



**THE WORLD HERITAGE LIST:**  
**Guidance and future priorities for identifying  
natural heritage of potential *outstanding  
universal value***

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## 1. INTRODUCTION

### 1.1 Aims and scope

This paper consolidates IUCN's technical advice to the World Heritage Committee and States Parties on:

- (i) the application of the concept of *outstanding universal value*, as enshrined in the World Heritage Convention and defined in terms of criteria in the Operational Guidelines, with respect to the nomination of World Heritage properties; and
- (ii) future priorities towards achieving a balanced and credible World Heritage List that fully reflects natural heritage of *outstanding universal value*.

The paper considers natural and mixed World Heritage properties, for which IUCN has an advisory role alongside that of ICOMOS (International Council of Monuments and Sites) for cultural World Heritage.

Previous work undertaken by IUCN for the World Heritage Committee has focused on:

- (i) identifying future priorities for a credible and comprehensive list of natural and mixed properties (IUCN, 2004), based on a strategic review by UNEP-WCMC (2004) of the world's major biogeographic regions, habitats and biodiversity hotspots in relation to the World Heritage network; and
- (ii) how IUCN assesses *outstanding universal value* in accordance with the four criteria for natural heritage, as presented to a Special Expert Meeting of the Convention held in Kazan (IUCN, 2005).

This and other work relating to the identification and assessment of *outstanding universal value* of natural heritage is reviewed and synthesized within the present paper, underpinned by the guidance provided in the World Heritage Convention and the latest version (2 February 2005) of the *Operational Guidelines for implementing the World Heritage Convention*.

IUCN is currently preparing a World Heritage Resource Manual which will provide more detailed guidance on the preparation of World Heritage nominations for natural properties. This paper provides the technical context on the application of *outstanding universal value* to natural heritage, which will also be used to inform the Resource Manual.

### 1.2 Global Strategy for World Heritage

In 1994, the World Heritage Committee launched its *Global Strategy for a Balanced, Representative and Credible World Heritage List* to address the then preponderance of cultural over natural properties and the fact that most properties were located in developed countries, notably in Europe. Its aim was to ensure that the List reflects the world's cultural and natural diversity of *outstanding universal value*.

Although the Committee is on record as seeking to establish a representative, balanced and credible World Heritage List in accord with the Budapest Declaration on World Heritage<sup>1</sup>, IUCN considers that it is not intended that the List should be completely representative of the earth's entire cultural and natural heritage as this would be contrary to the concept of *outstanding universal value*.

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<sup>1</sup> Adopted at the 26<sup>th</sup> Session of the World Heritage Committee, 2002.

In the case of natural areas, conserving ecosystems, landscapes, habitats and species is the role of national, regional and other international protected area systems. The relationship between World Heritage properties and other types of protected areas with respect to *outstanding universal value* and representation is shown diagrammatically in Figure 1. While all protected areas are important for ensuring adequate protection and maintenance of ecosystems, landscapes, habitats and species, only a few qualify for inscription on the World Heritage List based on their meeting one or more criteria for *outstanding universal value*.

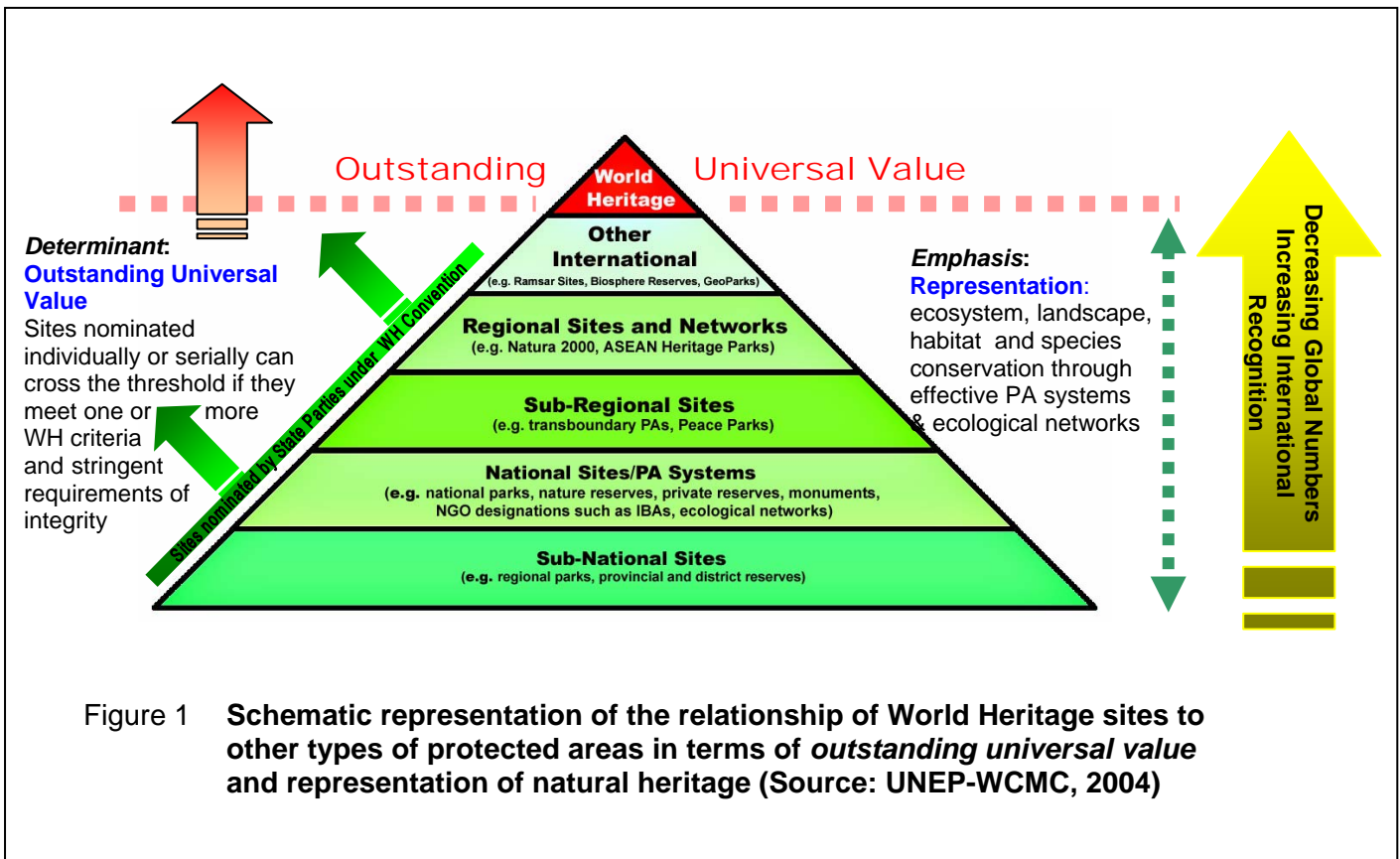


Figure 1 Schematic representation of the relationship of World Heritage sites to other types of protected areas in terms of *outstanding universal value* and representation of natural heritage (Source: UNEP-WCMC, 2004)

In particular, it should be noted that representation at the international level is an explicit objective of UNESCO's Man and Biosphere Programme, which seeks to establish a network of biosphere reserves "representative" of the world's biogeographic provinces. Similarly, the UNESCO Geoparks initiative aims to recognize a global series of geological sites in which protection of geological heritage is integrated with sustainable resource use and economic development.

