

Background Document¹



World Heritage International Expert Meeting on Science and Technology UNESCO WORLD HERITAGE CENTRE

London, UK, 21-23 January 2008

Content

1.	Introduction	2
2.	Objectives	2
3.	The World Heritage Convention and science and technology	2
3.1	Science and technology on the World Heritage List.....	2
3.2	Reference to science and technology in the World Heritage Convention	4
3.3	Reference to science and technology in the Operational Guidelines.....	4
3.4	Relevant Committee decisions (see also Annexes I and IV).....	5
4.	The Global Strategy for a representative and credible World Heritage List (1994)	6
4.1	Relevant expert meetings.....	6
	- Expert Meeting, Parc national de la Vanoise, France (1996)	6
	- Amsterdam, The Netherlands, 1998: a joint meeting of cultural and natural heritage experts	6
	- Expert meeting on Astronomy and World Heritage, Venice, March 2004.....	7
	- Joint working meeting on “Starlight Reserve” Concept and Heritage of Science and Technology.....	7
	- Other	7
4.2	Studies by the Advisory Bodies.....	7
4.3	Studies by States Parties and Scientific Bodies.....	8
5.	Examples of existing World Heritage sites with direct or indirect links to science and technology.....	9
	- Loire Valley (France) : Leonardo da Vinci.....	9
	- Galapagos (Ecuador): Charles Darwin.....	9
	- Lednice – Valdice Cultural Landscape (Czech Republic) : Gregor Mendel	9
	- Thingvellir National Park: Alfred Wegner	9
	- Alejandro de Humboldt National Park (Cuba) and Teide National Park (Spain): Alexander von Humboldt	9
6.	Conclusions.....	10
	ANNEX I.....	11
	List of key documents	11
	ANNEX II.....	12
	List of relevant World Heritage background documents	12
	ANNEX III.....	13
	Selected literature and web-pages.....	13
	ANNEX IV	14
	Thematic Initiative on Astronomy and World Heritage	14
	ANNEX V	18
	“Starlight Reserve” and World Heritage	18

¹ Prepared by M. Rossler with inputs by C. Fuchs, A. Sidorenko-Dulom, E. Lichtenstein and G. Debonnet 11/01/08

BACKGROUND DOCUMENT

1. Introduction

At its thirty-first session in July 2007 the World Heritage Committee (Christchurch, New Zealand 2007) accepted an offer by the State Party of the United Kingdom to host an international expert meeting on Science, Technology and World Heritage. It was discussed that it would be beneficial to explore further the opportunities, issues and additional guidance necessary to recognise achievements of science on the World Heritage List. An international expert meeting on the interpretation of science heritage in the context of the 1972 Convention with inputs from the scientific community and World Heritage specialists was considered a useful first step. The Committee **Decision 31 COM 9** is attached as Annex I.

The outcome of this meeting will contribute to the development of guidelines and criteria for identifying sites to recognize the outstanding heritage of science and technology on the World Heritage List. Currently places relating to science and knowledge are less well represented on the World Heritage List in particular for the natural sciences (physics, astronomy, chemistry, and biological sciences) and the development of their application through engineering and technology.

2. Objectives

The main objectives of the expert meeting are:

1. Assess and examine the interpretation of scientific heritage in the context of the World Heritage Convention (1972) with particular focus on four scientific areas: astronomy, physical sciences, biological sciences, and the engineering & technology.
2. Identify the opportunities to celebrate places of Outstanding Universal Value because of their significance for science and technology or as landmarks of scientific achievement by inscribing them on the World Heritage List;
3. Develop guiding principles for consideration by the World Heritage Committee at its 32nd session for the nomination and evaluation of sites which represents milestones and achievements in science and technology and are of Outstanding Universal Value;
4. Recommend a framework for the Advisory Bodies (ICOMOS and IUCN) working with the World Heritage Centre to implement future thematic studies in this area;
5. Recommend to the 32nd Session of the World Heritage Committee potential additions to Annex 3 of the Operational Guidelines for the implementation of the World Heritage Convention to take into account the final recommendations and proposals of the expert meeting.

