

Tourism. At present, levels of tourism to the site are very low, though no data are available except for the museum at Guzeripl (3,000/year). The management of the CSBR recognises that tourism can have environmental impacts, but at the same time they need financial resources, and tourism is an obvious source. In 1998, the CSBR placed a barrier at the Lagonaki entrance to the reserve. The only vehicles allowed in are those of the cattle herders on the Lagonaki plateau or those on official business. Visitors are charged an entry fee, and this provides an important contribution to the budget of the CSBR.

Given that this zapovednik suffers from the same problems of financial insecurity as all others in Russia, it is not appropriate or realistic to ban tourism; and the management of the CSBR indicated during the field visit that the development of areas on the Lagonaki plateau and in the buffer zone for tourism will be undertaken in consultation with the reserve's scientific council. Nevertheless, in at least one meeting considering the proposed Lagonaki-Dagomys road, officials of the Republic of Agygea responsible for the Fisht ecological-tourist zone immediately north of the CSBR were in favour of developing the road. Similarly, the President of the Republic has recognised the value of the road for developing tourism.

Overall, it seems likely that levels of tourism in the Lagonaki-Fisht area and some parts of the border areas of the site will increase. However, the management of the CSBR and officials of the Republic of Adygea recognise the need for appropriate development; and it must be recognised that access to the north side of the site is limited and seems likely to remain so.

No information is available regarding levels of tourism, if any, in the parts of Sochi National Park within the proposed site. Adjacent to the southern boundary of the CSBR is the summer and winter sports resort of Krasnaya Polyana. This – as well as the various resorts along the coast of the Black sea – is certainly a source of tourists, and both the management of Sochi National Park and the federal Ministry of Forestry recognise the tourism potential of the park and adjacent parts of the CSBR.

Logging. Although the site includes very large trees, only the parts in the four protected areas in Adygea have experienced significant logging. This should now effectively have stopped with their designation. At present they are not easily accessible by road.

To the south of the site, a zone designated for forestry divides the Sochi National Park in two, reaching the southern boundary of the CSBR. However, as the terrain in this area is very rugged, it appears unlikely that there would be logging near this boundary. In the parts of the site within Sochi National Park, there may be pressure for logging to supply the towns along the Black Sea coast, or for export. It was not possible to explore these issues in any detail during the field visit. The situation with logging should be kept under review.

5. ADDITIONAL COMMENTS

Regional management context. The majority of the site is designated as a biosphere reserve. Adjacent to the site is not only the remainder of Sochi National Park (to the south), but also seven zakazniks and the Fisht ecological-tourist zone of the Republic of Adygea to the north. In one way or another, all of these areas are formally devoted to the objectives of conservation and/or sustainable development; and it is notable that a sustainable development concept has recently been developed for the part of the Republic of Adtgea north of the CSBR, to be implemented from late 1999. There is therefore considerable potential for more integrated regional planning and for fuller implementation of the objectives of the biosphere reserve concept in this region. This would require greater levels of involvement of the local population, and better coordination between the individuals and agencies responsible for managing the various areas.

Lagonaki plateau. One part of the CSBR is excluded from the nomination: the eastern part of the Lagonaki plateau which was formerly excessively grazed and now has limited grazing and some tourism. Following discussion and a site visit during the field visit, it would seem appropriate to consider this part of the Lagonaki plateau as part of the nomination, for the following reasons: 1) the high biological diversity of this area: the carabid species diversity is particularly high, and two-thirds of the site's vascular plant species, including many endemics, are found there; 2) grazing levels are now low; 3) CSBR managers plan to use the area for research on revegetation of eroded areas and on increasing species richness on heavily-impacted areas; and 4) CSBR managers are aware that tourism should be developed sustainably and in an integrated way with the site.

6. APPLICATION OF WORLD HERITAGE NATURAL CRITERIA

The site has been nominated under all four criteria.

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

The nominated site includes sedimentary, metamorphic and igneous rocks from all periods from the Precambrian to the Paleozoic. It is very complex, primarily consisting of a series of thrust sheets, with a major Triassic anticline composed of karst limestone with deep gorges and many caves in its northern part. It shows all the effects of quaternary glaciation; remnant glaciers still remain. However, none of these characteristics are of outstanding significance at the global scale, being typical of many mountain ranges around the world.

Criterion (ii): Ecological processes

Since the last glaciation, ecological succession has taken place across the nominated site, resulting in a great diversity of ecosystems. The forests are remarkable at the European scale for their lack of human disturbance, i.e., natural ecological processes have continued over millennia. Vegetation dynamics and timberline have not been influenced by the grazing of domestic animals; an unusual situation at a global scale. There are important populations of both ungulates and wolves, providing opportunities for studying both competitive interactions between grazing animals and predator-prey interactions. Given the size and untouched nature of the site, it should be considered for inscription under this criterion.

Criterion (iii): Superlative natural phenomena, scenic beauty

The nominated site includes the typical variety of mountain landscapes. Overall, these cannot be considered as being of the superlative character needed to meet this criterion.

Criterion (iv): Biodiversity and threatened species

The Caucasus are one of the global centres of plant diversity. The nominated site includes nearly one-third of the 6,000 plant species of the Greater Caucasus, including Tertiary relicts and Mediterranean and Asiatic Turano-Iranian elements. About a third of the high mountain species and about a fifth of the forest species are endemic. The fauna is also very rich. The site is the place of origin and reintroduction of the mountain sub-species of the European bison, and acts as a reservoir for its expansion through the region. There are stable populations of many other large mammals. The avifauna is rich, and includes many endemic species. There are also high levels of species richness and endemicity in the lower orders.

Apart from the Virgin Komi Forests of the Urals, the nominated site is probably the only large mountain area in Europe that has not experienced significant human impacts. Its subalpine and alpine pastures have only been grazed by wild animals. Its extensive tracts of undisturbed mountain forests, extending from the lowlands to the subalpine zone, are unique in Europe. The forests include very large specimens, including possibly the largest trees in Europe: specimens of Abies nordmanniana (Nordmann fir) 85m high with a diameter of more than 2m.

The rich biological diversity of the site, reflecting its location at the meeting place of elements from surrounding regions and its isolation; its size, including a wide range of undisturbed ecosystems over an altitude of more than 3,000m; and its importance as habitat for threatened species warrants inscription under this criterion.

7. RECOMMENDATION

That the Bureau note that the following areas (see Map 3) have potential for inscription on the World Heritage List under criteria (ii) and (iv):

- the entire territory of the Caucasus State Biosphere Reserve (CSBR) with the exception of the Khosta Yew-Box Grove, but including the entire Lagonaki plateau;

- the buffer zone of the CSBR, the Bolshoy Thach nature park, and the nature monuments of Buiny Ridge and the headwaters of the Tsitsa, Pshecha, and Pshechashcha rivers which are protected territories of regional importance, under the jurisdiction of the Forests Committee of the Republic of Adygea.

IUCN also notes the uncertainty over the future of the Lagonaki-Dagomys road and its potential impact on the integrity of the site. IUCN thus recommends to the Bureau that this site be **deferred** and that the Bureau recommends that the State Party:

- submit a revised nomination with boundaries covering the above recommended area;
- advise of the status of the Lagonaki-Dagomys road in relation to the nominated area; and
- advise on mechanisms proposed for ensuring the integrated management of this area including the preparation of a management plan.

WORLD HERITAGE NOMINATION - IUCN TECHNICAL EVALUATION

THE HIGH COAST (SWEDEN)

1. DOCUMENTATION

i) WCMC Data Sheet

ii) Additional Literature Consulted: Nordic Council of Ministers. 1996. **Nordic World Heritage**. Copenhagen; Trenhaile A.S. 1997. **Coastal Dynamics and Landforms**. Clarendon Press. Oxford; Marsh, J. 1998. A Global Overview of Geological Features in Natural Heritage Sites. Draft theme study report to IUCN; Thorsell, J.R. Levy and T. Segaty. 1997. A Global Overview of Wetland and Marine Protected Areas on the World Heritage List. IUCN; IUCN. Summary and Technical Evaluation, The Lapponian Area,(Sweden), 1996; **National Parks in Sweden**, Environment Protection Board, 1984; Lofgren, 1998. **Sweden's National Parks**; Curt Freden (Ed.), 1994. **National Atlas of Sweden**, Swedish Academy of Sciences; County Administration of Vasternorrland. 1998. The High Coast, 5000 Years of Human History; Rapakivi granites and related rocks in Central Sweden, Research Papers, SGU series Ca87, Uppsala 1997; Classification of Coastal Landforms; F.C. Bird, **Coasts: An Introduction to Coastal Geomorphology**, MIT Press 1968; Pirazzoli, Paolo Antonio, 1996. **Sea Level Change the Last 20,000 years**, John Wiley & Sons.1996; Kvarken Council (Sweden/Finland). 1999. Proposed World Heritage Nomination for Kvarken – The Quark.

iii) Consultations: Five external reviewers, relevant officials from Swedish Environment Protection Agency, country administration, State geologist and local university specialists.

iv) Field Visit: June 15-18, 1999. Harold Eidsvik.

2. SUMMARY OF NATURAL VALUES

The nominated site lies within the specific area known as the "High Coast" of Sweden (HCS). HCS is located on the west shore of the southern Gulf of Bothnia, a northern extension of the Baltic Sea. The size of the nominated area is 1,425km^2 including the marine component of 800km^2. There are a number of off-shore islands. Two villages exist within the site which has a resident human population of 4,500 people. The HCS is a mosaic of human and natural landscapes with agriculture, fishing and tourism as the main economic activities. Approximately 9% of the total area is protected in 28 different protected areas with most of the remaining land under private ownership. The site has a long history of human use dating from late Stone Age dwellings and remains of an Iron Age village.

Physically, the archipelago has irregular topography with a series of lakes, inlets and flat hills rising to 350m. Vegetation is typical of the west eurasian taiga with a mix of alpine, boreal forest and wetland communities. The offshore islets support small seabird populations. The main natural values of the HCS are geological and relate to the glacial history of the area. Since the retreat of the last ice cap, 18,000 – 9,600 b.p., the land began to uplift. The geomorphology of the region is largely shaped by the combined processes of glaciation, glacial retreat and the emergence of new land from the sea which continues today at a rate of 0.9m/century. Total uplift of the area since the greatest extent of the last ice age is estimated to be 800m. Since the final retreat of the ice from the HCS 9,600 years

ago, the uplift has been in the order of 285-294m which is the highest evident ”rebound” known. Raised shorelines and the shifting location of glacial moraines are two of the marks left on the landscape which, in turn, gives rise to variations in soils and vegetation types. The extent of the "isostatic rebound” in the region is of scientific importance in demonstrating the original size of the ice sheets and their impact on northern Europe.

3. COMPARISON WITH OTHER AREAS

There are 200 protected areas in the West Eurasian Taiga Biogeographic Province, including one mixed site in Sweden (The Laponian Area) and one natural site in Russia (the Virgin Komi Forest). Both of these existing sites are much larger and also display a wide range of geological features. They do not, however, illustrate the isostatic uplift phenomena that occurs in the HCS. Many other protected areas in the Baltic Sea region display raised coastlines including several identified in the 1996 **Nordic World Heritage** report of proposed natural sites.

There are 47 sites inscribed on the World Heritage under geological criteria, many of which contain glacial landforms and several of which have and are experiencing uplift (e.g. Gros Morne, Los Glaciares, Macquarie Island). There are also 39 natural World Heritage sites with a coastal and marine component, some of which (e.g. St. Elias Parks, Henderson Is. Southwest New Zealand and the nominated St Lucia property) illustrate raised coastline phenomenon. The distinctiveness of the HCS site is the extent of the total isostatic uplift which, at 294m, exceeds all of the above except those that have been raised as a result of tectonic forces. The only other site with comparable isostatic uplift is found in Richmond Gulf in south-eastern Hudson’s Bay (Canada) which has been measured at between 275-290m. This area is very remote and extends over a great distance while the HCS can be seen in a small and accessible area.

In conclusion, the HCS is one of many places in the world that is experiencing uplift as a result of deglaciation. Isostatic rebound is well-illustrated in this site which is among the highest of such sites known. Other natural features of the HCS are relatively common and do not stand out as particularly unique at an international level. Similarly, the HCS scenic values, consisting of a blend of farmland, coastline and hills, are harmonious, but typical of much of the rural landscape of northern Europe.

4. INTEGRITY

The HCS nomination is a region inhabited by an estimated 4,500 people who practice small-scale agriculture and fishing. One national park of 2,950ha and 18 nature reserves (size ranging from 2-934ha) are contained within the region. According to IUCN’s protected area management categories, HCS is Category V-Protected Landscape. The nomination notes that 9% of the total area is under protected status with most of the rest being the marine component and private lands. About 2% of the marine component is protected but the nomination does not provide details of the natural values that occur there (56% of the size of HCS is marine).