Other international Conventions and Agreements include the Ramsar Convention for wetlands of international significance and, at regional level, the European Union Natura 2000 sites, and the Alpine and Carpathian Conventions. In addition, there are areas, such as the High Seas and Antarctica, for which the World Heritage Convention is less suited. In the latter case, the Antarctic Treaty offers a mechanism for collaboration in relation to its conservation.

To avoid any ambiguity or misunderstanding, therefore, no further reference is made in this IUCN paper to the term 'representative' in the context of World Heritage.

## 2. OUTSTANDING UNIVERSAL VALUE

### 2.1 What does *outstanding universal value* mean?

The World Heritage Convention is concerned exclusively with the identification, protection, conservation and presentation of cultural and natural heritage of *outstanding universal value* and their transmission to future generations, as laid out in Article 4 of the Convention.

The exclusive focus of the Convention on only those parts of heritage deemed to be of *outstanding universal value* applies consistently across the various types of cultural and natural heritage recognized under Articles 1 and 2, respectively. The challenge, therefore, is to distinguish between what is and what is not acceptable as being of *outstanding universal value* within the terms of the Convention, in order to develop and maintain a balanced and credible World Heritage List. The selective nature of the Convention is emphasised in paragraph 52 of the Operational Guidelines (UNESCO, 2005):

“The *Convention* is not intended to ensure the protection of all properties of great interest, importance or value, but only for a select list of the most outstanding of these from an international viewpoint. It is not to be assumed that a property of national and/or regional importance will automatically be inscribed on the World Heritage List.”

The term *outstanding universal value* is used to qualify all cultural and natural heritage recognized under the World Heritage Convention but it is not specifically defined in the Convention. It is defined, however, in the Operational Guidelines (Box 1).

#### Box 1 Definition of *outstanding universal value*

49. Outstanding universal value means cultural and/or natural significance which is so exceptional as to transcend national boundaries and to be of common importance for present and future generations of all humanity. As such, the permanent protection of this heritage is of the highest importance to the international community as a whole.

(Source: Operational Guidelines, February 2005)

IUCN (2005) considers the following principles are helpful in understanding the concept of *outstanding universal value*:

- **Outstanding:** For properties to be of outstanding universal value, they should be exceptional. IUCN has noted in several expert meetings that: “the World Heritage Convention sets out to define the geography of the superlative – the most outstanding natural and cultural places on Earth.”
- **Universal:** The scope of the Convention is global in relation to the significance of the properties to be inscribed on the World Heritage List, as well as their importance to all people of the world. By definition, properties cannot be considered for outstanding universal value from a national or regional perspective.
- **Value:** What makes a property outstanding and universal is its ‘value’. This implies defining the worth of a property in terms of its global importance, based on a set of clear standards or criteria that are consistently applied.

## 2.2 How is *outstanding universal value* applied to natural properties?

Natural heritage is defined in Article 2 of the World Heritage Convention as follows:

“natural features consisting of physical and biological formations or groups of such formations, which are of outstanding universal value from the aesthetic or scientific point of view;

geological and physiographical formations and precisely delineated areas which constitute the habitat of threatened species of animals and plants of outstanding universal value from the point of view of science or conservation;

natural sites or precisely delineated natural areas of outstanding universal value from the point of view of science, conservation or natural beauty.”

The World Heritage Committee, is responsible for establishing the criteria for the assessment of *outstanding universal value* (Article 11, paragraph 2 of the Convention). These criteria are set out in Table 1.

Table 1 **Natural World Heritage criteria for assessment of *outstanding universal value* and corresponding conditions of integrity**

Natural World Heritage criterion	Corresponding condition of integrity
(vii) Contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance.	92. Be of outstanding universal value and include areas that are essential for maintaining the beauty of the property
(viii) Be outstanding examples representing major stages of earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features.	93. Contain all or most of the key interrelated and interdependent elements in their natural relationships.
(ix) Be outstanding examples representing significant ongoing ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals.	94. Have sufficient size and contain the necessary elements to demonstrate the key aspects of processes that are essential for the long-term conservation of the ecosystems and the biological diversity they contain.
(x) Contain the most important and significant natural habitats for <i>in-situ</i> conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation.	95. Be the most important properties for the conservation of biological diversity. Only those properties that are the most biologically diverse and/or representative are likely to meet this criterion. Properties should contain habitats for maintaining the most diverse fauna and flora characteristic of the biogeographic province and ecosystems under consideration.

Source: Operational Guidelines, February 2005

There are three key tests, as set out in the paragraphs 77 and 78 of the Operational Guidelines, which the World Heritage Committee applies to decide whether or not a property is of *outstanding universal value*:

1. A property must meet one or more of the ten criteria for *outstanding universal value*, of which i-vi apply to cultural heritage and vi-x to natural heritage (Table 1).
2. A property must also meet certain conditions of integrity (cultural and natural properties) and/or authenticity (cultural properties only).
3. A property must have an adequate protection and management system in place to ensure its safeguarding, including appropriate legal, boundary and buffer zone provisions and a management plan or system that ensures uses supported by the property are ecologically and culturally sustainable.

Integrity is defined and amplified further with respect to natural properties nominated under criteria (vii) - (x) in the Operational Guidelines (Box 2). In addition, a corresponding condition of integrity has been defined for each of the criteria under which natural properties may be nominated. These conditions are summarized in Table 1 for each criterion (vii - x).

**Box 2 Definition of integrity and its application to natural properties**

88. Integrity is a measure of the wholeness and intactness of the natural and/or cultural heritage and its attributes. Examining the conditions of integrity, therefore requires assessing the extent to which the property:

- a) includes all elements necessary to express its outstanding universal value;
- b) is of adequate size to ensure the complete representation of the features and processes which convey the property's significance;
- c) suffers from adverse effects of development and/or neglect.

90. For all properties nominated under criteria (vii) - (x), biophysical processes and landform features should be relatively intact. However, it is recognized that no area is totally pristine and that all natural areas are in a dynamic state, and to some extent involve contact with people. Human activities, including those of traditional societies and local communities, often occur in natural areas. These activities may be consistent with the outstanding universal value of the area where they are ecologically sustainable.

(Source: Operational Guidelines, February 2005)

It should be noted that, while it is possible to take steps to improve management and integrity to reach the standards required by the Convention, if the values of a property do not meet one or more of the criteria for *outstanding universal value* it cannot be considered for inscription on the World Heritage List, irrespective of the quality of its integrity, protection or management.

These criteria and associated conditions provide the basis for: (a) States Parties to justify the nomination of a property for World Heritage status; and (b) Advisory Bodies and the World Heritage Committee to evaluate the property and determine whether or not it merits inscription on the World Heritage List. In assessing nominated properties, IUCN is also guided by paragraph 148 (b and c) of the Operational Guidelines, which states that evaluations and presentations should:

“be objective, rigorous and scientific in their evaluations;  
be conducted to a consistent standard of professionalism;”

## 2.3 Trends and practices in the nomination of properties and application of *outstanding universal value*

An understanding of the practical application of the concept of *outstanding universal value* can be gained from examining historic trends in the nomination of natural and mixed natural/cultural properties and the criteria under which properties have been inscribed on the World Heritage List. It should be noted that the criteria have changed from being arranged in two separate lists (v-x six cultural and i-iv four natural), prior to the 2005 Operational Guidelines, to a single list of ten criteria (i-vi cultural and vii-x natural). The relative order of the old natural criteria has changed, with natural criterion (iii) becoming new criterion (vii), followed by the other natural criteria in their former order. Also, the precise wording of the criteria has changed over time, the most significant amendments were made in 1992.