This brief document provides a summary of the background to this meeting. Further references and documents are listed in Annexes I and II.

3. The World Heritage Convention and science and technology

3.1 Science and technology on the World Heritage List

The 1972 UNESCO *Convention concerning the Protection of the World Cultural and Natural Heritage* currently has 184 States Parties. The purpose of the *Convention* is to ensure the identification, protection, conservation, presentation and transmission to future generations of the cultural and natural heritage of "outstanding universal value". To date, 851 properties (see Table 1) from a total of 141 countries have been inscribed on the World Heritage List (see whc.unesco.org).

Table 1: Number of properties inscribed on the World Heritage List

TYPE OF PROPERTY	TOTAL NUMBER
Cultural properties	660
Natural properties	166
Mixed cultural and natural properties	25
TOTAL	851

The List currently contains a number of properties, which have been inscribed in view of their significance for science and technology. Examples can be found in Table 2.

Table 2: Examples of properties relating to Science and Technology (this List is non-exhaustive to illustrate different themes)

PROPERTY	State(s) Part(y)ies	Criteria used	Year of Inscription
Struve Geodetic Arc (determining the shape of the earth through triangulation points)	Belarus Estonia Finland Latvia Lithuania Norway Republic of Moldova Russian Federation Sweden Ukraine	(ii)(iii)(vi)	2005
Varberg Radio Station (development of telecommunication: radio transmission station)	Sweden	(ii)(iv)	2004
Galápagos Islands (Theory of evolution; Darwin)	Ecuador	(vii)(viii)(ix)(x)	1978, extension 2001
Dorset and East Devon Coast (300 years of history of earth sciences)	United Kingdom of Great Britain and Northern Ireland	(viii)	2001
La Medulas (ancient mining technology)	Spain	(i)(ii)(iii)(iv)	1997
Cornwall and West Devon Mining Landscape (Export of mining technology around the world)	United Kingdom of Great Britain and Northern Ireland	(ii)(iii)(iv)	2006
Pre-Hispanic City of Chichen-Itza (astronomical observatory)	Mexico	(i)(ii)(iii)	1998

3.2 Reference to science and technology in the World Heritage Convention

The World Heritage Convention refers to science in its articles 1 and 2, clearly for both types of heritage, cultural and natural:

“Article 1

*For the purposes of this Convention, the following shall be considered as "**cultural heritage**":*

monuments: *architectural works, works of monumental sculpture and painting, elements or structures of an archaeological nature, inscriptions, cave dwellings and combinations of features, **which are of outstanding universal value from the point of view of history, art or science;***

groups of buildings: *groups of separate or connected buildings which, because of their architecture, their homogeneity or their place in the landscape, are **of outstanding universal value from the point of view of history, art or science;***

sites: *works of man or the combined works of nature and man, and areas including archaeological sites which are **of outstanding universal value from the historical, aesthetic, ethnological or anthropological point of view.***

Article 2

*For the purposes of this Convention, the following shall be considered as "**natural heritage**":*

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.**” [highlights by author]*

3.3 Reference to science and technology in the Operational Guidelines

The Operational Guidelines for the Implementation of the World Heritage Convention refer to science and technology specifically in the criteria for cultural and natural heritage, thus interpreting articles 1 and 2 of the Convention.