The HCS boundaries are sufficient to include the values for which it is nominated except for the western upland boundary which omits a portion of the highest paleocoast. Past mining and quarrying are claimed not to have damaged geological features, but agricultural and forestry activities have led to some disturbance of superficial deposits. The impact of marine fisheries on sea bed habitats is not known but bottom fishing and mineral exploration would affect its geological values. Only 15km^2 of the 800km^2 marine component of the area is under protective status.

Management plans exist for all the nature reserves and the national park but these lands constitute only 9% of the total area. The two relevant municipalities do have development plans and the National Natural Resources Law recognises the HCS as an area of national interest. Although the largest proportion of the HCS is marine, there is no information on its management status except to note that 2% of it is protected.

It is also noted that a major highway runs through the area and a new bridge is being constructed. The field review expressed some concerns over a visual intrusion of a large television tower and proposed expansion of wind turbine generating stations. The nomination states that World Heritage status will assist in more protection of the geological features as well as encourage the continuation of small-scale farming. Management of such multiple use and privately owned areas, however, will be difficult to achieve as there is no single management agency responsible for the area.

In sum, IUCN believes that the legislation, if applied effectively, would be reasonably adequate to protect the land area of the HCS, even though 82% of it allows for some form of development. However, without a unified management framework and without sufficient attention given to the 56% of the area that is marine, assurances of long-term integrity as per Operational Guidelines 44 (v, vi) would be cause for concern.

5. ADDITIONAL COMMENTS

Since the field inspection of the HCS, UNESCO's World Heritage Centre has received a draft of a joint Finland/Sweden nomination for an adjacent area known as "The Quark". The document was submitted on 11 June, 1999 by the Kvarken Council who are the cross-border organisation between the two countries. This site is also proposed in the **Nordic World Heritage** report prepared by the Nordic Council of Ministers. A substantial part of the rationale for the proposed Quark nomination is based on similar isostatic phenomena as well as what appear to be other substantial biological and landscape values. The nomination has yet to be formally submitted by the two State Parties but it has been endorsed by a number of municipalities and country administrations. As there is such a close proximity of the Quark and the HCS, and as there is a large duplication of heritage values, the relation between the two sites needs clarification.

6. EVALUATION

As discussed above, there are a number of questions and uncertainties over various aspects of the nomination of the HCS, These include:

- The lack of an adequate comparative analysis in the nomination which does not allow a clear and convincing case to be made on the international significance of the isostatic rebound issue and related ecological processes;
- The lack of documentation in the nomination of the natural heritage values of the marine environment which comprises 56% of the total area; and
- The lack of an assessment of the potential overlap of HCS with the proposed transborder nomination of the Kvarken/Quark site;

In addition there are a number of concerns over management issues that would mean that the HCS would not fulfil the Conditions of Integrity as provided in the Operational Guidelines for the Convention.

Finally, both the **Nordic World Heritage** report and the report of the IUCN field inspection, recommend that the site may be considered as a potential cultural landscape nomination. Certainly with its strong historical traditions and attractive rural landscape features, the feasibility of this would seem worthy of investigation.

7. RECOMMENDATIONS

That the Bureau recommend to the Committee that the High Coast nomination be **deferred** to allow the Swedish authorities to (i) more fully document the values of the marine portion of the area; (ii) to

provide a more complete comparative analysis including its relation to the proposed Quark World Heritage nomination; and (iii) address the various issues relating to integrity. The Bureau may also wish to suggest that the State Party consider the prospect of nominating the site under cultural criteria.

A.1. EXTENSION OF NATURAL PROPERTIES INSCRIBED ON THE WORLD HERITAGE LIST

WORLD HERITAGE NOMINATION - IUCN TECHNICAL EVALUATION

MIGUASHA PROVINCIAL PARK (CANADA)

1. DOCUMENTATION

i) **WCMC Data sheet:** (17 references)

ii) **Additional literature consulted:** Richard and Lelievre, Herve, 1998. **Comparative Study of the fossiliferous sites of the Devonian.** Ministry of Environment and Fauna, Government of Quebec, Cloutier; Wells, R.T. 1996. **Earth's geological history - a contextual framework for assessment of World Heritage fossil site nominations.** Working Paper No. 1 of Global Theme Study of World Heritage Natural Sites, IUCN. **Reglement sur les Parcs (Park Regulations)**. Government of Quebec. Selection of newspaper articles, media reports, tourist documents and popular science writings, including: Grescoe, T., 1997. Where Fishes Walked. **Canadian Geographic**.

iii) **Consultations:** 1 external reviewer. Director-General, Parks Quebec. Director, Miguasha Provincial Park. Officials from Parks Canada, Department of Parks & Wildlife and Quebec Department of Environment. Park palaeontologist and other park staff.

iv) **Field Visit:** May 1999. Paul Dingwall and Associate Professor David Elliott.

2. SUMMARY OF NATURAL VALUES

Miguasha Provincial Park is located on the north shore of the Ristigouche River, which also forms the southern coast of the Gaspe Peninsula in south-eastern Quebec, Canada (see Map 1). The Park, covering some 87ha, was established in 1985 to protect the coastal exposure of the Escuminac Formation. This Formation (see Map 2), which is Upper Devonian in age and contains a unique vertebrate fossil fauna, is 8km long and 1km wide. It attains a maximum height of 100m and is represented by four distinct outcrops. The most important of these extends for 3km, rises to 30m and essentially constitutes the park. Dating from 370 million years ago, the Escuminac Formation is composed of alternating layers of sandstone, silt and schists, and is overlain by the Carboniferous-age Bonaventure Formation whose reddish colour is the origin of the term "Miguasha" in the language of the native Micmac people.

The fossil assemblage at Miguasha is particularly important for representing fishes of the Devonian Period. Of the eight groups associated with this period, which is commonly referred to as the "Age of Fishes", six are found at Miguasha - this degree of representation being rare among sites of the same age throughout the world. Furthermore, the site is remarkable for the exceptional condition of fossil remains, including 3-dimensional specimens and allowing for observation and study of soft body parts such as gill imprints, digestive traces, blood vessels and cartilaginous elements of skeleton. Of great importance is the presence of the crossopterygian group of fishes, which share many characteristics with the tetrapods: (four-legged land animals). It was the discovery of one of these, the Eusthenopteron (the so-called "Prince of Miguasha") which focused the attention of the international scientific community on the Escuminac Formation, giving rise to the modern conception of evolution from fish to land dwelling vertebrates.

The site is also distinguished by fossil invertebrates, plants, and spores including the first terrestrial scorpion, 10 species of plants belonging to the first vascular flora of the primitive Devonian forests, and some 80 spore species. These allow a picture of the Devonian ecosystem to be constructed.

3. COMPARISON WITH OTHER AREAS

Miguasha is included on the Global Indicative List of geological sites as compiled by the World Heritage Geological Working Group. Sites with important fossil values on the World Heritage List include the Canadian Rocky Mountain Parks (which contain as one of their many features the famous Burgess Shales), the Dinosaur Provincial Park (with 60 species of Cretaceous dinosaurs) and the Grand Canyon National Park (where exposed horizontal strata display fossil remains over 2 billion years of geological time). The Australian Fossil Mammal Sites (Riversleigh/Naracoorte) are considered to be among the world's ten greatest fossil sites (Wells, 1996). They illustrate the evolution of Australia's mammal fauna. Many other World Heritage sites contain notable fossils as one element of their total value but there is no site on the list for its fossil values alone.

The State Party commissioned a study, published in 1998, to establish the relative scientific and conservation significance of the world's Devonian fossil sites. The scientifically based methodology for this comparative assessment takes careful account of the 10-question checklist developed by IUCN for evaluating the significance of fossil sites (see Annex 1), and the nine recommendations in the 1996 report of Wells for establishing the World Heritage standing of a fossil site. The authors derived seven criteria for addressing the relative significance of sites: vertebrate biodiversity; faunal representativeness; evolutionary representativeness; environmental representativeness; palaeobiological representativeness; quality of fossil preservation, and abundance of specimens. An initial evaluation was made of 61 of the world's Devonian vertebrate fossil sites, selected by a process of extensive bibliographic search and consultation with other scientists. The list was then reduced to 15 key sites, including Miguasha, by eliminating those not meeting at least one of five qualifying criteria, viz.: more than 10 vertebrates species; more than three major groups of fishes; more than one environmental component; macroremains of vertebrates; and more than 100 vertebrate specimens.

These 15 sites were then evaluated using a scoring system, awarding either an arbitrary score or an absolute score based on actual numbers. From this evaluation, Miguasha is ranked as being:

- 6th in overall vertebrate biodiversity, its lower ranking due mainly to the absence of sharks, and some other minor groups;
- 1st in representativeness of evolutionary events particularly because of the presence of many first and last representatives of animal groups, and organisms of unusual anatomical interest;
- 3rd in palaeobiological representativeness, measured from features such as ingested prey, or growth series;
- 1st in quality of fossil preservation, especially on account of the existence of 3-dimensional and soft anatomy specimens; and
- 1st in abundance of specimens, due in particular to the accessibility of the site and extensive collections by museums and research institutions over the past century.

A final, overall rating places Miguasha first in seven of the 10 significance categories assessed, and either second or third in the remaining three categories. The study, therefore, concludes that among more than 60 of the world's most important Devonian fossil sites, the Escuminac Formation of Miguasha is outstanding as the most representative of the Devonian Period. Furthermore, Miguasha is revealed as globally paramount in representing evolutionary events, the exceptional quality of specimen preservation and the abundance of vertebrate fossils.

The comparative assessment report is considered a fair reflection of Miguasha's primary ranking among the world's Devonian fossil sites. The report is authoritative and its authors have impeccable credentials in palaeontology for undertaking the study with internationally recognised expertise in Devonian fossil vertebrates including sarcopterygian fishes - the group from which land animals developed; and placoderms - a group of jawed vertebrates confined to the Devonian.

There are some qualifications that should be borne in mind, however. The comparative assessment report highlighted some of the inherent methodological difficulties in undertaking comparisons among fossil sites. For example, deciding what features to evaluate and how to score them.

Devonian fish sites, being marine in origin are relatively widespread and consist of many of the same species. Miguasha, thus, is not the only such site of renown for fossil fishes. Two of these, Gogo Station and Canowindra, both in Australia, were included among the 15 key sites evaluated in the comparative study. In the final analysis, the Gogo size is ranked fifth and Canowindra fourteenth. Gogo, though globally significant, is more restricted than Miguasha in its representation of Devonian environments, and is less exceptional in terms of vertebrate anatomical preservation. Canowindra is comparatively low-ranked in all respects among the 15 key sites. The other significant site, Rhynie Chert in Scotland, is significant only for preservation of terrestrial plants and lacks the vertebrate faunas necessary for it to represent the Devonian as the "Age of Fishes".

4. INTEGRITY

The long-term security of protection and management of the site are not in question, and all relevant conditions of integrity are satisfactorily met. This site fully meets World Heritage Integrity criteria where other sites fail to do so. The comparative study mentioned above shows that of the 15 key Devonian age fossil sites assessed in the world, only Miguasha enjoys formal protection.

The nominated site is a Provincial Park within an extensive protected area system in the Province of Quebec. It has statutory protection in perpetuity under Quebec law, with legislative provision both for park management and for protection against mining activities. The land tenure is public property under the jurisdiction of the Quebec Government. The administrative system for parks in Quebec is currently being restructured under a new Ministry of Fauna and Parks. Responsibility for park operations has been transferred to the State-owned Societe des etablissements de plein air du Quebec (SEPAQ), while legal, policy and planning functions will be conducted by a new Societe de la faune et de parcs (SFP).

There is a legally binding management plan for the Park which establishes the paramount protection objectives of management while providing for compatible recreational, education and research uses through use of a zoning system. The plan prohibits all forms of exploitation, modification or exploitation which might detrimentally affect the park environment and natural values.

The park boundaries are appropriately located to encompass a substantial proportion of the Escuminac Formation, including its most continuous surface expression. There are plans to extend the park boundaries in future.

Annual visitation is approximately 40,000 with use restricted to low-impact observation and appreciation of the park environment. The collection of fossils is strictly prohibited except for approved scientific and educational purposes. There is remarkably very little experience of illegal collection, but many instances of visitors adding valuable fossils to the collections. The entire area of the park and a surrounding privately owned 775ha Peripheral Zone are protected from mineral exploration and excavation activities. There are no permanent residents in the Park and the Park headquarters are located in the Peripheral Zone, which also has about 120 residents. The park is

adequately staffed and financed to ensure security of protection and meet the educational and recreational needs of visitors.

5. ADDITIONAL COMMENTS

The 1993 nomination of Miguasha Provincial Park for inscription on the World Heritage List was withdrawn by the State Party pending development of a contextual framework for assessing World Heritage fossil sites, and further examination of the comparative significance of Miguasha in relation to the natural values of other Devonian fossil sites. IUCN has since developed this contextual framework, including a checklist of criteria for measuring the World Heritage significance of sites (see Annex 1). These have been carefully taken into account in the new nomination as well as in the comparative study (Section 3 above).