As of April 2006, 160 natural and 24 mixed natural/cultural properties have been inscribed on the World Heritage List. The annual percentage of successful nominations, shown in Figure 2, has fallen with some fluctuation from about 70% to 50% and lower during the life of the Convention. This trend reflects a variety of factors relating to *outstanding universal value* and other key tests that should be taken into account when considering whether or not a property merits nomination, including:

- During the first decade of the Convention, many of the most iconic, well-known and outstanding natural properties were nominated and immediately inscribed on the List.
- Although the annual number of nominations has risen in subsequent decades, an increasing proportion of these have been deferred or not inscribed. The main reason for this is that the evaluation process has become more robust:
  - (a) largely as a result of better information becoming available to facilitate more objective comparative analyses; and
  - (b) partly through more rigorous application of the Conditions of Integrity, in accordance with the Operational Guidelines.

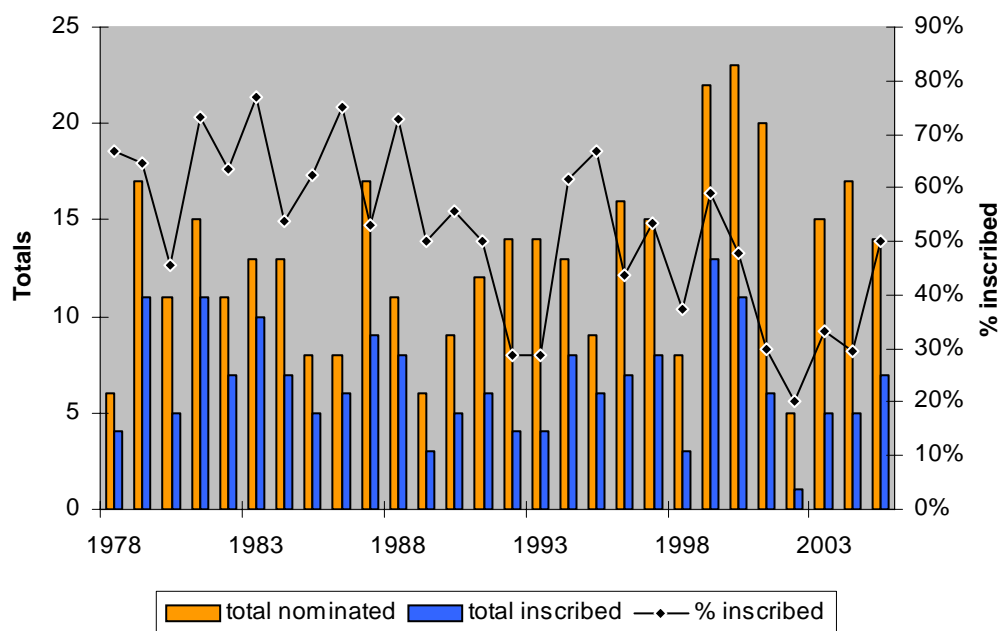




Figure 2 **Natural and mixed natural/cultural properties nominated and inscribed on the World Heritage List during the life of the Convention**

The extent to which the four criteria for assessing *outstanding universal value* have been applied to natural and mixed natural/cultural properties is summarised in Table 2. The following trends are evident:

- A small though significant proportion of natural sites (20%) has been inscribed on the basis of a single criterion, particularly in the case of criteria (viii) and (x).
- In terms of frequency, criteria have been applied fairly evenly across natural properties with the apparent exception of criterion (viii). This observation is complicated, however, by the fact that prior to 1994 *outstanding universal values* for earth science were included within categories (i) and (ii), which are now (vii) and (ix), respectively, under the revised numbering system of 2005. There is currently a reassignment exercise to deal with these changes in the criteria.

Table 2 **Frequency of the use of the different natural World Heritage criteria**

Type of World Heritage property Basis of inscription	Natural World Heritage criteria			
	Natural phenomena vii	Geological processes <sup>1</sup> viii	Biological processes ix	Biodiversity conservation x
<b>Natural properties</b>				
Inscribed on basis of single criterion	6	11	3	12
Inscribed on basis of several criteria <sup>2</sup>	90	50	95	95
<b>Mixed natural/cultural properties</b>				
Inscribed on basis of several criteria <sup>2</sup>	21	5	11	10

<sup>1</sup> Geological properties are underrepresented, as no account is taken of changes to the definitions of criteria in 1994.

<sup>2</sup> Properties inscribed on the basis of this criterion in combination with one or more other criteria. (Note that, by definition, mixed natural/cultural properties also meet at least one of the cultural World Heritage criteria.)

Further analysis of the data for natural properties in Figure 3a shows that the majority (80%) has been inscribed on the basis of two or more criteria, with two criteria being the most frequent category (51%). In the case of the application of two criteria, there is a high coincidence (38%) of criteria (ix) and (x) (i.e. biological processes and biodiversity conservation) and to a lesser extent criteria (ix) or (x) with (vii) (natural

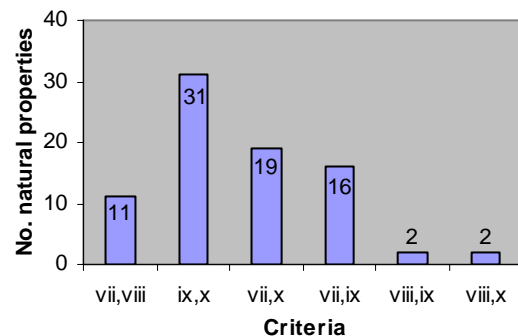
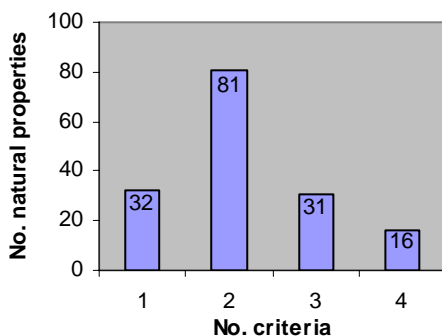


Figure 3 **(a) Number of natural properties inscribed on basis of 1, 2, 3 or 4 criteria**  
**(b) Number of natural properties inscribed on basis of different combinations of two criteria**

phenomena or beauty). Criterion viii (geological processes) features in combination with (vii) in fewer cases (14%) and rarely with either criterion ix or x (Figure 3b).

The main points emerging from this analysis of historic trends and practice are:

- There is an overall increase in the proportion of nominated natural and mixed natural/cultural properties that are not inscribed on the World Heritage List over the life of the Convention. This highlights the increasing rigour applied by the Advisory Bodies and by the World Heritage Committee. It also highlights the need to improve the tentative listing and nomination processes so that properties with a higher likelihood of meeting the criteria of outstanding universal value are identified and nominated by States Parties. Also that properties which are unlikely to pass the test of *outstanding universal value* are eliminated at the outset.
- In practice, the majority (80%) of natural and mixed natural/cultural properties have been inscribed on the World Heritage List on the basis of at least two of the natural World Heritage criteria.
- Criteria vii (natural phenomena) and ix (biological processes) are rarely used in isolation. Criterion (vii) is most often used in combination with (ix) or (x), less often with (viii). Criterion (ix) is most often used in combination with (x), as might be expected since properties representing biological processes of *outstanding universal value* are quite likely to contain the most important habitats for biological diversity conservation, and sometimes with (ix).
- More detailed analysis of the decisions of the World Heritage Committee would provide a valuable insight into the extent to which nominated properties have not met any of the criteria for *outstanding universal value* as opposed to failing the tests for integrity or protection and management.