77. The Committee considers a property as having outstanding universal value (see paragraphs 49-53) if the property meets one or more of the following criteria. Nominated properties shall therefore :

*(i) represent a masterpiece of **human creative genius;***

*(ii) exhibit an important interchange of human values, over a span of time or within a cultural area of the world, on developments in architecture or **technology,** monumental arts, town-planning or landscape design;*

(iii) bear a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or which has disappeared;

(iv) be an outstanding example of a type of building, architectural or **technological** ensemble or landscape which illustrates (a) significant stage(s) in human history;

(v) be an outstanding example of a traditional human settlement, land-use, or sea-use which is representative of a culture (or cultures), or human interaction with the environment especially when it has become vulnerable under the impact of irreversible change;

(vi) be directly or tangibly associated with events or living traditions, with ideas, or with beliefs, with artistic and literary works of outstanding universal significance. (The Committee considers that this criterion should preferably be used in conjunction with other criteria) ;

(vii) contain **superlative natural phenomena** or areas of exceptional natural beauty and aesthetic importance;

(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;

(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**;

(x) contain the most important and significant **natural habitats** for in-situ conservation of **biological diversity**, including those containing **threatened species** of outstanding universal value **from the point of view of science or conservation**.
[highlights by author]

3.4 Relevant Committee decisions (see also Annexes I and IV)

Specific discussions on science and technology at the World Heritage Committee sessions took place under the item nominations throughout the history of the Convention and particularly at the following sessions which are summarized below:

- **2006: Extract of the Report of the World Heritage Centre on the implementation of the new World Heritage Programmes and Initiatives (30th session, Vilnius, Lithuania, July 2006 - WHC-06/30.COM/6):**

Taking in the account the importance of the Thematic Initiative "Astronomy and World Heritage" in the recognition and promotion of achievements in science, the numerous State Parties designated the national scientific institutions which will be in charge of the implementation of activities within the framework of the Initiative. The coordination experts team of the Thematic Initiative "Astronomy and World Heritage", in cooperation with all these national institutions, started the elaboration of a project proposal for the nomination of serial transnational properties entitled "World Ancient Observatories". The Thematic Initiative "Astronomy and World Heritage" wishes to assist the State Parties in the implementation of this project as a part of activities aims to the possible proclamation, by the United Nations General Assembly, of the Year of Astronomy in 2009 which was supported by the UNESCO General Conference at its 33rd session.

- **2005 : Extract of the Decisions adopted by the 29th session of the World Heritage Committee (July 2005) :**

The World Heritage Committee, requests the Director of the World Heritage Centre to further explore the thematic initiative "Astronomy and World Heritage" as a means to promote, in particular, nominations which recognize and celebrate achievements in science (see background document in Annex IV)

- **2004 : At its 28th session, the World Heritage Committee, by its Decision 28 COM 9, paragraph 6,** requested the World Heritage Centre to present the Thematic Initiative on Astronomy and World Heritage.

4. The Global Strategy for a representative and credible World Heritage List (1994)

In June 1994 at the request of the World Heritage Committee, the World Heritage Centre and ICOMOS organized an expert meeting to examine the representative nature of the World Heritage List and the methodology for its definition and implementation. The meeting was organized in response to perceived imbalances in the types of heritage included on the List and its regional representativity. A Global Strategy for a representative and credible World Heritage List was proposed at the meeting, and subsequently adopted by the World Heritage Committee at its eighteenth session in December 1994.

The Global Strategy is both a conceptual framework and a pragmatic and operational methodology for implementing the *World Heritage Convention*. It relies on regional and thematic definitions of categories of heritage which have outstanding universal value, to ensure a more balanced and representative World Heritage List by encouraging countries to become States Parties to the *Convention*, to prepare tentative lists and to harmonise them, and to prepare nominations of properties from categories and regions currently not well represented on the World Heritage List.

The background and reports to numerous Global Strategy meetings can be found at <http://whc.unesco.org/en/globalstrategy/>

4.1 Relevant expert meetings

- Expert Meeting, Parc national de la Vanoise, France (1996)

At its eighteenth session in December 1994, the World Heritage Committee requested that the Global Strategy be expanded to include an equal emphasis on natural properties and cultural properties. For this purpose an Expert Meeting on the evaluation of general principles and criteria for nominations of natural World Heritage sites was held in the Parc national de la Vanoise, France in March 1996.