The Committee have previously rejected three earlier fossil nominations (*Jixian* (Permian exposures in China), the *Petrified Forest on Lesbos* (Greece), and the *Fossil Findings of Ipolytarnoc* (Hungary)) as they did not meet natural criteria. Despite this the rigorous comparative assessment applied to this nomination should be seen as a significant step forward in objectively assessing the outstanding universal value of fossil sites.

6. APPLICATION OF WORLD HERITAGE NATURAL CRITERIA

Miguasha is nominated in accordance with World Heritage natural criterion (i), as an outstanding representative of a major stage in the earth's history, including the record of life.

Its claim is based upon the site's international scientific reputation as the most outstanding place in the world for preserving fossils that characterise the Devonian Period as the "Age of Fishes" (360-410 million years ago).

Miguasha is of paramount importance in having the greatest number and best preserved fossil specimens found anywhere in the world of the lobe-finned fishes that gave rise to the first four-legged, air-breathing terrestrial vertebrates - the amphibians. In fact, Miguasha's extensive fossil assemblage includes the oldest known specimen of the world's amphibian ancestors.

Of all the world's Devonian fossil sites that contain significant representation of the fishes, Miguasha stands out as the most significant in terms of its representation of evolutionary events, the exceptional quality of fossil preservation and the abundance of vertebrate fossils. It also ranks highly among all other sites in terms of overall representation of biodiversity.

There are about 60 important Devonian fossil sites in the world, of which 15 are regarded as key sites in revealing the vertebrate animal life of that geological time period. Rigorous comparative analysis of these sites, using a wide range of significance criteria, has revealed that the Escuminac Formation of Miguasha Provincial Park is clearly the most outstanding, particularly in respect of its representation of evolutionary events, the quality of fossil preservation and the abundance of fossils. The reviewers are satisfied that this analysis is scientifically sound and that the conclusions are valid.

Miguasha cannot claim, however, to represent all elements of Devonian life and environments - but no one site anywhere in the world can do this. The best one can expect is optimum representation of key biotic and palaeoenvironmental elements. In its representation of vertebrate life, Miguasha is the most outstanding fossil site in the world for illustrating the Devonian as the "Age of Fishes". In this respect, Miguasha has an unequivocal claim to being of universal value in terms of natural criterion (i).

In addition Miguasha satisfies the World Heritage integrity criteria where other sites fail to do so. The comparative study shows that of the 15 key Devonian age fossil sites assessed in the world, selected from a total of 61, only Miguasha is formally protected.

7. RECOMMENDATION

It is recommended that the Miguasha Provincial Park be **inscribed** on the World Heritage List under criterion (i). The Committee may wish to note the rigorous comparative assessment applied to this nomination, in order to establish its outstanding universal value, as a model methodology for future fossil nominations.

ANNEX 1

IUCN FOSSIL SITE EVALUATION CHECKLIST

In evaluating prospective fossil sites for inscription on the World Heritage List, IUCN has prepared the following ten questions which provide some indicative measures of significance. These questions are not meant to be binding, but for evaluation purposes it would be expected that fossil sites of truly outstanding universal value would rate highly in most, if not all, of the following:

1. Does the site provide fossils which cover an extended period of geological time? ie. how wide is the geological window?

2. Does the site provide specimens of a limited number of species or whole biotic assemblages? ie. how rich is the site in species diversity?

3. How unique is the site in yielding fossil specimens for that particular period of geological time? ie. would this be **the** type locality for study or are there other similar areas that are alternatives?

4. Are there comparable sites elsewhere that contribute to the understanding of the total "story" of that point in time/space? ie. is a single site nomination sufficient or should a serial nomination be considered?

5. Is the site the only or main location where major scientific advances were (or are being) made that have made a substantial contribution to the understanding of life on earth?

6. What are the prospects for on-going discoveries at the site?

7. How international is the level of interest in the site?

8. Are there other features of natural values (eg. scenery, landform, vegetation) associated with the site? ie. does there exist in the adjacent area modern geological or biological processes that relate to the fossil resource?

9. What is the state of preservation of specimens yielded from the site?

10. Do the fossils yielded provide an understanding of the conservation status of contemporary taxa and/or communities? ie. how relevant is the site in documenting the consequences to modern biota of gradual change through time?

WORLD HERITAGE NOMINATION - IUCN TECHNICAL EVALUATION

BELOVEZHSKAYA PUSHCHA/BIALOWIEZA FOREST - EXTENSION (BELARUS / POLAND)

1. DOCUMENTATION

i) **IUCN/WCMC Data Sheet**

ii) **Additional Literature Consulted:** Breymeyer, A. (ed.) 1997. **Biosphere reserves in Poland.**- Warsaw, pp 71-96. Chebakova, I. V. 1997. **National parks of Russia**.- Moscow, BBC, 167 pp. Falinski, J. B. 1975**. Anthropogenic changes of the vegetation of Poland**.- Phytocoenosis 4.1, pp 97-116. Falinski, J.B. 1986. **Vegetation dynamics in temperate lowland primeval forests - Ecological studies in Bialowieza Fores**t.- Geobotany 8, Dr W. Junk Publishers, Dordrecht/Boston/Lancaster, 537pp. Falinski, J. B., Kwiatkowski, W. 1994. **Concise geobotanical atlas of Bialowieza Forest**.- Warsaw/Bialowieza, **Phytocoenosis-Supplementum Cartographiae Geobotanicae** 6, 88pp. Luchkov, A., Tolkach, V., Berwick, S., Brylski, P. (ed.) 1997. **Belovezhskaya Pushcha** - Forest Biodiversity Conservation.- Minsk, 297pp. Ministry of Environmental Protection, Natural Resources, and Forestry 1998. **The contract for Bialowieza Forest**.- Warsaw, 16pp. The Board of Polish National Parks 1998. **National Parks in Poland**.- Warsaw/Bialowieza, 61pp.

iii) **Consultations:**

iv) **Field Visit:** April, 1999. Gerhard Heiss

2. SUMMARY OF NATURAL VALUES

This nomination is a proposal to extend the Belovezhskaya Pushcha/Bialowieza World Heritage Site, which is a transboundary World Heritage site between Belarus and Poland. The existing World Heritage area covers 87,607ha on the Belarus side and 5,316ha on the Poland side. This nomination of 5,186ha, is an extension to the existing World Heritage area on the Polish side. It has been nominated by Poland and is part of the Bialowieza National Park. This National Park was expanded in October 1996 when the Council of Ministers approved an extension of the area to make the whole site a National Park, which covers 10,502ha. It is situated in northeast-central Poland on the border with Belarus within Podlasie Promice, 62km southeast of Bialystok and 190km northeast of Warsaw (see Map 1).

The extension area is a part of the whole Belovezhskaya Pushcha/Bialowieza Puszcza unit. It is situated on the hydrological divide between the Baltic and Black Seas and lies in the drainage basin of the river Narewka, a tributary of Narew river. The area is covered by glacial formations of Central Poland with deposits composed of deep sands, sands overlaying clays, and clays and loams overlaying the Cretaceous bedrock. Other major deposits are organogenic formations of peat and marshy peat which occur in river valleys and local depressions which often contain raised mire systems.

Climate is of the cool continental type. Snow cover persists for three months a year on average. Mean annual precipitation is 640 mm and mean annual temperature is 6.8° C.

The Bialowieza National Park is situated in the centre of Belovezhskaya Pushcha/Bialowieza Puszcza, an extensive forest complex. Bialowieza Puszcza is considered one of the best investigated forest ecosystems in the world. Over a hundred years of scientific research has been conducted here. However, most of scientific research undertaken is limited to the strict nature reserve of Bialowieza National Park. 113 different plant associations have been noted within its Polish part. 20 forest associations, four communities of water plants, two shrub communities, and 13 communities of peat bogs and meadows occur within Bialowieza National Park. All major forest associations of this part of Europe occur. Dominant tree species are spruce, hornbeam, small-leafed lime, alder, oak, Norway maple, pine, ash, birch, and aspen. Beech, sycamore, large-leafed lime, larch, and yew are absent. 277 species of lichens, 200 species of mosses, 80 species of myxomycetes, and over 3,000 species of fungi have been identified within the national park.

The proposed extension area includes forest habitats of parabolic dunes and peatbogs with oligotrophic pine forests surrounded by hornbeam-oakwoods which are considered unique in northeast Poland. Besides here, they have survived only in marginal stream valleys of Bierbza and Narew rivers.

More than 10,000 species of fauna have been observed within the Bialowieza National Park, including 120 breeding birds and 56 species of mammals. Among mammals most noteworthy are European bison, wolf, lynx, otter, beaver, and moose. The Belovezhskaya Pushcha/Bialowieza Puszcza is most well known as the nucleus of the European bison. At present, nearly 300 bisons range freely on the Polish side and 240 on the Belorussian side. Most noteworthy birds are capercaillie, black stork, crane, eagle owl, pygmy owl, spotted eagle, booted eagle, three-toed woodpecker, and white-backed woodpecker.

3. COMPARISON WITH OTHER AREAS

The Belovezhskaya Pushcha/Bialowieza National Park - Extension Area (BPE) is located in the Middle European Forest Biogeographic Province and is part of the boreonemoral forest biome (transition zone of boreal coniferous and temperate deciduous broadleaf forests). The BPE is part of the Belovezhskaya Pushcha/Bialowieza Puszcza forest complex, the largest and best preserved lowland forest in Europe and is within the enlargement of Bialowieza National Park which occurred in 1996 (10,502ha). Within the palearctic realm six World Heritage sites with temperate forests exist - Pirin National Park/Bulgaria (40,060ha), Huanglong Scenic and Historic Interest Area/China (72,000ha), Huangshan/China (15,400ha), Taishan/China (25,000ha), Plitvice Lakes National Park/Croatia (19,200ha), and Durmitor National Park/Yugoslavia (32,000ha). The BNE shares no similarities with the sites listed above. Similarities may be better found in other reserves of Belarus and the Russian Federation like Berezinskiy Strict Nature Reserve/Belarus (76,201ha), Chavash Varmane National Park/Russian Federation (25,199ha), Khvalynsky National Park/Russian Federation (25,514ha), Marii Chodra National Park/Russian Federation (36,593ha), Nizhnyaya Kama National Park/Russian Federation (25,848ha), Samarskaya Luka National Park/Russian Federation (127,186ha), and Smolny National Park/Russian Federation (36,482ha). However, those areas are smaller in size and the state of preservation of old growth forests is lower than the Belovezhskaya Pushcha/Bialowieza Puszcza as a whole.

Belovezhskaya Pushcha/Bialowieza Puszcza forest complex is divided by state boundaries into a Belorussian part of about 90,000ha and a Polish part of about 60,000ha. While nearly the total Belorussian part (87,607ha) was nominated in 1992 for inclusion on the World Heritage list, the Polish part was limited to 5,316ha following the boundaries of the existing Bialowieza National Park boundaries at that time.. The extension area (5,186ha) increases the biodiversity in forest habitats of the Polish part by protecting oligotrophic pinewoods. However, those pinewoods are common on the Belorussian side of the existing World Heritage site (about one third of Belovezhskaya National Park). Native old-growth forest stands are rare and natural condition of forests in general is much lower on the extension area than in the existing World Heritage site on the Polish side.

4. INTEGRITY

All of the Belovezhskaya Pushcha/Bialowieza Puszcza forest complex is State-owned. The national park is managed by the Ministry of Environmental Protection, Natural Resources and Forestry. The extension area is legally protected under national park status since 1996 and no people live within the area. The extension area is surrounded by a buffer zone of 3,224ha in size.

In general, threats for the extension area are the same as for the national park and the Belovezhskaya Pushcha/Bialowieza Puszcza as a whole. Major threats are forest exploitation, agriculture, human impacts on the hydrological system, poisonous chemical transports, and air pollution. Within the existing World Heritage site on the Polish side 4,747ha are under strict protection without any human activities besides limited access of visitors. However, it is noted that forest management activities are not prohibited from any part of the extension area. These activities include removal of dead timber, thinning, and harvesting of seed trees. IUCN considers that forest exploitation represents a threat within the extension area itself and also in the surrounding zone. IUCN considers these activities are not compatible with potential World Heritage status.

In recognition of the unique value of the forest complex, the Ministry of Environmental Protection, Natural Resources, and Forestry has launched in 1998 'The Contract for Bialowieza Forest' with its major goal of enlarging national park boundaries to cover the whole complex in 2000. This would involve an additional extension of the National Park to cover a total area of between 58,000 and 59,000ha. However, a final decision has not been taken yet and discussions have reached a crucial point at present. It is noted that the additional extension may take a number of years as it involves sensitive issues with the local population. The implementation of this plan is anticipated to commence in July 2000.

Other threats include intensification of agriculture on the Belorussian side and activities associated with drainage. In the sixties, drainage of large areas in Belarus caused a significant decrease of groundwater level causing decline of some tree species. Recent plans for new drainage activities in Belarus could impair the sensitive forest ecosystem once more. The Siemianowka water reservoir on Narew river has also been noted as a potentially serious impact to the natural integrity of the hydrological system. However, investigations on impacts of this reservoir are just under way and it is not possible at this time to draw well-founded conclusions. Concerns also exist about poisonous chemical transport on a railway line crossing the forest complex for 9km on its northwestern end, 8km from the national park boundary.