### 3 HOW IUCN ASSESSES *OUTSTANDING UNIVERSAL VALUE*

#### 3.1 IUCN's approach to applying *outstanding universal value* to natural heritage

The World Heritage Convention seeks to recognize the world's most exceptional properties of common importance to all of humanity. It is the role of IUCN, in its capacity as an advisory body to the World Heritage Committee, to help maintain the credibility of the Convention by applying the highest standards to its evaluation of natural heritage of potential *outstanding universal value*, based on the best available information and expertise. A similar role is undertaken by ICOMOS (International Council of Monuments and Sites) for cultural heritage.

It is important to understand that there are intrinsic differences between natural and cultural properties, as summarized in Table 3. Consequently, the two advisory bodies (IUCN and ICOMOS) tend to use different frameworks for assessing *outstanding universal value*, while endeavoring to maintain equivalent standards in interpreting and applying this concept. As noted, both Advisory Bodies are required under the Operational Guidelines to: "be objective, rigorous and scientific in their evaluations" and undertake their evaluations to a "consistent standard of professionalism".

Table 3 **Key differences between natural and cultural properties and frameworks for their assessment of *outstanding universal value***

Natural properties	Cultural properties
<ul style="list-style-type: none"> <li>• Most properties are discreet territorial units, often large, and distributed in most biomes and ecoregions of the world.</li> <li>• Values or qualities of properties tend to be associated with measurable characteristics, such as the diversity of species or number of endemic species (where such information is available).</li> <li>• Values of properties are usually linked to scientific information, which affords objective assessment.</li> <li>• Scientific assessment (both in relation to geographical and biodiversity features) is often informed by classification systems.</li> </ul>	<ul style="list-style-type: none"> <li>• Properties tend to be fragmented, diverse and not evenly distributed worldwide.</li> <li>• Values or qualities tend to depend on such factors as: materials used; when and how a property was created; history behind the property; and the value that society may attribute to those qualities.</li> <li>• Values of properties are usually linked to regional cultural identity for which assessment is often subjective.</li> <li>• Evaluation of cultural heritage is less predisposed to being informed by classification systems since combination of the above factors tends to result in a high diversity of situations.</li> </ul>
<p><b>Frameworks for assessment</b> A topological framework (based on biogeographical differences and unique characteristics) is generally used to assess natural heritage, complemented by a thematic framework.</p>	<p>A typological framework (based on similarities) is generally used to assess cultural heritage, complemented by a chronological/regional framework and a thematic framework.</p>

Source: IUCN (2005)

In general, IUCN draws upon a wide range of information and international expertise in its evaluation of natural or mixed properties nominated for World Heritage status. This includes, but is not limited to, the following:

- The nomination dossier and its justification for the *outstanding natural value* of the property, based in particular on the criteria and a global comparative analysis.
- Data analysis and review of relevant literature, with support from UNEP-WCMC.
- The IUCN analysis of the World Heritage List (IUCN, 2004), which is based on a series of global classification and prioritisation systems reviewed by UNEP-WCMC (2004).
- Global, regional and thematic studies, developed by IUCN in partnership with other professional bodies.
- The views and recommendations of expert reviewers drawn from IUCN's extensive range of specialist networks (World Commission on Protected Areas and other IUCN Commissions, IUCN Regional and Country Offices, IUCN Global Thematic Programmes, IUCN Membership and partners).
- Feedback and recommendations from the field evaluation mission.
- A final review of all of the above information by the IUCN World Heritage Panel, which forms the basis of IUCN's recommendation to the World Heritage Committee.

The way in which IUCN applies each of the four criteria that define *outstanding universal value* for natural heritage is considered in the following sections, along with the range of tools commonly used to help assess *outstanding universal value*. Details of these tools (global, regional and thematic studies) are provided in Annex 1.

### 3.2 Criterion vii - Natural phenomena and natural beauty

Two distinct ideas are embodied in this criterion. The first, 'superlative natural phenomena', can often be objectively measured and assessed (the highest mountain, the most extensive largest cave system etc.). The second, that of 'exceptional natural beauty and aesthetic importance', is harder to quantify and tends to be assessed on the basis of a wide range of expert advice which compares the property under consideration to other comparable WH properties inscribed under this criterion (IUCN, 2005).

Properties nominated for inscription will have comparable sites distributed on a worldwide, rather than regional basis, so standards applied under this criterion need to meet the highest global standards. This global standard can help to distinguish the application of the aesthetic element of this criterion from more local or regional factors, which may be more relevant to the consideration of cultural landscapes<sup>2</sup>.

A total of 117 properties have been inscribed in the WH List under this criterion, six on the basis of this criterion alone and the rest in combination with other criteria (Table 2).

A specific review and analysis of the world's heritage of natural phenomena and beauty is required to inform and guide assessment of properties nominated under this criterion. IUCN is proposing to develop guidance for the application of this criterion that could include the following considerations:

- interpretation of the basic terms (phenomena, beauty, aesthetics) as they relate to the Convention and Outstanding Universal Value;

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<sup>2</sup>Cultural landscapes are part of the cultural heritage in which the "combined works of nature and of man" are manifest, as defined in Article 1 of the *Convention*.

- descriptive analyses of landscape and other cultural perspectives, including the extent to which local values have contributed to national identity and transcend national boundaries;
- an assessment of 'case law' and comparative analysis; and
- analysis of natural features that can contribute to aesthetic values.

### 3.3 Criterion viii - Geological processes

This criterion recognizes four different natural elements relevant to geological and geomorphological science: the earth's history, the record of life, ongoing geological process, and geomorphic or physiographic features (Table 1). Each of these elements is briefly described in Box 3.

#### Box 3 Description of natural elements of earth science recognized in criterion (viii)

##### (a) *Earth's history*

This subset of geological, as opposed to geomorphological, features is represented by phenomena that record important events in the past development of the planet such as:

- the record of crustal dynamics and tectonism, linking the genesis and development of mountains, volcanoes, plate movements, continental movement and rift valley development;
- records of meteorite impacts; and
- records of glaciations in the geological past.

Properties in this category are considered to be of *outstanding universal value* in exhibiting elements of earth history through rock sequences or associations rather than fossil assemblages.

##### (b) *Record of life*

This subset includes palaeontological (fossil) properties. An IUCN thematic study (Wells, 1996) considers the role of such properties in the World Heritage List and provides a framework for their assessment.

##### (c) *Significant on-going geological processes in the development of landforms*

This element is the first of two aspects related to geomorphology and ongoing geological processes, such as volcanic eruptions. It relates to active processes that are shaping or have shaped the Earth's surface. Properties recognised under this element include those that are of *outstanding universal value* as examples of:

- arid and semi-arid desert processes;
- glaciation;
- volcanism;
- mass movement (terrestrial and submarine);
- fluvial (river) and deltaic process processes; and
- coastal and marine processes.