At its twentieth session in December 1996, the World Heritage Committee discussed the report of the Vanoise meeting. The Committee decided that a "truly joint meeting of cultural and natural heritage experts" be organised, which took place in Amsterdam in 1998.

- Amsterdam, The Netherlands, 1998: a joint meeting of cultural and natural heritage experts

On the *World Heritage Global Strategy Natural and Cultural Heritage Expert Meeting* it was discussed how to achieve a better balance in the types of heritage and cultural and natural values protected by the *World Heritage Convention*. For this purpose the meeting addressed issues of World Heritage site identification, evaluation and management within the framework of the implementation of the *World Heritage Convention*, its existing criteria, the "conditions of integrity", "the test of authenticity" as well as the notion of "outstanding universal value", making reference to specific case studies in heritage conservation. It also reviewed the diversity and interactions between cultural and natural heritage and examined opportunities for their conservation through the implementation of the *World Heritage Convention*. Protecting the diversity of cultural and natural heritage and interactions between the two are fundamental to the spirit and intent of the *World Heritage Convention* and responsive to current definitions and interpretations of heritage and of the environment as being both natural and cultural.

- Expert meeting on Astronomy and World Heritage, Venice, March 2004

Following the encouragement of several States Parties of the World Heritage Convention, the World Heritage Centre, in collaboration with the UNESCO Venice Office – Regional Bureau for Science in Europe (ROSTE) and ICOMOS, and with the generous support of the Governments of the Netherlands and the United Kingdom, organised a meeting of international experts in the fields of astronomy and astrophysics, archaeoastronomy, archaeology, architecture and heritage management at the UNESCO Venice Office from 17-19 March 2004. During the Venice meeting, the experts elaborated an implementation strategy of the thematic programme and examined the development of a methodological approach aimed at the consideration of properties associated to astronomy.

- Joint working meeting on “Starlight Reserve” Concept and Heritage of Science and Technology, UNESCO HQ, Paris, 10 October 2007 (see Recommendation in Annex V)

- Other

A working document on transnational serial nominations is under preparation for the 32nd session of the Committee, some of which take into account scientific achievements, such as the Arctic (see results of the international expert meeting, Narvik, 30.11.2007 – 1.12.2007) or the Mid Atlantic Ridge (see results of the international expert meeting, Iceland, 15.01.2007) included on the web-pages of the World Heritage Centre at whc.unesco.org.

4.2 Studies by the Advisory Bodies

- The World Heritage List: Filling the Gaps. An Action Plan. An Analysis by ICOMOS (2004)

“The idea of ‘balance’ in relation to the World Heritage List should not be seen to refer to a balance between countries, or types of properties, but rather to how well a particular type of heritage of outstanding universal value is represented on the List. There will probably always remain a certain ‘imbalance’ between various regions and countries of the world, considering the incredible diversity of cultural heritage, the way it is distributed and how it is now represented around the world. As a consequence, the aim of the present study is to help States Parties in their efforts to identify possible gaps on the List. The following attempt, illustrated by comments and statistics, of approaching the question of representivity of the existing World Heritage List, as well as the Tentative Lists, from three frameworks - typological, chronological/regional and thematic framework - in accordance with the Decision of the World Heritage Committee in Budapest mentioned above, is meant *to facilitate the tasks of the States Parties to identify properties of potential outstanding universal value and prepare Tentative Lists and nominations*. It is clear that improving the representivity on the List and “filling the gaps” will require further research. The definition of potential heritage properties to be nominated to the List will necessarily remain an open question, subject to evolving concepts, policies, strategies and available resources.” (From: The World Heritage List: Filling the gaps - an action plan for the future. 2005. ICOMOS International. p. 14-15

http://www.international.icomos.org/world_heritage/gaps.pdf

In “Filling the Gaps” ICOMOS analyses the World Heritage List within a typological, chronological-regional, and thematic framework, also reviewing possible reasons for certain gaps that occur on the List. The study refers to the history of science and technology at several instances:

“The Industrial Revolution and the Advance of Science and Technology; European colonialism” appears in the chronological-regional framework, pointing out 15 sites that are related to it.