The importance of managing the Belovezhskaya Pushcha/Bialowieza Puszcza forest complex as one integrated unit should be emphasised. The creation of this site as the first transboundary World Heritage site in 1992 was an important step to achieve this integrated management. However, expansion of the boundaries of Bialowieza National Park is considered necessary to ensure effective management of species and threats over the whole forest complex. The previously mentioned initiative by the Ministry of Environmental Protection, Natural Resources, and Forestry regarding "The Contract for Bialowieza Forest" is an important initiative which should be supported, particularly its major goal of inclusion of the whole forest complex under national park status. IUCN applauds the decision to allocate resources to realise this plan by the Ministry. Aside from scientific and ecological reasons, the enlargement provides the opportunity for all settlements in the surroundings of Bialowieza Puszcza to participate in touristic income sources which are limited now to the Bialowieza village only.

A management plan for the Bialowieza National Park is under preparation and will be ready in 2002. This applies to the whole area of the National Park, plus the planned additional extension. In terms of budget and equipment, the site appears to have adequate resources at present.

5. ADDITIONAL COMMENTS

5.1. Cultural Values

The IUCN review mission noted cultural features within the extension area, specifically the (48ha) Palace Park, a park designed in English style from the end of the 19th century with a set of buildings dating back to 1,845 and representing hunting architecture of the tsar period.

6. EVALUATION

Belovezhskaya Pushcha/Bialowieza Puszcza (150,000ha) has remained the largest and best preserved unit of mixed lowland forests in Europe divided by state boundary into a Belorussian (90,000ha) and a Polish part (60,000ha). While in Belarus nearly all forests of the complex have been designated as a national park (87,607ha) and became part of the first transboundary World Heritage site (92,923ha), a high level of protection by national park status in Poland has been limited to 5,316ha. In 1996 Bialowieza National Park has been extended to 10,502ha. The extension area (5,186ha) is nominated to become part of the World Heritage site.

Following field investigations, IUCN notes that the extension area provides an important contribution to biodiversity of the Polish part of existing World Heritage site, in particular by inclusion of oligotrophic pinewoods. However, oligotrophic pinewoods are quite common on the Belorussian part of the site (about 30% of forest cover) and therefore, this is not significant for the existing World Heritage site as a whole. Additionally, the natural condition of forests within the extension area is less than that within the existing World Heritage site on the Polish side. Within the extension area forest stands with high degree of human impacts are common and native old-growth stands are rare. No part of the enlargement is currently subject to strict prohibition of human activities by law. Thus, it is considered that the extension area is not significant enough by itself to warrant inclusion within the World Heritage site at this stage. Also, the conditions of integrity are not considered sufficient to warrant World Heritage status at this time.

Nevertheless, proposals by the Polish Government to expand the existing Bialowieza National Park are to be applauded, and to be encouraged at all levels.

7. RECOMMENDATIONS

The extension area not be included within the existing World Heritage site.

It is suggested that the Bureau outline its support for the Polish Government initiative for expansion of the existing Biolowieza National Park to give legal protection to the whole unit. IUCN notes that: (a) if this expansion occurs; and (b) if the standards of protection which apply within the existing World Heritage site apply to the expansion area, then it recommends that a new nomination proposal, enclosing the whole Polish part of the Belovezhskaya Puscha/Bialowieza Puszcza, should be nominated by the State Party.

B. NOMINATIONS OF MIXED PROPERTIES TO THE WORLD HERITAGE LIST

WORLD HERITAGE NOMINATION - IUCN TECHNICAL EVALUATION

MOUNT WUYI (CHINA)

1. DOCUMENTATION

i) **IUCN/WCMC Data Sheet** (4 References).

ii) **Additional Literature Consulted:** State Environmental Protection Administration. 1998. **China's Biodiversity: a country study.** Beijing; Hideo Tagawa and Mitsuru Hotta. ed. 1997. **Co-existence of the World Humid Evergreen Forest Ecosystems and People**. in Tropics 6(4); Chen Changdu. 1999. **On the position of Wuyishan Mountain in the biodiversity conservation of China**. Peking University, 3/1999.

iii) **Consultations**: 4 external reviewers, Peking University, Beijing, local scientific and cultural experts of Fujian Province.

iv) **Field visit:** March-April, 1999. Les F. Molloy.

2. SUMMARY OF NATURAL VALUES

Mount Wuyi lies along the north-western boundary of Fujian Province (with Jiangxi Province) in south-eastern China. They form the watershed between tributaries of the lower Yangtze Kiang to the north, and the Min River system of Fujian to the south. Mount Wuyi is heavily forested, with steep slopes and deep gorges. The range is the highest in south-east China and is sometimes referred to as "The Roof of Eastern China". The highest peak, Mt. Huanggang, is 2,158m and there are more than 110 other peaks higher than 1,000m.

Mount Wuyi lies along latitudes 27-28^{o} N and, because they are only 250km from the East China Sea, they have a warm, wet and foggy climate subject to the monsoonal influence. The annual precipitation varies little throughout the site, ranging from 2,200mm in the SW to 3,200mm in the NE around Mt. Huanggang. Although Mount Wuyi lies within the subtropical climatic zone, snow can lie for up to one month in winter in the mountain meadowlands above 1,800m.

The site nominated covers an area of just under 100,000ha, consisting of four sectors (the first three being contiguous, see Map):

- A western Biodiversity Protection Area (63,575ha);
- A central Ecological Protection Area around the middle gorges of the Nine-Bend Stream;
- An eastern Scenic Protection Area (both natural and cultural) around the spectacular lower gorge of Nine-Bend Stream. (Zones 2 & 3 together total 36,400ha); and
- A separate area of 48ha, about 15km to the south-east, protecting the remains of the ancient city of the MinYue people who were assimilated into the Han empire.

In addition, there is a buffer zone of 27,888ha around the entire site.

The spectacular landforms in the eastern scenic area around the Nine-Bend stream gorge are isolated, sheer-sided monoliths of the local red sandstone. They dominate the skyline for a tortuous 10km section of the river (which has high water quality), standing 200-400m above the riverbed. The landscape has been formed by water cutting down through rectangular jointing in the sandstone, and periodic gravity collapse of huge blocks. It is a geomorphology which contains a lot of overhangs and caves, hence their use by the ancient Min and Yue people for burials in suspended 'boat coffins'.

The rocks of the western peaks are more volcanic or plutonic, with peaks above 1,500m consisting of hard tuffaceous lavas, rhyolite and granite. This area is bisected by a pronounced north-east/south-west fault, which is followed by the headwaters of Nine-Bend Stream. Access to this virtually uninhabited core biodiversity zone is difficult and is strictly controlled. A former military road gives four wheel drive access to Mt Huanggang and there are a small number of walking tracks. Otherwise the core area of nearly 60,000ha of the biodiversity protection zone is unmodified – probably the largest intact wilderness in southeast China.

Mount Wuyi has long been recognised as a centre of biodiversity in China. Since the famous English botanist R. Fortune visited Mount Wuyi to collect specimens in 1845, the mountains have attracted dozens of scientists from within China, Europe and the USA. Type specimens number close to 1,000 and most were collected from the Guadun and Dazhulan localities within the heart of the core area; most of these are now held in international museums, in London, Berlin, New York and Honolulu. The original Nature Reserve was designated in April 1979, then recognised as a key national Nature Reserve by the Chinese State Council in July 1979, and accepted as a MAB Biosphere Reserve by UNESCO in 1987. According to the recently-published, national strategic document, *"China's Biodiversity: a country study"*, it is considered to be one of the 11 critical regions for biodiversity conservation in China – and the only one in south-eastern China. Its importance stems from its geographic location and climate, making it a mid-subtropical mixing zone between the temperate biotas to the north and the tropical to the south. Mount Wuyi is characterised by high species richness and many endemic species.

Within the western core lies the largest (30,000ha), intact mid-subtropical pristine forest in China. Five broad altitudinal vegetation belts are recognised, from evergreen broadleaf forest on red soils at 350m, to mountain meadow grassland (on mountain meadow soils) at 1,700-2,100m. However, these can be further broken down into 53 discrete plant associations. A total of 3,728 different plant species have been found, of which 2,888 are higher plants – including 282 fern species (85 genera), 25 gymnosperm species (18 genera) and 2,222 angiosperms (812 genera). The richest plant biodiversity is in the evergreen broadleaf forest type. The diversity of bamboo forest associations (14) and the number of orchids (78 species in 32 genera) are also noteworthy features. Within this flora there are 48 recognised plants endemic to Mount Wuyi, most of them ferns and bamboo.

Because of the wide variety of geological and geomorphological niches, microclimates, and the lack of any significant impact of the Pleistocene glaciations, Mount Wuyi has become a refuge for ancient and relic plants which are very rare elsewhere in China. The foremost is the endemic maidenhair tree, (the only member of its family), as well as many other rare gymnosperms and notable angiosperms. In addition, the importance of Mount Wuyi as a plant refuge is indicated by the large number of families present which contain only one (or very few) members, and the presence of a number of ancient families such as the Magnoliaceae, Illiciaceae, Lardizabalaceae, and Schisandraceae.

Mount Wuyi is even more famous for its fauna. To date 475 vertebrate animal species have been identified, including 71 mammals, 256 birds, 73 reptiles, 40 fishes, and 35 amphibians. Of these vertebrates, 49 are endemic to China, including the near-extinct Chinese tiger. Other rare animals are the clouded leopard, and three vertebrates endemic to Mount Wuyi – the 'horned toad' and another amphibian, and the bird David's Parrotbill. Mount Wuyi is also an important site for migratory birds and over 100 are protected under the Sino-Japanese and Sino-Australian agreements. A total of 143

species are under some form of State protection order (with 11 under 1st class protection) and 46 are listed under CITES.

The region is also renowned for its insect fauna, with 4,560 species identified to date. Estimates of the total number of insect species range from 10,000 to 20,000. In particular, Mount Wuyi is acknowledged as having an internationally outstanding amphibian, reptile and insect fauna.

3. COMPARISON WITH OTHER NATURAL AREAS

The nomination considers Mount Wuyi to be the best example of a tract of humid subtropical forest in China. Arguably, the most extensive remaining humid subtropical forests in the world are in southern China, between latitude 30° N and the Tropic of Cancer. Comparisons are difficult with other parts of the world because of climatic and floristic differences. At these latitudes (24-30° N) throughout most of the Northern Hemisphere, the prevailing biomes are deserts and high mountains. Comparable humid subtropical climatic environments (and the potential for subtropical evergreen broadleaf forests) can only be found in Florida, the foothills of the Himalaya and northern Myanmar, and the islands of Taiwan and southern Japan. Generally, these forests, on the mid-altitude slopes, are all dominated by trees from the Fagaceae, Lauraceae, Theaceae, Magnoliaceae, Elaeocarpaceae, and Hamamelidaceae, etc, while at higher altitudes this merges into a distinctive 'cloud forest' of Ericaceae and conifers of the Pinaceae, Taxodiaceae, Taxaceae and Cupressaceae families.

Within China, there are three other forested natural sites on the World Heritage list – Huangshan, Wulingyuan (now locally referred to as 'Zhangjiajie' after the name change of the locality) and Mt Emei – all lying within this broad subtropical climatic zone of the Palaearctic Realm. Wulingyuan site was only listed on scenic grounds but both Huangshan and Mt Emei qualified because of their biodiversity values [criterion (iv)]. Like Mount Wuyi, Huangshan and Mt Emei sites have a wide altitudinal range of vegetation; Huangshan is lower, while Mt Emei is nearly 1,000m higher than Mt Huanggang in Mount Wuyi. In terms of Udvardy Biogeographical Provinces, both Wulingyuan and Huangshan lie withing the Oriental Deciduous Forest and Mt Emei spans both the Oriental Deciduous Forest and Chinese Subtropical Forest. Mount Wuyi, however, is on the border between both the Chinese Subtropical Forest and the South Chinese Rainforest. Mount Wuyi, therefore, has many of the biogeographic features of the Indomalayan Realm – it is warmer, wetter and has more tropical elements in its biota.

A comparison of the biodiversity of the three sites – Mount Wuyi, Huangshan and Mt Emei – indicates the pre-eminence of Mount Wuyi. Both Mount Wuyi and Mt Emei have an outstanding number of different plant species (3,600-3,700), each about 250% more than Huangshan. But it is in the number and variety of animals that Mount Wuyi stands out above the other two sites. The table in Figure 1 below shows that Mount Wuyi and Mt Emei have similar numbers of species of birds and amphibians, but Mount Wuyi has less fish, more mammals and more than twice the number of reptile species. The insect fauna of Mount Wuyi far surpasses that of Mt Emei in number (and variety) of species.

The WCMC protected area data base lists nearly 200 other protected areas within the South Chinese Rainforest and Chinese Subtropical Forest biogeographic provinces. Eight of them (in addition to Mount Wuyi) are larger than 55,000ha. but none of these are considered to have the biodiversity values of Mount Wuyi.