##### (d) *Significant geomorphic or physiographic features.*

This second primarily geomorphological element represents the landscape products of active or past processes, which can be identified as significant physical landscape features. Criterion (viii) recognizes these features in relation to their scientific value: however, frequently they may also be of aesthetic value. Properties recognised within this part of the criterion may include those of *outstanding universal value* as:

- desert landforms;
- glaciers and ice caps;
- volcanoes and volcanic systems, including those that are extinct;
- mountains;
- fluvial landforms and river valleys;
- coasts and coastal features;
- reefs, atolls and oceanic islands;
- glacial and periglacial landforms, including relict landscapes; and
- caves and karst.

(Source: *Geological World Heritage*. Dingwall *et al.*, 2005)

A new global thematic study on *Geological World Heritage* with respect to criteria (vii) has been produced by IUCN (Dingwall *et al.*, 2005) to guide the assessment of *outstanding universal value*. The study shows that geological heritage comprises a major component of the current World Heritage network: a total of 71 properties in 42 countries are judged have geological features of *outstanding universal value*, although not all are inscribed under criterion (viii), as discussed in the previous section; and a further 53 properties are considered to demonstrate a significant degree of geological interest but not to the level of *outstanding universal value*.

The study identifies 13 themes to assist in understanding the operation of this criterion with respect to the four different earth science values embodied within it. The themes are listed and briefly described in Box 4. More work is required to understand the application of *outstanding universal value* within each of these themes.

**Box 4 Conceptual framework of 13 themes proposed for the assessment of outstanding universal value of geological heritage**

1. **Tectonic and structural features** Elements of global-scale crustal dynamics including continental drift and seafloor spreading. Major crustal landforms and structural features at plate boundaries. Geosyncline/anticline development and erosion; riftvalley systems.
2. **Volcanoes/volcanic systems** Major areas and types of volcanic origin and evolution. These may include examples of major features, such as the 'Pacific Ring of Fire', as a global-scale expression of volcanic activity and associated crustal movements.
3. **Mountain systems** Major mountain zones and chains of the world.
4. **Stratigraphic sites** Rock sequences that provide a record of key earth history events.
5. **Fossil sites** The record of life on Earth represented within the fossil record (see also Wells, 1996).
6. **Fluvial, lacustrine and deltaic systems** Land systems resulting from large-scale river erosion and drainage system development, lakes, wetlands and deltas.
7. **Caves and karst systems** Subterranean hydrological processes and landforms, together with their surface expressions.
8. **Coastal systems** The role of water at oceanic margins on large-scale erosional and depositional coasts and banks.
9. **Reefs, atolls and oceanic islands** Geo-biological and/or volcanic features in oceanic areas or with oceanic influences.
10. **Glaciers and ice caps** The significant role of ice in landform development in alpine and polar regions, including periglacial and nivation (snow) influences.
11. **Ice Ages** Global patterns of continental icesheet expansion and recession, isostasy, sea-level changes, and associated biogeographic records.
12. **Arid and semi-arid desert systems** Land systems and features reflecting the dominant role of wind (eolian processes) and intermittent fluvial action as agents of landform development and landscape evolution.
13. **Meteorite impact** Physical evidence of meteorite impacts (astroblemes), and major changes that have resulted from them, such as extinctions.

(Source: *Geological World Heritage*. Dingwall *et al.*, 2005)

### 3.4 Criterion ix - Ecological and biological processes Criterion x - Biological diversity

These two criteria are considered together because they are closely linked and often used in combination with each other. A total of 46 natural properties have been inscribed on basis of these criteria alone, either singly (Table 2) or in combination (Figure 3b), and a further 23 properties on the basis of criteria (vii), (ix) and (x).

Assessment of criterion (ix) depends on a scientific understanding of the world's ecosystems and their associated ecological and biological processes. A range of thematic studies have been generated to objectively assess *outstanding universal value* with respect to ecosystems, such as tropical forest, boreal forest, tropical marine and coastal, wetlands, mountains, and centres of plant and animal biodiversity. Others are proposed for arid lands, freshwater and the polar regions.

Criterion (x) is associated with one of the core competencies of IUCN, which is able to draw on the expertise of its Commissions (with more than 10,000 expert members worldwide) and key IUCN members, such as BirdLife International, WWF, Conservation International and The Nature Conservancy. A range of tools are available to assess this criterion, including the IUCN Red List, Centres of Plant Diversity, Endemic Birds Areas of the World, Conservation International's Biodiversity Hotspots and WWF's Global 200 Ecoregions for Saving Life on Earth.

A recent global study of the coverage of biogeography, major habitats and centres of high biodiversity within the World Heritage network by UNEP-WCMC (2004) provides a valuable tool for assessing the *outstanding universal value* of properties nominated under criteria (ix) and (x). The study provides analyses of two biogeographic classification systems, two habitat classification systems and three biodiversity prioritization schemes, each of which is briefly described in Box 5.

Box 5 **Classification and prioritization schemes used to assess *outstanding universal value* in relation to biological processes (Criterion ix) and biodiversity (Criterion x)**

**Biogeography**

- **Udvardy biogeographic system**

This classification system comprises 8 biogeographic *realms*, subdivided into 193 biogeographic *provinces*, and 14 ecosystem types or *biomes*. It has proved to be an effective framework for assessing potential natural World Heritage but does not cover the marine environment.

- **WWF Global 200 Ecoregions**

Global 200 refers to a subset of 238 Ecoregions considered to be of highest priority for conservation and derived from a total of 867 ecoregions. It comprises 142 terrestrial, 53 freshwater and 43 marine Ecoregions.

**Habitats**

- **IUCN Species Survival Commission Global Habitat Classification**

This scheme divides the world's terrestrial and marine habitats into a hierarchical series of 13 first-level habitat categories, 78 second-level categories and 154 third-level categories. The first-level habitat category has proved the most useful for World Heritage purposes.

- **Global Land Cover Characterisation**

This classification system, developed by Olson (1994a, 1994b), recognizes 94 ecosystem classes using 1 km<sup>2</sup> AVHRR (Advanced Very High Resolution Radiometer) data. Ecosystem classes are based on their land cover mosaic, floristic properties, climate and physiognomy.

**Biodiversity**

- **Conservation International Biodiversity Hotspots**

Conservation International has identified 25 biodiversity hotspots around the world, based principally on their high plant endemism and significant human impact. A region must contain 1,500 endemic plant species (0.5% of the global total). Such hotspots also support an enormous number of endemic animal species. CI notes that 44% of all vascular plant species and 38% of all animal species occur in less than 2% of the globe's terrestrial area.

- **BirdLife International Endemic Bird Areas**

BirdLife International has designated approximately 2% of the world's land surface as Endemic Bird Areas (EBAs), of which 218 have been identified on the basis of encompassing the breeding ranges of two or more bird species whose total breeding ranges are restricted to 50,000 km<sup>2</sup> or less. These cover the ranges of 93% of restricted range birds (2,451 species or approximately 25% of all known bird species).

- **WWF/IUCN Centres of Plant Diversity**

Principally on the basis of high diversity of species or numbers of endemic species, or both, 250 centres of plant diversity have been identified globally. Other criteria include habitat diversity, under threat of large-scale devastation, and importance as gene pools for plants of value to humans.



## 4 FUTURE PRIORITIES

### 4.1 Priorities for natural heritage

#### ***Criterion vii - Natural phenomena and natural beauty***

The priority is to develop guidance for assessing *outstanding universal value* under this criterion (Section 3.2). Once this is available, it will be possible to identify key gaps in the World Heritage network and better assess the potential for *outstanding universal value* of properties nominated under this criterion.

#### ***Criterion viii - Geological processes***

The global thematic study on *Geological World Heritage* provides a framework of 13 themes against which the existing World Heritage network has been assessed with respect to their coverage. The results of this analysis are summarized in Table 4 and full details are provided in Appendix 1 of Dingwall *et al.* (2005). The distribution of features having *outstanding universal value* is uneven across the different themes. This is to be expected as the scope of themes varies from the relatively specialised (e.g. karst, ice ages and meteorite impact) to those that are very broad (e.g. fluvial, lacustrine and deltaic systems). Given this variety in the scope of the themes, it appears that some themes, including volcanoes and karst, are recognised by a proportionately larger number of properties relative to other themes.

Table 4 **Number of natural and mixed natural/cultural properties featuring geological themes of *outstanding universal value* (Dingwall et al., 2005)**

Theme	Outstanding universal value		Other significant features
	Principal features	Possible features	
Tectonic and structural features	3	1	3
Volcanoes/volcanic systems	13	0	0
Mountain systems	11	4	9
Stratigraphic sites	2	0	0
Fossil sites	11	1	9
Fluvial, lacustrine and deltaic systems	10	4	6
Caves and karst systems	7	1	4
Coastal systems	8	2	8
Reefs, atolls and oceanic islands	1	1	2
Glaciers and ice caps	6	2	5
Ice Ages	7	6	6
Arid and semi-arid desert systems	4	0	3
Meteorite impact	1	0	0

Note: figures do not sum as some properties are assigned to more than one theme.

The priority is to develop guidance on potential *outstanding universal value* for each of these themes, with the exception of fossil sites for which such guidance already exists. Table 5 illustrates the extent to which the record of the evolution of life on Earth is captured by existing World Heritage properties. It does not necessarily follow, however,

that properties of *outstanding universal value* can be identified for those geological periods or epochs currently not represented within the World Heritage network.

Table 5 **Geological time periods covered by World Heritage fossil properties**  
(Sources: Wells, 1996; Dingwall *et al.*, 2005)

Geological period		Plant evolution	Animal evolution	World Heritage property
	Epoch			
Quaternary	Recent	Increase in herbaceous plants	Appearance of <i>Homo sapiens</i>	Naracoorte (Australia)
	Pleistocene 25	Repeated glaciation leads to mass extinction	Repeated glaciation leads to mass extinction First <i>Homo</i>	
Tertiary	Pliocene	Forests decline, grasslands spread	Appearance of hominids	
	Miocene		Appearance of first apes	Riversleigh (Australia)
	Oligocene		All modern genera of mammals present	
	Eocene		Bony fish abound in seas	Messel Pit (Germany) Wadi Al-Hitan (Egypt)
	Paleocene 65	Explosive radiation of flowering plants	Rise of mammals First placental mammals	
Cretaceous 135	First flowering plants	Dinosaurs extinct Modern birds	Dinosaur Provincial Park (Canada)	
Jurassic 195	Forests of gymnosperms and ferns over most of land	First birds Age of dinosaurs	Dorset/East Devon Coast (UK)	
Triassic 240	Gymnosperms dominant	Explosive radiation of dinosaurs First dinosaurs First mammals  Complex arthropods dominant in seas First beetles	Dorset/East Devon Coast (UK) Ischigualasto-Talampaya (Argentina) Monte San Giorgio (Switzerland)	
Permian 285	Widespread extinction Decline of non-seed plants	Widespread extinction Therapsids (mammal like reptiles) appear Increase in reptiles and insects Decline of amphibians	Grand Canyon (USA)	
Carboniferous - Pennsylvanian - Mississippian 375	Gymnosperms appear. Widespread forests of giant club moss trees, horsetails and tree ferns create vast coal deposits	Early reptiles First winged insects Increase of amphibians	Mammoth Cave (USA)	
Devonian 420	First seed plants Development of vascular plants: club mosses and ferns	Amphibians diversify into many forms First land vertebrates – amphibians	Miguasha (Canada)	
Silurian 450	First vascular plants First land plants	Golden ages of fishes First land invertebrates – land scorpions		
Ordovician 520		First vertebrates – fishes Increase in marine invertebrates	Gros Morne (Canada)	
Cambrian 570	Algae dominant	Trilobites dominant Explosive evolution of marine life	Burgess Shale (Canada)	
Precambrian	First algae/bacteria			

Millions of years ago

IUCN is developing partnerships with the International Association of Geomorphologists and the International Union of Geological Sciences in order to deepen the understanding of each of the 13 themes, identify future priorities and strengthen processes for review and evaluation.

**Criterion ix - Ecological and biological processes**

**Criterion x - Biological diversity**

A wide range of guidance and tools has been developed for the assessment of these two criteria. Key priorities are the development of thematic assessments for arid and semiarid lands and freshwater ecosystems, and regional assessments of the polar regions.

A summary of the results of the 2004 UNEP-WCMC study, as refined by IUCN (2004), is provided in Table 6 in terms of coverage of biogeography, habitats and centres of high biodiversity within the World Heritage List<sup>3</sup> and opportunities for nominating properties of potential *outstanding universal value*. Habitats and priority conservation areas currently not included or well represented within the World Heritage network are listed in column two of Table 6 but, importantly, only some of these (or components of them) are considered by IUCN to be of potential *outstanding universal value* (column three).

A number of conclusions have been drawn from the above analyses by IUCN (2004):

- Natural and mixed natural/cultural properties on the World Heritage List cover almost all biogeographic regions, biomes (ecosystems), and habitats of the world with a relatively balanced distribution.
- The biomes (ecosystems) most commonly found in World Heritage properties are mountains, humid tropical forests, tropical dry forests and mixed island systems.
- There are opportunities for listing natural heritage of *outstanding universal value* within the following biomes: tropical grasslands/savannas, lake systems, tundra and polar deserts, temperate grasslands, and cold winter deserts.

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<sup>3</sup> The analysis covers 149 natural and 23 mixed natural/cultural properties inscribed up to 2003. It does not include properties inscribed in 2004 and 2005.

Table 6 **Biogeography, habitats and centres of biodiversity of potential outstanding universal value** (Sources: IUCN, 2004; UNEP-WCMC, 2004)