World Heritage (natural) site	Area (ha)	Total vertebrates	Mammals	Birds	Reptiles	Amphib-ians	Fish	Insects
Mount Wuyi	99,975	475	71	256	73	35	40	4,560
Mount Emei and Leshan	15,400	434	51	256	34	33	60	c.1,000
Mount Huangshan	15,400	300	48	170	38	20	24	n.r.
Yakushima (Japan)	10,747	n.r.	16	150	15	8	n.r.	1,900

n.r. = not reported

Figure 1. Numbers of animal species, comparing Mount Wuyi with otherEast Asian World Heritage sites

The only other comparable East Asian site on the World Heritage list is the island of Yakushima at 30° N in southern Japan, within the Japanese Evergreen Forest biogeographic province. Yakushima has just as wide an altitudinal range of forest (sea level to almost 2,000m) but the site is much smaller and does not have the robust shape of Mount Wuyi. However, Yakushima is a much wetter site (up to 10,000mm around the summits) and it has more of a warm temperate character (as opposed to subtropical). Yakushima is listed under criteria (ii) and (iii), but not criterion (iv); reference to Fig.1 illustrates that Yakushima has much lower total biodiversity (as befits a small island) although there are many other outstanding features to its flora.

4. INTEGRITY

One of the strengths of the nomination is its high level of ecological and landscape integrity (and on-going scientific research), and its long history of management as a protected area.

The positive integrity features are as follows:

- large size (c.100,000ha) with a diverse range of peak and valley landforms. [Fig. 1 shows the large size of Mount Wuyi relative to the limited size of the comparable existing World Heritage sites];
- the protected area lies within one provincal administration (Fujian);
- the site has an effective buffer zone;
- there are few inhabitants in the core zone (60,000ha); the 22,700 inhabitants in Mount Wuyi are scattered through 14 villages primarily in the 'ecological protection' and 'scenic & cultural protection' planning zones;
- the site has had a strict protective status since 1979, but prior to that provincial and central governments had issued protective edicts over the area for more than 1,000 years. The first edict banning forest-felling and fishing was made in the year 748 AD of the Tang Dynasty. In addition, 13 of the 450 historic rock inscriptions along the lower gorge of the Nine-Bend River exhort visitors and occupants to protect Nature; and

- a history of comprehensive management planning, beginning with the 1986 master plan for the scenic and historic areas, followed by the 1995 protection plan for the Chengcun Han Dynasty city, and in February 1998 the management plan for the nature reserve (biodiversity protection zone), produced with the support of the Global Environment Facility (GEF).

5. ADDITIONAL COMMENTS

5.1. Biosphere Reserve

The Biosphere Reserve status of the 'biodiversity protection' sector of the site for the past 12 years has meant that a great deal of scientific information has been able to be assembled for the nomination. On-going research is being assisted with finance from the GEF. There is a scientific museum at Sangang village in the heart of the protection zone, where the MAB research work is outlined and a comprehensive range of specimens are displayed to illustrate Mount Wuyi's biodiversity.

5.2. Visitor issues

Mount Wuyi is very fortunate in that it does not yet (and may not) suffer the acute pressures of visitors now afflicting many natural sites in China, such as Taishan, Wulingyuan and Jiuzhaigou. Nevertheless, visitor numbers have increased to around 700,000 per annum. Of these, 300,000 annually raft down the Nine-Bend River gorge and another 120,000 visit the 'Thread of Sky' caves close by in the scenic zone. Visitor access to the biodiversity protection core (beyond Sangang village) is strictly controlled.

The rafting operation is very professionally controlled through a booking system and strict environmental codes. Up to 1,000 visitors daily are carried through the 10km stretch of the river, in raft relays, without congestion, noise, or water/air pollution.

There is no hotel accommodation within the site and it is the intention of site management to keep all such infrastructure in the 'tourist service area' outside.

5.3. Cultural landscape

IUCN's comments on the site as a potential cultural landscape have been submitted to ICOMOS.

6. APPLICATION OF WORLD HERITAGE CRITERIA

Mount Wuyi site is nominated under criteria (ii), (iii) and (iv). Most of the documentation in the nomination document relates to the latter two criteria.

Criterion (ii): Ecological processes

There is evidence of species differentiation but, considering the fact that Mount Wuyi escaped the rejuvenating effects of the last glaciation, it is surprising that there is not more evidence presented of on-going biological evolution. IUCN considers that the site does not meet criterion (ii).

Criterion (iii): Superlative natural phenomena, scenic beauty

The case for criterion (iii) is also strong with respect to the features in the eastern scenic zone, especially the riverine landscape of Nine-Bend Stream (lower gorge). Rugged rock monoliths are a feature of other natural sites, such as Wulingyuan and Huangshan, but Mount Wuyi is exceptional in its juxtaposition of smooth rock cliffs with clear, deep water. The ancient cliff tracks are an important

dimension of the site, allowing the visitor to get a 'birds-eye-view' of the river that they are travelling down. IUCN considers that the site meets criterion (iii).

Criterion (iv): Biodiversity and threatened species

The biodiversity case made out for listing under criterion (iv) is the strongest. In essence (not withstanding Mt Emei), Mount Wuyi is the first natural Chinese site to be nominated on its biodiversity values, as much as its scenic values. The evidence points to Mount Wuyi being the outstanding biodiversity conservation site in south-east China and one of the outstanding subtropical forests in the world. Its floral importance is twofold:

- it is the largest, most representative example of a largely-intact forest encompassing the diversity of the Chinese Subtropical Forest and the South Chinese Rainforest; and

- it is a refuge for a large number of ancient, relict species, many of them endemic to China. Many of these plants are now very rare elsewhere in China.

Furthermore, in comparison with other Chinese (and East Asian) sites, its fauna show greater diversity in numbers of species and especially in the number and nature of its reptiles, amphibians and insects. IUCN considers that the site meets criterion (iv).

7. RECOMMENDATION

At its twent-third ordinary session, the Bureau recommended that the World Heritage Committee **inscribe** Mount Wuyi under natural criteria (iii) and (iv).

WORLD HERITAGE NOMINATION - IUCN TECHNICAL EVALUATION

ISOLE EOLIE (AEOLIAN ISLANDS) (ITALY)

1. DOCUMENTATION

i) **IUCN/WCMC Datasheets:** nil

ii) **Additional Literature Consulted: Volcanoes of the World.** Smithsonian, Simkin T. et al., 1981. **Volcanoes: A Planetary Perspective.** OUP, Bullard F.M. 1973. **Guida Naturalistica alle Isole Eolie.** P. Lo Cassio ed. E. Navarra, L'Epos, Palermo, 1997. **Isole Eolie: Vulcanologia, Archeologia**. Milano, Oreste Rogusi, L. Brea e M. Cavalier. 1991. **Confirmed breeding of the storm petrel in the Aeolian Islands (Italy)**. Naturalista Sicil., Anon. 1994. **Amphibians and reptiles of the circumsicilian islands: new data and some considerations.** Boll. Mus. Reg. Sci. Nat. Torino, C. Corti et al., 1997. **Guida Excursionistico Vulcanologica delle Isole Eolie**. Centro Studi e Ricerche de Storia e Problemi Eoliani, N. Calanchi et al., 1996. **Guida Alla Natura della Sicilia**, WWF, Milan, F. Pratesi e F. Tassi, 1974.

iii) **Consultations:** 7 external reviewers. Officials of the Ministry of Cultural Property and Environment (Rome), Cultural Property and Environment (Province of Messina). Mayors of Lipari, Sindaco, Sant Marina di Silina, Sendaco, and Malfa. Provincial level management staff and field staff. Specialists in vulcanology and biology.

iv) **Field Visit:** February-March 1999. Lawrence Hamilton, Ray Bondin (ICOMOS).

2. SUMMARY OF NATURAL VALUES

The Isole Eolie (Aeolian Islands) are located less than 40km off the northern coast of Sicily (see Map 1). The group consists of seven islands (Lipari, Vulcano, Salina, Stromboli, Filicudi, Alicudi and Panarea) and five small islets (Basiluzzo, Dattilo, Lisca Nera, Bottaro and Lisca Bianca) in the vicinity of Panarea. The total area of the Aeolian Islands is 1,216km^2. The islands range in size from Panarea which is 34km^2 to Lipari which is 376km^2.

The original nomination included the islands in their entirety, however, this has been changed following referral back to the State Party after the July 1999 Bureau meeting. The Bureau specifically requested the State Party to provide additional information and to address the exclusion of human use areas and to propose more sharply defined boundaries for the nature reserves and buffer zones. The revised nomination encompasses Zone A areas (nature reserves) being those areas of greatest scientific importance and Zone B areas being surrounding natural areas (see Map 2a-2c). Zone C areas are not included in the nomination, however, for the most part act as predominantly human modified landscape buffer zones to Zone A and B areas.

The islands' volcanic landforms represent classic features in the continuing study of vulcanology world-wide. With their scientific study from at least the 18th Century, the islands have provided two of the types of eruptions (Vulcanian and Strombolian) to vulcanology and geology textbooks and so have featured prominently in the education of all geoscientists for over 200 years. They continue to provide a rich field for vulcanological studies, as significant on-going geological processes in the development

of landforms. The nominated site provides an interrelated set of volcanic features and phenomena, as noted in Section 44 (b) (i) of the Operational Guidelines for the Implementation of the World Heritage Convention.

The revised nomination material provides additional information on the islands' biota. Information on the faunal characteristics of the archipelago has been made available with indications of levels of endemism. It was also noted on the evaluation mission that floral and faunal recovery seem to be occurring following past land-use, including terracing for wheat and olive cultivation. Some rare plants, lizards and insects are returning to the islands. Bird colonies are increasing also, now that hunting has been largely controlled. Additional information on flora has also been provided with species lists for each island and indications of levels of endemism and protection for threatened plants.

The cultural properties of the nomination, mainly buildings, have been evaluated separately by ICOMOS. The recommendation from ICOMOS was that the site did not meet cultural World Heritage criteria. However, in the proposed nature reserves there is considerable evidence of ancient land use, particularly stone-walled terraces, many of which were maintained until the depopulation of the islands during the late 19th and early 20th centuries.

3. COMPARISON WITH OTHER AREAS

By various counting methods there are at least 454 active volcanoes in the world (Bullard, 1973) or as many as 1343 (over the past 10,000 years) as tallied by the Smithsonian Institution (Simkin, 1981). The majority of the world's active volcanoes are found in the "Pacific Rim of Fire" that extends around the Pacific Ocean.

There are at least 22 island or portions of islands now inscribed on the World Heritage List. There are several active or dormant volcanoes located in World Heritage sites such as Sangay National Park, Virunga National Park, Kilimanjaro National Park, Tongariro National Park, Hawaii Volcanoes National Park, Galapagos Islands, Morne Trois Pitons National Park, Kamchatka Volcanoes, Mount Kenya National Park/Natural Forest, and Heard and McDonald Islands. Heard and McDonald are volcanic islands, as is Hawaii Volcanoes, and the Galapagos are a volcanic archipelago of islands very much like the Aeolian Islands. However, the Aeolian Islands gave their name to two recognised types of eruptions and are among the earliest ever studied and documented. Perhaps the principal distinguishing value of the Aeolians lies in the diversity of "textbook" volcanic features located within such a compact area and their history and on-going role as a field laboratory for the study of vulcanology. Comments from expert reviewers note the significance and importance of the nominated site for vulcanology. The twenty third (23rd.) World Heritage Bureau meeting (July, 1999) noted that this site has the potential to meet World Heritage natural criterion (i).

There are other existing World Heritage sites in the Udvardy Mediterranean Sclerophyll Biogeographic Province: Mount Athos (Greece), Meteora (Greece), Ichkeul National Park (Tunisia), Doñana National Park (Spain), and Cape Girolata, Cape Porto, Scandola Nature Reserve and the Piana Calanches in Corsica (France). The maquis vegetation biome, within this biogeographic province, and associated fauna, are not well represented in the World Heritage List. On the Aeolian Islands the release of large areas from anthropogenic pressure (except low-level grazing) has permitted native vegetation and some native fauna to return, however, these elements do not provide a solid case to differentiate this site from other volcanic sites already on the World Heritage list.

4. INTEGRITY

The integrity of the proposed listing is strengthened by the revised boundaries and the exclusion of developed areas. The planned reserves are mainly the upper volcanic cones and the steep lands plunging to the sea. The field evaluation noted that almost all reserves (Zone A) were free from modern human structures and uses, except for grazing, and some park structures in the existing

Reserve of Mount Felci and Porri on Salina. In general, these areas are free from human disturbance due to either volcanic risk or very steep, rough slopes. Zone B areas show some development problems. For example, "modern" urban type housing already occurs within the areas proposed as B Zones.