Classification system/ Prioritisation scheme	Not well represented in World Heritage network	Potentially of <i>outstanding universal value</i>
<b>Udvardy biogeographic system</b>		
Realms	Indomalaya	
Biomes	Tropical grasslands/savannas Lake systems Tundra/polar desert Temperate grasslands Cold winter deserts	{ { { Specific details provided in Box 5. { {
Provinces	85 (44%) not represented	
<b>WWF Global 200 Ecoregions</b>	<i>Ecoregions not represented:</i> 50 (35%) terrestrial 23 (43%) freshwater 18 (42%) marine	Andaman (sites in marine ecoregion) Arctic tundra Benguela Current (marine) Central Asian deserts Fiji (sites in marine ecoregion) Gulf of California (marine) Karoo desert Madagascar moist forests Maldives/Chagos atolls (marine) New Caledonia dry and moist forests Palau (sites in marine ecoregion) Red Sea (sites in marine ecoregion) Socotra desert Sudd-Sahelian savanna and flooded grasslands Tahiti (sites in marine ecoregion) Volga and Lena River deltas Western Ghats and associated ecosystems (wetlands and forests)
<b>IUCN/SSC Global Habitats</b>		
First-level natural habitats	Savannah Shrubland Grassland Desert Sea Coastline/intertidal	
Second-level habitats	Sub-Antarctic forest Sub-Antarctic shrubland Sub-Antarctic grassland Permanent saline, brackish or alkaline lakes Seasonal/intermittent saline, brackish or alkaline lakes/flats Permanent saline, brackish or alkaline marshes/pools Kelp or macroalgae beds Coastal freshwater lagoons Karts & subterranean hydrological systems	Succulent Karoo Flooded grasslands (e.g. Okavango, Sudd swamps) Red Sea corals Namib desert Madagascar moist forests Western Ghats High latitude and sub-polar tundra Central Asian deserts Montane forests in Polynesia and New Caledonia Sub-Antarctic habitats in southern Chile, southern Argentina and South Georgia
<b>Conservation International Biodiversity Hotspots</b>	<i>Hotspots not represented:</i> New Caledonia Central Chile Succulent Karoo  <i>Hotspots not well represented:</i> Southwest Australia California Floristic province	New Caledonia Central Chile Succulent Karoo
<b>BirdLife International Endemic Bird Areas</b>	144 (66%) not represented, of which 51 classed as 'critical'	Unlikely to qualify for <i>outstanding universal value</i> solely on EBA status
<b>WWF/IUCN Centres of Plant Diversity</b>	193 (77%) not represented	Some CPDs likely to be of <i>outstanding universal value</i>

- There are also some terrestrial and marine habitat types within a number of these and other biomes that may have potential for World Heritage inscription. They are listed in Box 5 and include sites that have been identified as priorities by Conservation International, IUCN/SSC, WWF and BirdLife International. Concerned State Parties should give high priority to prepare new nominations for properties located in any of these areas.

**Box 5 Ecosystems and habitats considered being of potential *outstanding universal value*, based on information summarized in Table 6**

**Grasslands**

Sudd-Sahelian savanna and flooded grasslands  
Sub-Antarctic grasslands, including South Georgia  
Sub-polar and arctic tundra

**Wetlands**

Flooded grasslands such as Okavango and the Sudd swamps  
Volga and Lena River deltas  
Western Ghats rivers

**Deserts**

Succulent Karoo  
Namib desert  
Central Asian deserts  
Socotra desert

**Forests**

Madagascar moist forests  
Forests in southern Chile and southern Argentina  
Dry and moist forests in New Caledonia  
Western Ghats forests

**Marine**

Red Sea corals  
Andaman Sea (sites within the marine ecoregion)  
Benguela Current (marine)  
Marine sites within the following WWF ecoregions: Fiji, Palau and Tahiti  
Maldives/Chagos atolls

## 4.2 Improving the process for identification of potential *outstanding universal value*

### *Tentative lists and harmonization*

Each State Party to the Convention is obliged to submit to the World Heritage Committee an inventory of cultural and natural heritage within its territory, referred to as a Tentative List, considered to be of *outstanding universal value* and intended for nomination in subsequent years (Article 11 - 1). Nominations are not considered unless the property has already been included within a State Party's Tentative List<sup>4</sup>.

Tentative Lists provide an important planning and evaluation tool early on in the process of identification of *outstanding universal value*. Not only are States Parties encouraged to consult widely among stakeholders (site managers, local and regional governments, local communities, indigenous peoples, NGOs and other interested partners and stakeholders) within their own country but also they can be guided by the analyses of the World Heritage List, specific thematic studies and other technical reviews by the Committee's Advisory Bodies (ICOMOS and IUCN) in the development of their Tentative List. Such information is intended to assist States Parties in identifying gaps in the network and comparing themes, regions, geo-cultural groupings and biogeographic provinces for prospective World Heritage properties.

States Parties are encouraged to harmonize their Tentative Lists at regional and thematic levels. This process enables States Parties to collectively assess their respective Tentative List to identify opportunities and common themes. The outcome of harmonization can result in improved Tentative Lists, new nominations from States Parties and cooperation amongst groups of States Parties in the preparation of nominations. Advisory Body support in this process can be provided through the provision of technical documents and studies. For natural and mixed properties this includes material outlined in Annex 1. Thus, 'tentative listing' is an iterative process that plays an important part in generating sound understanding and consensus on the identification and nomination of properties that may meet the criteria for *outstanding universal value*.

From IUCN's perspective, the following issues need to be addressed with respect to the preparation of Tentative Lists:

- Most existing Tentative Lists are poor in technical quality, biased towards potential cultural nominations and have not been harmonized at regional levels. They are of limited value in their present state as a planning tool for implementing the Convention in respect of natural properties.
- It is important that States Parties draw on examples of 'best practice', such as for Canada, New Zealand and Madagascar, in preparing their own Tentative Lists and also make more effective use of the various studies by IUCN and other bodies (Annex 1) to inform their preparation.
- States Parties should place more emphasis on natural and mixed properties in the preparation of their Tentative Lists, thereby ensuring a reasonable balance between cultural and natural World Heritage in accordance with the Operational Guidelines (2004, para 57).

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<sup>4</sup> Decision 24COM para.VI.2.3.2 of the 24<sup>th</sup> Session of the World Heritage Committee, 2000

### ***Nomination and inscription of properties***

A critical component of a nomination is the proposed Statement of Outstanding Universal Value of the property. This Statement must make clear why the property is considered to be of *outstanding universal value*, based on a global comparative analysis with similar properties, whether or not they are on the World Heritage List. The comparative analysis must explain the importance of the nominated property in the international context.

Key shortcomings of many nominations, from IUCN's perspective include:

- The justification for inscription is not clearly linked to each of the criteria for which the property is proposed to be of *outstanding universal value*. States Parties should note that the practice of nominating properties under as many criteria as possible, in the hope that this will increase chances of listing, is unhelpful and as likely to weaken as to strengthen the nomination.
- The global comparative analysis is often poorly developed, often focusing on national or regional rather than global comparisons.
- The conditions of integrity are not always presented clearly and objectively. For example, cartographic information should allow for a proper assessment of the location of the values of the nominated property in relation to the status of their protection within the whole nominated areas. Threats, both existing and potential, should be clearly defined and measures for their management or mitigation provided.
- The management plan for the nominated property may be of poor quality, often lacking clear management objectives and unclear as to its status of approval, institutional responsibilities and level of implementation.

Finally, it is important to note that on occasion the Committee has inscribed natural and mixed natural/cultural properties by overruling the recommendation from IUCN. While this is a prerogative of the Committee as the decision-making body of the Convention, it is vital that the inscription process is guided by technical considerations, based on the criteria for *outstanding universal value*, and not political factors, which would otherwise undermine the credibility of the World Heritage List and also reduce support from potential donors and development agencies.

### **4.3 Transboundary and serial nominations**

Provisions within the Operational Guidelines for the nomination of transboundary and serial properties have increasingly been used by States Parties. Such provisions provide opportunities to enhance existing World Heritage properties through extensions, as well as to establish new properties in cases where it is the series of properties as a whole (which could transcend the political boundaries of the States parties involved) and not its individual components, which fulfil the criteria for *outstanding universal value*.

There are currently seven natural and one mixed natural/cultural transboundary properties, each of which encompasses the boundaries of two States Parties. Transboundary nominations are supposed to be submitted jointly by States Parties, in accordance with Article 11.3 of the Convention, and the Operational Guidelines encourage States Parties to establish a joint committee or similar body to oversee the management of the entire property.