While most of the delineated Zone A and B areas are only planned, Reserva Naturale "La Montagne delli Felci e dei Porri" on Salina is a statutory reserve, created by the Region of Palermo in 1984 and has a small protection staff. This reserve consists of the upper reaches of two volcanic hills covering roughly 278ha. Unfortunately Felci has been planted with alien tree species, such as pine and eucalyptus, seriously affecting the recovery of native species. The small islands of Alicudi (278ha.), Panarea (154ha.), Filicudi (562ha.) and Stromboli (718ha.), plus their islets, have been designated Nature Reserves under Regional law, however, there are no reserve staff on any of them and no administration on Alicudi or Filicudi. Vulcano and Lipari do not apparently have any legally defined reserves. On both, there is a substantial amount of urban and suburban development in the proposed Zone B, and some also in the proposed Zone A areas.

The Vulcanology Museum located in the Acropolis of Lipari, although still under development, provides an impressive educational and interpretive adjunct to the understanding of the volcanics of the islands. The maintenance and development of this facility would be essential and central to the value of any World Heritage listing.

No consolidated management plans exist for natural areas on the islands. However, there is a general regulatory plan for the four local communes (Lipari, Santa Marina Salina, Malfa and Leni) which aims to control further haphazard development. The additional information on biota also provides some indication of biodiversity values and threats. Issues of fragmentation, convoluted boundaries, and poor perimeter/area ratios can impact on natural values limiting the capacity for effective management. These issues stress the need for effective integrated management plans.

IUCN suggests there are a number of activities which could help develop the heritage significance of the area, including:

- development of museum facilities, including support of the current museum project. It is noted that, except for the excellent museum displays in the town of Lipari, there is currently limited interpretation on site or near site and it is recommended that more attention be given to this aspect;

- inclusion of professional geological input in published books and maps, and for the planning of tourist trips, and also for the education and training of tourist guides, and general publicity about the volcanic heritage of the Islands;

- development of a regular series of on-site conferences to build up information for the use of visitors to this area; and

- the development of a volcanic trail (a concept being used in the young volcanic area of western Victoria, Australia).

5. ADDITIONAL COMMENTS

Marine reserves and the presence of coral reefs are not mentioned in any of the documentation notwithstanding the islands being strongly oriented to coastal tourism.

At its Twenty-second ordinary session , the Bureau noted that the site has potential to meet natural criterion (i). The Bureau decided to refer the nomination back to allow the State Party to provide

additional information and to address the exclusion of human use areas to propose more sharply defined boundaries for the Nature Reserves and buffer zones.

The information requested was provided by the State party and reviewed by IUCN.

6. APPLICATION OF WORLD HERITAGE NATURAL CRITERIA

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

The merit of the nomination rests upon the Aeolian Islands being an outstanding record of volcanic island building and destruction, the ongoing volcanic phenomenon, and the influence that vulcanism has had on the culture and peoples of these islands. Moreover, their activity and influence is in evidence today, with the active volcano of Stromboli and the continuing threat of Vulcan (and Vulcanello). The seven islands are in a volcanic arc or archipelago, much like the Hawaiian Islands. They offer in relatively small geographic space a model on a small scale of the story of volcanoes. They are well studied and monitored and have international significance in the study of vulcanology.

IUCN considers that the Aeolian Islands nomination possesses outstanding universal value within the meaning of criterion (i).

Criterion (ii): Ecological processes

The nomination does not directly address this criterion. It is noted that the Aeolian Islands have a long history of land use, and subsequent abandonment, which has lead to an on-going processes of maquis recovery.

IUCN considers that the Aeolian Islands nomination does not meet this criterion.

Criterion (iii): Superlative natural phenomena, scenic beauty

The nomination does not directly address this criterion, though the still-active vulcanism, especially in Stromboli, is an interesting natural phenomenon. Though the juxtaposition of volcanic topography and seascape is very scenic, unsightly "modern" development, including visible solid waste dumps, mining activity, housing, small businesses, and infrastructure, impacts negatively on the setting of the volcanic and natural features.

IUCN considers that the Aeolian Islands nomination does not meet this criterion.

Criterion (iv): Biodiversity and threatened species

Mediterranean climatic areas of the world are regionally important for their high plant diversity, high number of rare taxa, and high endemism. The Mediterranean basin suffers from prolonged human impact, and consequently many species of both flora and fauna are rare or threatened. The nomination provides evidence of the important contribution these islands make toward the conservation of biodiversity in the Mediterranean basin, however, this is considered a secondary value to the volcanism.

IUCN considers that the Aeolian Islands nomination does not meet this criterion.

7. RECOMMENDATION

It is recommended that the Aeolian Islands, comprising zones A and B in the revised nomination from the State Party, be **inscribed** on the World Heritage List under criterion (i). The revised nomination

submitted by the State Party is more complete and presents a strong case for inscription based on volcanic values and also addresses issues relating to the boundary of the nomination.

However, IUCN notes some concerns in relation to the long term integrity of the site and recommends that the Committee urge the State Party to expedite formal legal protection for the nominated area and develop an integrated management plan for the area to ensure effective management of World Heritage values. The Committee may wish to request the State Party to report back in one year time in relation to progress with these issues.

WORLD HERITAGE NOMINATION – IUCN TECHNICAL EVALUATION

UVS NUUR BASIN (MONGOLIA / RUSSIAN FEDERATION)

1. DOCUMENTATION

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

ii) **Additional literature consulted:** Dompke, S. & Succow, M. 1998. **Cultural Landscapes and Nature Conservation in northern Eurasia**, NABU/AID Environment/Nature Conservation Bureau, Bonn. 330pp.; Henwood, W.D., 1998. An overview of Protected Areas in the Temperate Grassland Biome, **PARKS Vol. 8, No. 3.** 3-8; IUCN, 1994. **Protecting Nature: regional reviews of protected areas**, Ed. McNeely, J.A., Harrison, J., Dingwall, P., p.13; Ministry for Nature and the Environment of Mongolia, 1998; Biological Diversity in Mongolia. MNEM/UNDP/Regional Bureau for Asia & Pacific, Ulaanbaator. 106pp. Ministry for Nature and the Environment of Mongolia, 1996. **Mongolia's Wild Heritage**. MNEM/UNDP-GEF/WWF, Ulaanbaator, 42pp. UNESCO/Mongolian Ministry of Enlightenment, 1997. Mongolian Tentative List: Cultural & Natural Heritage. World Heritage Centre, 53pp. USSR Academy of Sciences, 1991. **Uvs Nuur Hollow: an unique test region for Biospherical Research**. Pushchino, 47pp. Russian Academy of Sciences (Siberian Division), 1993. Experiment Uvs Nuur. Puchchino, 432pp. Russian Academy of Sciences (Siberian Branch), 1994. **Uvs Nuur Hollow World**. 156pp.

iii) **Consultations:** 2 external reviewers; relevant officials from government and non-government organisations in Mongolia and Republic of Tuva (Russian Federation).

iv) **Field Visits:** J. Thorsell & Y. Badenkov, June 1996 (Tuva section only); L.F. Molloy, August 1999 (Tuva and Mongolia).

2. SUMMARY OF NATURAL VALUES

The nominated site is the northern-most of the enclosed basins of Central Asia, lying between latitudes 49-51 degrees N and longitudes 91-99 E. The basin is enclosed on the north (Tuva) by the Tannu Ola Range and the Sangilen Mountains in the north-east (2,600-3,200m); the Tannu Ola Range marks the northern limits of Central Asia, for its northern slopes drain to one of the major rivers of Siberia, the Yenisey, which runs directly north for 3,000km from Tuva to empty into the Arctic Ocean. In the west, the basin is bounded by outliers from the Mongolian Altai – the glaciated Tsagan Shuvuut - Turgen Uul ranges, extending from Mongun Taiga (3,976m) in Tuva south to Turgen (3,955m) and Harkhiraa (4,057m) in western Mongolia. In the south, the Khan Khohiy Range (2,300-2,900m) extends along the full length of the main drainage system, the Tes-Khem River. Estimates of the size of the basin vary (because of the complex topography) but is considered to be in the range of 7.5 million hectares (5,400,000ha in Mongolia; 2,160,000ha in Tuva).

At the bottom of the basin lies Uvs Nuur (759m a.s.l), the large, roughly-circular lake (60-70km in diameter) from which the site takes its name. The main feeder to Uvs Nuur is the Tes-Khem River, which has its source in a fresh-water lake, Sangyn Dalai Nuur, in the alpine meadows and larch forests of the Sangilen uplands at the eastern extremity of the basin (in Mongolia). The Tes-Khem then flows 500km westwards, through steppe and desert, into southern Tuva, and then back into

Mongolia, before emptying into Uvs Nuur. For its last 100km, the river meanders through an extensive wetland complex, a green swathe in an otherwise semi-desert landscape; its delta is nearly 40km wide and is an important wildlife habitat. Uvs Nuur itself is by far the largest (335,000ha) of 7 lakes larger than 5,000ha within the basin. Uvs is relatively shallow (10-20m depth) and very saline (18g salts/l) and alkaline (pH 9.0). In all, the lakes display a range of hydrological character, water quality and biomass productivity; like Uvs Nuur, some of them have no surface outlet and those with the lowest level of dissolved minerals (such as Tere-Khol) are fed by springs from the surrounding dunelands. Uvs is the 'sea' of western Mongolia; it is so wide that the other side is often not visible, and it is frequented by a range of seabirds, even though the nearest ocean is 3,000km away.

The climate of the basin is sharply continental. The basin is in the rain-shadow of the Tannu Ola Range, which shelters it from the prevailing moisture-bearing north-westerly winds from Siberia. This is a significant bioclimatic transition, where the south Siberian taiga gives way to the deserts and steppes of Central Asia. The Uvs Nuur basin has an extraordinary temperature range; the lowest winter temperature in western Mongolia (-58° C) has been recorded here but summer temperatures can rise to 40° C. Because of the sharp topographic and climatic gradients, the basin contains representative samples of seven continental ecosystems.

Within the site there are 9 strictly protected areas (5 in Tuva; 4 in Mongolia) with a total area of 805,400ha, representing the main ecosystems. The 5 Tuvan 'cluster reserves' constitute the 'Uvs Nuur zapovednik; four of them are grouped around the protected area administrative centre of Erzin and cover the taiga/steppe/desert (and 'desert lake') systems. The fifth Tuvan strictly protected area, Mongun Taiga (core 940ha, buffer 99,460ha), is in the extreme west and protects the Mongun Taiga massif, with its glaciers and tundra/alpine meadow landscapes.

Two of the Mongolian protected areas, Turgen Uul and Tsagaan Shuvuut, also lie in the western mountains. Together with Mongun Taiga, they effectively encircle the second-largest lake in the site, Ureg Nuur, which nestles in a mountain steppe basin at 1450m (and also has no surface outlet). Studies in the two Mongolian protected areas have shown the presence of 173 bird and 41 mammal species within their boundaries. Both are important habitats for the endangered Snow Leopard and there is active research into the conservation of this species. Other important mammals are large herbivores such as the Asiatic ibex, argali mountain sheep, wild boar, red deer and musk deer and the Mongolian and black-tailed gazelle; predators include: wolf, red fox, lynx, polecats and weasels, and many different kites, falcons, eagles and vultures. Monitoring of large mammals in the two protected areas indicated that Turgen Uul contains around 7,000 ibex and 200 argali, while Tsagaan Shuvuut probably holds 2,000 ibex and 800 argali.

Within the ecologically-diverse Uvs Nuur site, some 359 bird species have been recorded. Many of these are of international importance, including: Dalmatian pelican, red-crowned crane, Siberian crane, Houbara bustard, Asian dowitcher, relict gull, white-tailed sea eagle, and black griffon. Some of the migrating birds that use Uvs Nuur as a temporary habitat are rare: Bewick's swan, lesser white-fronted goose, red-breasted goose, and the Baikal teal. There are 81 resident rare and endangered bird species found within the wider Uvs Nuur basin, including the Eurasian spoonbill (more than 100 pairs breed around the lake), black stork, relict gull, Altai ular, swan goose, bar-headed goose, shelduck, osprey and white-tailed sea eagle. Many of these are entered in the Red Book(s) of Tuva and Mongolia. The vegetation also reflects the conjunction of the Siberian and Central Asian floras, with 19 species endemic to Tuva and Mongolia, 51 relict species and 94 plant species classified as rare.

3. COMPARISONS WITH OTHER AREAS

Biogeographically, Uvs Nuur is a very diverse site but one which has a high degree of ecological integrity because it all lies within one closed catchment. Consequently, it is not valid to compare individual ecosystem components of Uvs Nuur with other similar ecosystems; instead, the whole basin needs to be compared with other closed Central Asian lake systems.

The only other listed natural World Heritage site with some of Uvs Nuur's features is the Golden Mountains of Altai (GMA) lying 400km to the WNW in the Altai Republic of the Russian Federation. The western high mountain sector of Uvs Nuur is indeed an outlier of the Altai Mountains and shares with the GMA similar glacial landforms, tundra and boreal forest vegetation, and habitats for endangered large alpine mammals, especially the Snow Leopard. However, Uvs Nuur contains much more climatic and landscape diversity than GMA; it includes this Siberian mountain element (the Altai Highlands biogeographic province) but extends right into the Central Asian steppe and desert environment.