A serial World Heritage property comprises a series of naturally related components that are geographically separated from each other. The series as a whole must be of *outstanding universal value*, though not necessarily each individual part. By definition, therefore, it is possible to have a serial, transboundary property. The first serial property, the Central Eastern Rainforest Reserves of Australia, was established in 1986 and later extended in 1994.

IUCN considers that the following issues need to be addressed with respect to transboundary and serial nominations:

- In the case of transboundary properties, some nominations have been prepared by only one of the States Parties involved. Thus, there has been limited or no information on the values of the property belonging to the other State Party.
- The rationale for using a serial approach is often unclear, with inadequate explanation and evidence of how all the proposed components adequately fulfil criteria for *outstanding universal value*.
- Clearer directions and guidelines are required to ensure that serial nominations are properly prepared and that the individual sites are effectively managed after inscription.

IUCN also notes that the following questions guide its evaluation of serial properties:

- What is the justification for the serial approach ?
- Are the separate elements of the property functionally linked ?
- Is there an overall management framework for all of the units ?

## 5. CONCLUSIONS

The following conclusions are drawn on the application of the concept of *outstanding universal value*:

### **Implications of *outstanding universal value***

- By definition, the World Heritage List comprises the most exceptional natural places on earth. It is not intended to be representative of all natural heritage. This is the role of national, regional and other international protected areas systems.
- The key test for inscription of natural and mixed properties on the World Heritage List is that such properties must be of outstanding universal value with respect to one or more of the four criteria relating to natural heritage.
- Since the test for inclusion in the World Heritage List is that of *outstanding universal value*, it follows that the List cannot be open-ended and that there will be some kind of eventual limit on the total number of natural and mixed properties.
- As for any natural resource, natural and mixed World Heritage properties (both existing and potential) are not distributed evenly around the globe, nor does it follow that there will be at least one site of outstanding universal value in every country.
- Full use should also be made of other international instruments and agreements to complement the aims of the World Heritage Convention, many of which are designed to address the issue of representativeness.

### **Application of *outstanding universal value* to natural heritage**

- There are intrinsic differences between natural and cultural properties, requiring different frameworks (topological and typological, respectively) for assessing outstanding universal value. It is important that rigorous standards in applying these frameworks are adopted by the advisory bodies, IUCN and ICOMOS.
- There is an increasing proportion of nominated natural and mixed properties that are not inscribed on the World Heritage List. This indicates a need to:
  - (a) Improve the tentative listing and nomination processes to eliminate properties unlikely to pass the test of *outstanding universal value* at the outset;
  - (b) Undertake more detailed analysis of the decisions of the World Heritage Committee to provide information on the extent to which nominated properties have not met any of the criteria for *outstanding universal value*, as opposed to failing the tests for integrity or protection and management.

### **Technical guidance and tools for assessing *outstanding universal value***

- Technical guidance is required for the assessment of:
  - (a) properties featuring superlative natural phenomena of exceptional natural beauty that are nominated under Criterion (vii); and
  - (b) serial nominations.

- Thematic studies are vital to providing an internationally accepted scientific foundation for the nomination and evaluation of potential World Heritage properties. Existing studies should be updated periodically, taking into account recommendations arising from the Periodic Reporting process, and from decisions of the World Heritage Committee. Further guidance is required for assessing *outstanding universal value* with respect to:
  - (a) the 13 major thematic areas for geological heritage, with the exception of fossil sites for which guidance already exists; and
  - (b) arid lands (including deserts), freshwater (wetlands, lakes, rivers) and the polar regions.
- Such guidance, informed by further thematic and regional studies, and new scientific knowledge will inevitably highlight further opportunities for improving the balance and credibility of the World Heritage List.
- The Udvardy biogeographical system continues to provide a useful entry point for the broad classification and global comparative analysis of natural heritage concerning biological science. This must be complemented by the use of other classification and prioritization systems which need to be integrated into a Geographic Information System that can be routinely updated to provide current information on the World Heritage List and its coverage of particular themes and biodiversity hotspots as required.

#### **Priorities for natural heritage of potential *outstanding universal value***

- Suggestions regarding important geological and biological heritage that should be included in the World Heritage List is identified in Section 4.1. Priority biomes (ecosystems) of potential *outstanding universal value* include: tropical grasslands/savannas, lake systems, tundra and polar deserts, temperate grasslands, and cold winter deserts. Within these and other biomes a range of habitats have been prioritised as set out in Box 5.
- Transboundary and serial world heritage concepts provide further opportunities for State Parties to prepare new nominations using a range of innovative approaches.

#### **Priorities for the further application of the concept of *outstanding universal value***

- It is vital to maintaining the credibility of the World Heritage List that the inscription process is guided by technical considerations, based on assessment of the criteria for outstanding universal value, and not political considerations.
- A range of measures relating to the development and harmonization of Tentative Lists and the nomination of properties is required to strengthen the objectivity of the process of identifying natural and mixed properties that potentially meet the criteria for *outstanding universal value*. These include but are not limited to the following:
  - (a) More emphasis on natural heritage in the preparation of Tentative Lists to ensure a better balance between cultural and natural World Heritage.
  - (b) Development and harmonization of Tentative Lists at regional levels so that they become a more effective tool in the identification of natural and mixed properties of potential *outstanding universal value*.

- (c) Greater clarity in the Statement of Outstanding Universal Value as to why and with respect to which criteria the nominated property is of *outstanding universal value*, based on rigorous global comparative analysis.

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## ANNEX 1

### Sources of information for Global Comparative Analyses and the review and update of Tentative Lists

#### IUCN technical and thematic studies:

- The World's Greatest Natural Areas: an indicative inventory of natural sites of World Heritage Quality (1982).
- Earth's geological history: a contextual framework for assessment of World Heritage fossil site nominations (1994).
- Global Overview of Wetland and Marine Protected Areas on the World Heritage List (1997).
- A Global Overview of Forest Protected Areas on the World Heritage List (1997).
- A Global Overview of Human Use of World Heritage Natural Sites (1997).
- A Global Overview of Protected Areas on the World Heritage List of Particular Importance for Biodiversity (2000).
- Which oceanic islands merit World Heritage status? (1991).
- Report of the working group on application of the World Heritage Convention to islands of the Southern Ocean (1992).
- Future directions for natural WH sites in East and Southeast Asia. Filling the Biome Gaps: a thematic approach to achieving Biodiversity conservation through World Heritage, Les Molloy (2000).
- Potential natural World Heritage sites in Europe, Lars-Erik Esping (1998).
- A Global Representative System of Marine Protected Areas, World Bank/IUCN. 4 vols. (1995)

#### Reports from selected regional meetings and UNESCO World Heritage initiatives to identify potential natural World Heritage Sites:

- Task force to select a global inventory of fossil sites (1991);
- Nordic World Heritage - proposals for new areas for the UNESCO World Heritage List (1996);
- Identification of potential World Heritage sites in Arab countries (1999);
- Tropical Forests (Berastagi meeting report, 1998);
- Identification of WH properties in the Pacific (1999);
- Regional Workshop on the Nomination of World Heritage Sites, Mozambique (2000);
- Seminar on Natural Heritage in the Caribbean, Suriname (2000);
- Central Asian meeting (2000);
- Karst sites in East and South East Asia (2001);
- Alpine Arc meetings (2000-2001).
- Tropical marine and coastal sites (Vietnam workshop, 2002).
- Boreal forest protected areas (Russia, Oct. 2003).