Most of the Uvs Nuur site lies within the Mongolia-Manchurian Steppe biogeographic province which currently has less than 1% of its large area (2.6 million sq km) in protected areas (McNeely et al, 1994) – and no World Heritage sites. The steppe grasslands are one of the major biomes of Eurasia, extending from Manchuria to Hungary, but they generally have a low level of protection – a conservation problem of world-wide concern. IUCN estimate that less than 1% of the world's natural grasslands are protected (IUCN, 1994; Henwood, 1998) and the Mongolian-Manchurian Steppe province is no exception.

The most famous of Central Asia's 'inland seas' is Lop Nur and the Tarim River system within the Taklamakan Desert basin of Xinjiang (Uygur Autonomous Region) in western China. The environment of this vast basin is severely modified through human use. There are other salt lake systems in western Mongolia (in both Uvs and Hovd aimags) but they do not have the diversity of the Uvs Nuur system. Within the Arjin Mountains Nature Reserve (nestled between the Altun Shan and Kun Lun Shan of southern Xinjiang) there are two salt lake systems – Ayakkum Hu and Aqqikkol Hu – but these are at a much higher altitude and have a very different alpine desert climate. There are a number of salt lakes (such as Ebinur Hu and Manas Hu) in the Dzungarian basin of northern Xinjiang (between the Tian Shan and Altai Mountains) but neither has protected area status. Further west, in Kyrgyzstan, Lake Issyk Kul is one of the largest (slightly saline) intermontane lakes in Central Asia but it is affected by urbanisation, industrialisation and intensive agriculture in its large catchment.

It is difficult to find data on the waterfowl populations of the other lakes of Central Asia for comparison purposes. The importance of Uvs Nuur for waterfowl migrating through Central Asia is well known.

Because of its high salinity, Uvs Nuur does not carry any fish which are edible for human populations, so it has never been subject to commercial exploitation. It does, however, contain two small fish which are endemic to the salt lakes of western Mongolia. Each is considered to be a relict species from the fish that populated the lakes of large extent in western Mongolia at the close of the last glaciation of the ice age.

It is difficult to assess whether Uvs Nuur contains the best of the world's steppe landscapes without a detailed knowledge of a biome that extends across 8,000km of Eurasia. However, virtually all the steppe landscapes of eastern Europe, the Ukraine, the central Russia uplands of the Don and Volga, Kazakstan, the western Siberian plain and Manchuria have been significantly modified – by arable agriculture and industrial development.

In conclusion, Uvs Nuur basin contains an outstanding diversity of ecosystems and spans one of the major geoclimatic boundaries of Asia, that between Central Asia and Siberia. No existing World

Heritage sites within this bio-geographic region contain this diversity. In addition, Uvs Nuur contains one of the best remaining natural steppe landscapes of Eurasia.

4. INTEGRITY

4.1. Legal Status and Scientific Research

The 5 Tuvan 'cluster areas' making up the Uvs Nuur zapovednik were given protected area status by both the governments of the Republic of Tuva and the Russian Federation in 1993. The 4 cluster areas in Mongolia were listed under the "Mongolian Law on Protected Areas" in 1994 and their buffer zones by law in 1997.

However, the 85% of Uvs Nuur basin that lies outside the 9 protected areas seems to have no specific protective legal status, other than the protection afforded to State-owned land. This issue is of concern (see 'Management' below) because of the threat of over-grazing, particularly in the desert steppe landscape around Uvs Nuur in the vicinity of the capital of Ulaangom.

The existing 9 strictly protected areas (SPAs) do not adequately cover the wide range of ecosystems within this large site. In particular, the wetlands in the lower 60km of the Tes-Khem need to be part of a protected area which can extend northwards across the border into Tuva, incorporating semi-desert, steppe, and the slopes of the Vostochnyi Tannu Ola range (mixed forest/steppe, taiga and tundra). This proposal was discussed with senior officials in Ulaan Baator who stated that it had merit and that both countries were on the point of signing a protocol to establish better trans-border conservation management. Also the nomination document admits that the additions of other SPAs are desirable.

4.2. Management

Management of the Tuvan Uvs Nuur zapovednik is vested in the State Committee for the Protection of the Environment, and exercised through the Tuvan Minister for the Environment and an administration centre in the village of Erzin at the junction of the Erzin and Tes-Khol rivers. The Mongolian Administration of the Uvs Nuur Basin Strictly Protected Area is based in Ulaangom.

However, the crucial integrity issue for the site is how the rest of the basin – nearly 7 million hectares – can be managed in a way which will sustain the natural values currently exhibited within the site. There is no comprehensive management plan for the basin, although this is stated to be "under preparation" by the Mongolian Ministry for Nature and the Environment in Ulaan Baator.

Although most Mongolian land is still the property of the State, Mongolia privatised grazing herds in 1992; since that date there has been a spectacular increase in the domesticated grazing animal population of Mongolia – from an estimated 20 million in 1992 to 30 million in 1999. Mongolia's most important sustainable natural resource is its fertile soils and grasslands, so the threat of continually increasing stock numbers leading to over-grazing (and rural conflicts over traditional family pasturage rights) is a very serious issue facing the country. It is certainly a key issue in maintaining the integrity of the natural and cultural values of the steppe and desert steppe ecosystems of Uvs Nuur.

4.3. Other Human Uses

There is a small open-cast coal mine near Ureg Nuur but at present it only has a very local impact. The lack of any controls over rural road development within the basin is another localised detrimental human impact that can probably only be improved through environmental education. The opportunities for large-scale tourism in the basin are very limited compared with more popular natural

attractions like Khovsgol National Park. Small-scale cultural/eco-tourism will develop naturally but any tourism strategy is a very low priority at this stage of Uvs Nuur's development.

4.4. Other Threats

Notwithstanding the above concern about the potential for over-grazing, there are currently few other serious threats to the natural environment of Uvs Nuur. The low level of urban population and complete lack of industry in both the Tuvan and Mongolian sectors affords protection; its geographic isolation, climatic extremes, and lack of surface water flow make it an unattractive locality for agricultural industries. There has been talk of pressures for mining within Tuva but the Tuvan government has blocked this industry initiative pending a decision on World Heritage. If rural populations continue to increase at their current rate, however, the impact of hunting and forest clearance could become a threat to the taiga and forest steppe ecosystems. Indeed, as per Operational Guidelines 44(vi), only the core zone would be appropriate for World Heritage nomination with the buffer and occupied zones excluded.

In conclusion, the Uvs Nuur basin has important integrity issues which need to be solved. The 1999 nomination differs significantly from the 1996 proposal, in that the original nomination of 12 'cluster reserves' (covering 838,000ha) has now been expanded to encompass the entire basin (of more than 7.5 million ha). Whilst the present nomination is much stronger because it is now a continuum of all the ecological diversity in the basin; on the other hand, it now includes all the villages, some agricultural areas, and vast areas of grazed mountain, steppe and desert lands, which are not subject to any form of explicit management controls over grazing levels, buildings, roading, discharges to waterways, etc. Economic and social/demographic pressures are steadily building on Mongolia's grazing lands and no assurances have been given by the State parties that this large site can be maintained in its current state through management planning and strict land-use regulations. Thus there are major questions of integrity relating to the nominated site.

5. CULTURAL LANDSCAPE VALUES

The Uvs Nuur basin has a rich historical and cultural heritage. The site has also been nominated for cultural heritage status, largely on the basis of 2900 sites containing burial mounds ('kurgans') and stone tablets ('steles'), many of late Palaeolithic age. These will be reported on separately by ICOMOS. However, IUCN would like to note the following:

- Historically, a large proportion of the Eurasian steppe would have undergone a vegetation succession to forest as the post-glacial climate became warmer – had wild herbivores and humans (as they domesticated wild grazing animals) not worked to maintain the grassland environment.

- There is a close relationship between the domesticated grazing animals (traditionally sheep, cattle, goats and horses) and the grassland plants of the steppes, a relationship which has moulded this landscape over thousands of years. To an extent the increasing domestication of livestock supplemented (and supplanted) the wild grazing animals of the steppe – such as Przewalski's horse, the Saiga Antelope and the wild Bactrian camel. Over the millennia, the nomadic seasonal herding patterns transferred plants and nutrients spatially within the steppe ecosystems. Some grasses and herbs will have been eliminated; others will have thrived. Soil organic matter (humus) gradually accumulated as plant leaf litter, dead roots and animal excreta were decomposed and their constituent nutrients recycled back into new plant growth. To a large extent, it can be argued that the great soils of the steppes – the chernozems and chestnut soils – are partly cultural by-products. They are indeed zonal soils but the domesticated herbivores (as well as wild ones) of the steppes have contributed to their development. In fact, some soil ecologists would argue that domesticated herbivores have been essential to the development of the steppe soil landscape.

- The nomadic herders of the steppes of Tuva and Mongolia have traditionally relied upon their grazing animals for most of their domestic needs. Animal protein and fat provides most of their diet; bone has a myriad uses as a raw material; felted wool is used to provide shelter (yurts/gers) and clothing. Sustainable hunting of marmots and other wild animals has traditionally supplemented food and skins from domesticated animals. The culture of the Tuvan and Mongolian herding society is inextricably linked to their land-use – nomadic pastoralism and a relationship to wild Nature. This is particularly reflected in their stories, songs, arts and crafts, and religious beliefs.

The only remaining question, then, is whether the Uvs Nuur basin is the best 'universal' example of a steppe cultural landscape. It could be that there are better steppe cultural landscapes in eastern Mongolia. Nevertheless, all the major varieties of steppe landscapes are well represented within the Uvs Nuur basin and the site would appear to have high value as a cultural landscape.

6. APPLICATION OF WORLD HERITAGE CRITERIA

The Uvs Nuur basin has been nominated under all four natural criteria, as well as criterion (v) for cultural properties:

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

The nomination document does not present any compelling evidence in support of this criterion. The western Mongolia mountains sector of the site contains a good range of glaciers and landforms of glacial origin but these are only of regional significance and probably better represented in the Golden Mountains of Altai site. IUCN consider that this site does not meet criterion (i).

Criterion (ii): Ecological processes

The closed salt lake system of Uvs Nuur is of international scientific importance because of its climatic and hydrological regimes. Because of the unchanging nature of the nomadic pastoral use of the grasslands within the basin over thousands of years, current research programmes should be able to unravel the rate at which Uvs Nuur (and other smaller lakes within the basin) have become saline (and eutrophic). These processes are on-going and because of its unique geophysical and biological characteristics, the basin has been chosen as an IGBP site for monitoring global warming. IUCN considers that this site has the potential to meet criterion (ii).

Criterion (iii): Superlative natural phenomena, scenic beauty

The diversity of landscapes within Uvs Nuur basin, and especially the uncluttered horizons of the steppes broken only by colourful ribs of weathered rocks ('skerries'), have their own subtle aesthetic appeal. Overall, however, they are not superlative in character and the site is not considered to meet criterion (iii).

Criterion (iv): Biodiversity and threatened species

The Uvs Nuur site has a large range of ecosystems, representing the major biomes of eastern Eurasia, with a number of endemic plants. Although the basin is inhabited and has been used for nomadic pastoralism for thousands of years, the mountains, forests, steppes and deserts are extremely important habitats for a wide range of wild animals, many of them threatened or endangered. The steppe ecosystem supports a rich diversity of birds and the deserts a number of rare gerbil, jerboas and the marbled polecat. The mountains at the western end of the basin are important refuges for the globally threatened snow leopard, mountain sheep (argali) and the Asiatic ibex. Uvs Nuur itself is an important habitat for waterfowl as well as for birds migrating south from Siberia. IUCN considers that this site has the potential to meet criterion (iv).

7. RECOMMENDATIONS

That the Bureau recommend to the Committee that noting that Uvs Nuur Basin has the potential to meet natural criteria (ii) and (iv), **defer** the nomination back to the State Parties involved (Mongolia and the Russian Federation) until the management plan for the site is prepared, including the feasibility analysis of its implementation. Further, the authorities should be requested to revise the boundaries from the 7.5 million hectares to exclude the 90% of the basin which currently has no protective status.

The Bureau may wish to recommend to the two State Parties involved to continue their efforts to enhance transboundary cooperation to ensure the conservation of this site. The preparation and implementation of a joint management plan for this site might be a good framework for transboundary cooperation.

Noting the economic difficulties facing the State Parties involved, the Bureau may wish to encourage them to submit a request to the World Heritage Fund for technical assistance for the preparation and implementation of a management plan for the Uvs Nuur Basin.

WORLD HERITAGE NOMINATION – IUCN TECHNICAL EVALUATION

IBIZA, BIODIVERSITY AND CULTURE (SPAIN)

1. DOCUMENTATION

i) **IUCN/WCMC Datasheets:**

i) **Additional Literature Consulted:** Heywood. 1994. **Centres of Plant Diversity.** WWF/IUCN, pp 50-51; Kelleher, Bleakley & Wells. 1995. **A Global Representative System of Marine Protected Areas.** Vol. 1. GBRMPA, WB and IUCN, pp 89-103; Aritio *et al.* 1993. **Parques Nacionales de España.** Incafo, pp 150-162; IUCN and RAC/SPA (UNEP). 1989. **Livre Rouge des Vegetaux, Peuplements, et Paysages Marins Menaces de Mediterranee.** Faculte des Sciences de Luminy. France, pp 83-107; Sherman, Alexander and Gold. 1993. **Large Marine Ecosystems.** AAAS, pp 137-146; Gomez-Campo. 1996. **Libro Rojo de Especies Vegetales Amenazadas de España e Islas Baleares.** ICONA, pp 647-667; Margalef. 1995. **Key Environments: Western Mediterranean.** Pergamon Press, pp 175-193; San Félix. 1997. **Guía Submarina de Ibiza y Formentera.** Ayuntamiento de Ibiza, 120 p; Ballesteros *et al.* 1987. **Invertebrados Alguícolas Marinos de las Islas Pitusas.** Consell Insular D' Eivissa I Formentera, 96 p.

ii) **Consultations:** 2 external reviewers, officials of Ibiza and Formentera Municipal Government; ecologists, fishers, divers and nature reserve personnel.

iii) **Field Visit:** February 1999, Pedro Rosabal.

2. SUMMARY OF NATURAL VALUES

The Ibiza site (nominated under both natural and cultural criteria) is located in the Balearic Islands, Western Mediterranean. The terrestrial component of the nomination includes the coastal lagoons and saltworks areas (Las Salinas) on the islands of Ibiza and Formentera as well as the small islands of Freus (Penjats, Espardell and Espalmador). The marine component includes the open sea between these islands up to limit of the isobar of 40m depth (see Map 2). This represents a total area of 11,231ha, including 2,667ha of land and 8,564ha of marine component.

The marine component is characterised by the presence of dense and very well preserved prairies of oceanic Posidonia (seagrass) and coral reefs. The other important ecosystems included are related to the saltworks areas (Las Salinas de Ibiza y Forementera) which were included in the List of Wetlands of International Importance (Ramsar Convention) in 1993 for their importance for migratory birds.

Oceanic Posidonia is an important endemic species only found in the Mediterranean basin. In its climax stage and under exceptional conditions of transparency and unpolluted waters, this species generates coastal reef that offers protection to coastal areas from storms. In this area, particularly around the Island of Formentera, the coastal reefs are four metres high, the highest reef reported world-wide of this origin (San Félix, 1998).

The prairies of Posidonia also have high importance as a hatchery for a variety of marine fish. This function is particularly important to the maintenance of fish stock thus being an essential element for sustainable fisheries. This ecosystem has a high biological productivity. One hectare of oceanic Posidonia produces 21 ton/year of biomass, similar to the productivity of a tropical forest (22 ton/year/ha).

This particular seagrass community is increasingly under threat across the Mediterranean Sea mainly due to increasing levels of pollution. Consequently, oceanic Posidonia communities are included as a priority ecosystem for protection under the Habitat 2000 Directive (92/43/ECC) and under Annex IV of the Berne Convention. According to UNEP this is a highly threatened ecosystem in the Mediterranean Basin (UNEP 1989).

Other important marine values present in the nominated site are:

- Presence of the most diverse community of *Cladocora caespitosa*, supporting 220 species, the highest record for a marine community in the Mediterranean basin;
- The area offers protection to three globally endangered species, including the Monk Seal and to 5 marine species considered by IUCN in a Vulnerable state of conservation (IUCN, 1996);
- An important community of *Ecteinascidia turbinata*, a marine species with recognised value to prevent and combat different types of cancer; and
- A number of underwater caves that offer important elements to assess the geological and geomorphological evolution of the islands.

In relation to the values existing in the terrestrial component of the nominated site it is important to note:

- There are 11 species of strictly endemic plants;
- There are 7 Rare species of plants and 8 considered in a Vulnerable state of conservation (IUCN, 1996);
- The area contains well-preserved examples of *Juniperus sp*. forest, which was the typical coastal forest of the Mediterranean region but now only remains in a few sites. In the Island of Espalmador there is probably one of the few relict samples for the entire Mediterranean;
- 205 different species of birds have been reported in this area, particularly in the coastal lagoons and saltworks (Las Salinas) of which 171 are migratory species; and
- There are 56 species of invertebrates, 11 species of terrestrial reptiles, and 5 species of mammals reported from this area, all of them endemic to Ibiza and Formentera.

3. COMPARISON WITH OTHER AREAS

There are currently 42 sites on the World Heritage list with major wetland values and 40 others that contain a coastal and marine component. They include 20 Island World Heritage sites. However, most of the sites have been inscribed for their exceptional and extensive coral reefs formations, such as the Great Barrier Reef (Australia) and the Belize Barrier Reef (Belize). Other World Heritage sites include other types of seagrass beds, but most of them formed by Thalassia sp or Halimeda sp communities, thus biologically these are not comparable to the Posidonia prairies.

The Mediterranean Sea is a unique Marine Biogeographic Region and within it the Western Mediterranean is a distinct Biogeographic Zone (IUCN, 1995). In the Mediterranean basin there is only one other site that could be compared to Ibiza -- Capes Girolata and Porto and Scandola Nature Reserve, France. However, this site was included in the World Heritage list mainly for its dramatic geological landforms. Its marine component includes prairies of Posidonia but the proposed site in Ibiza (8,564ha) is double the size of the area represented in the French site (4,950ha). In addition, the Posidonia prairies of Ibiza are considered as the best preserved in the Mediterranean basin. Moreover, both the marine and terrestrial diversity is greater in Ibiza.

The nominated site offers protection to the Monk seal. It could be used as a reference for comparison with the Banc d' Arguin National Park World Heritage site (Mauritania). However this site is representative of a different Marine Biogeograhical Region (Western Africa). The marine component in Banc d' Arguin only includes shallow coastal waters little more than 5m, that include seagrass beds consisting of Zostera sp., Cymodocea sp., and Halodule sp., which form a different ecosystem to that of Posidonia sp. In the nominated site the marine component extends to the isobar of 40m, providing a broader sample of marine life at different depths. It also has a more diverse geomorphology including a number of underwater caves.

4. INTEGRITY

National Law 26 of 1995, which established the Nature Reserve of Ibiza and Formentera, protects this site. The site has also received international recognition by the Ramsar Convention and by the Habitat 2000 Directive (92/43/EC). Following the process of devolving power and responsibilities to local authorities in Spain, the Council of the Balearic Islands is negotiating with the national government over the jurisdiction and control of this Nature Reserve, which is presently under the control of the National Ministry of the Environment. It is expected that the State Court will devolve this responsibility to the Council of the Balearic Islands, but this would not imply a diminution in its legal protected area status. The World Heritage Centre and IUCN have received additional information from the State Party showing a comprehensive legal framework by which the State Party ensures to maintain full protection of the area under autonomic law.

A management plan exists for the area and it is being implemented. There are two administrative centres for the protection and management of this reserve, one in the Island of Ibiza, that serves as the headquarters, and a second one on the island of Formentera. There are 10 permanent staff working in the area with 4 vehicles for terrestrial patrol and one boat for marine patrol. However control on the use of the reserve is also supported by the local police and the National Coast Guards, the latter playing a key role in the marine and coastal areas. Volunteers (mainly members of local ecological groups and students) assist in management, particularly in summer where extra support is need to clean up beaches and coastal areas due to the high number of visitors.

Twelve projects are currently being implemented in the Reserve. They include the construction of a Visitor Centre in Ibiza and a project dedicated to coastal zone protection. The total annual budget for conservation and management is around 4 million USD, mostly from the National Ministry of the Environment. There are on-going agreements with the University of Valencia, the University of Madrid and with the Ecological Group of Balearic Islands (GOB) to continue monitoring and research activities in the reserve. Rangers and technical staff in the reserve receive systematic training in management practices and biological monitoring as part of these agreements. There is also a strong commitment to conservation among the local fishers, who recognise the importance of protecting this area to ensure the long-term sustainability of traditional fisheries. Commercial fisheries are not allowed in the reserve and Coast Guards have acted to prevent violation of this regulation.

During the field mission, it was reported that a new submarine pipeline to discharge waters from a treatment plant in the urban areas of Ibiza was under consideration. There have been several local objections to this plan. Additional information has been received by the World Heritage Centre and

IUCN noting that the Government of the Balearic Islands has not allowed the construction of the submarine pipeline within the boundaries of the proposed site. At the same time the government proposed to evaluate other alternatives to re-use treated water so as to avoid the need to construct this submarine pipeline in any other location.

However, after the last session of the World Heritage Bureau and Committee (July 1999), IUCN has received information related to the approval by the EC of a project to reform and expand the port of Ibiza. This project will be partially funded by EU Fund for Cohesion and implies the construction of a dike to regulate coastal dynamics, offering greater protection to port facilities and operations. IUCN considers that this project could potentially impact the natural values of the marine area.

Further clarification is required in relation to the impact of this project, specifically in relation to the extent this development project could effect the conditions of integrity of the nominated site

5. ADDITIONAL COMMENTS

As indicated, this site is part of a Mixed Natural and Cultural Site nomination, which includes the ancient town of Ibiza and its fortress system. There are close linkages between the cultural and natural environment evident in:

- Strong local culture and traditions relate to the sea, with the marine environment providing an indivisible part of the landscape;

- The presence of more than 10 underwater archaeological sites related to the Late Bronze Age that help to understand old trade and interactions in the Western Mediterranean (Sherrat 1993). Most of these archaeological sites are far from adequately researched;

- In the Island of Formentera the local population is still applying traditional land use patterns that have been in place for the last 300 years. This has created a living cultural landscape that takes visitors to the island back to the Middle Ages; and

- The quality of the salt produced in the saltworks of Ibiza and Formentera (Las Salinas) depends on the quality of the coastal waters which, in turn, depend to a great extent on the ecological functions of the Posidonia prairies. Local people fully understand this and it is the basis of their concern for the protection of the marine environment.

Also in the Balearic Islands is the Archipelago de Cabrera National Park, consisting of 9,715ha of terrestrial and marine areas. It has some limited seagrass prairies but has other coral features and fish species that complement and extend the marine values in the Ibiza nomination. The potential exists to consider an extended World Heritage site, encompassing the current nomination plus Cabrera in a site that would be more representative of the whole variety of marine ecosystems of the Western Mediterranean.

The Bureau noted at its twenty-third session (Paris, July '99) that the site has the potential to meet natural criteria (ii) and (iv). The Bureau decided to refer the nomination back to allow the State Party to provide clear evidence on the continuation of the Nature Reserve's legal status under autonomic law, as well as clarification of the pipeline plans and their impact on the site. This information was provided and is reported on in this evaluation report.

6. APPLICATION OF WORLD HERITAGE NATURAL CRITERIA

It is not clear from the nomination dossier under which criteria this site has been nominated. IUCN suggests that the State Party consider the case for inscription on the following two criteria:

Criterion (ii): Ecological process

In the nominated site the direct influence of the *Posidonia* prairies in the dynamics and evolution of the coastal zone of the islands can be observed extremely well and it is thus an excellent example of the interaction between the marine and coastal ecosystems. Accumulation and decomposition of *Posidonia* have led to the development of all the sandy beaches existing in the site and this is an on-going process essential for the replenishment and growth of the existing beaches. At the same time, the protective function of *Posidonia* coastal reefs against storms is remarkably evident in the islands included in the nominated site. The regulatory functions of *Posidonia* prairies, particularly in retaining sediments and oxygenating coastal waters, is recognised as a key factor to ensure the high quality of the salt produced in Ibiza and Formentera.

Criterion (iv): Biodiversity and threatened species

The well-preserved *Posidonia* prairies in this site contain and support a diversity of marine life. This ecosystem, and its related biodiversity, is highly threatened in most parts of the Mediterranean. One assessment indicates that this ecosystem will completely disappear from the coast of France by 2010. Thus, conservation of *Posidonia* prairies has been identified as a priority under the Habitats Directive of the European Union. The nominated site has been also identified as a priority area to achieve a Global Representative System of Marine Protected Areas. The site contains a diverse community of *Cladocora caespitosa*, supporting 220 species, the highest recorded for a marine community in the Mediterranean Biogeographic Region. It also contains an important community of genetic value (*Ecteinascidia turbinata*) for pharmaceutical purpose. In addition, the area is of importance for the conservation of the Monk Seal. The terrestrial component of the nominated site also supports a diversity of plant and animal species, most of them endemic to these islands.

7. RECOMMENDATION

That the Bureau notes that the State Party did not identify which natural criteria the site might qualify under but IUCN suggests that natural criteria (ii) and (iv) might be relevant. But to satisfy the conditions of integrity, the State Party should provide further clarification, based on the EIA study, on the potential impact that the project to expand the port of Ibiza can have on the integrity of the nominated site. The Bureau is recommended to **defer** this nomination until this clarification is received.

The Bureau may also wish to invite the State Party to consider the nomination of the Archipelago of Cabrera with the possibility of it forming, with the Ibiza site, a combined site representing almost the whole spectrum of marine ecosystems of the Western Mediterranean.