Furthermore, “Developing technologies” is taken into consideration, containing multiple sub-categories such as technologies for “converting and utilising energy”, for “processing Information and communicating”, and “technology in urban community”. In total, this terming lists 35 sites.

“The theme of ‘developing technologies’ has been sub-divided into energy conversion and utilisation (wind power, water energy, steam, coal, electricity, thermonuclear energy, etc.), which occurs 6 times; information processing and communication systems (writing, archives, postal and telecommunication systems, astrology and astronomy) 16 times; and technology of urban community (infrastructures, transport systems, construction technology) 13 times.”, (see p. 87.)

“Most other themes have relatively few references, such as ‘utilising natural resources’, ‘movement of peoples’, and ‘developing technology’.” (p. 88)

Additionally “Philosophy and science” is regarded as a sub-category of “Expressions of Society” that develop knowledge. Under this term the study lists 12 related World Heritage sites.

“The references under this theme [Expressions of Society] identify events, living traditions, ideas, beliefs, artistic and literary works that are associated with the outstanding universal value of the cultural property concerned. For example, reference can be made to personalities, such as artists or architects who have been responsible for the creative design and construction of a site, or relate to significant religious, philosophical, literal or scientific personalities, who have been closely associated with a site.” (p.82.)

- IUCN

IUCN has developed a strategy paper on future priorities for natural World Heritage as an input to the Global Strategy for a balanced, representative and credible World Heritage List. The strategy was based on an initial analysis "A Review of the Global World Heritage Network: Biogeography, Habitats and Biodiversity" (click on "Protected Areas"), carried out by the UNEP World Conservation Monitoring Centre. IUCN presented their analysis “The World Heritage List: Future priorities for a credible and complete list of natural and mixed sites” to the World Heritage Committee at its 28th Session in Suzhou, 2004. (<http://whc.unesco.org/?cid=60&&meeting=28COM> : IUCN Analysis of the World Heritage List and Tentative Lists and follow-up action plan).

4.3 Studies by States Parties and Scientific Bodies

In a number of cases States Parties carried out (extensive) comparative studies in relation to specific nominations. In the case of the Struve Geodetic Arc the nomination was carried forward by scientific organisations, among them the International Federation of Surveyors (FIG), the International Association for Geodesy (IAG) and the International Astronomical Union (IAU). For sites related to astronomy IAU has established collaboration (see Annex IV). For nominations related to Earth Sciences cooperation with the IGU (International Geographical Union and its geomorphological sections mainly) and IUGS (International Union of Geological Sciences) have started since the “Earth Heritage – World Heritage” conference in Dorset, 2004. (see <http://www.geoconservation.com/EHWH/index.htm>). All scientific unions work under the umbrella of ICSU, the International Council for Science (see www.icsu.org).

A number of Tentative Lists by States Parties include sites related to scientific achievements, such as the current US Tentative List with the Goddard Rocket Launching site (launching of the first liquid propellant rocket), the Lowell Observatory (known for the discovery of Pluto), the Pupin Physics laboratory (uranium experiments) or the Trinity site (first nuclear device). This Tentative List is currently under revision. Many Tentative Lists include sites of technological achievements or industrial development and a review was carried out of these lists in 2002 (see also Rössler 2002).

5. Examples of existing World Heritage sites with direct or indirect links to science and technology

In order to review the situation in more detail, a few case studies are suggested to illustrate relations between science technology and existing World Heritage properties. Some of these are not evident from the nomination, evaluation and inscription, and in each of these cases the outstanding universal value is not based on the link to scientific achievements and technological advances.

- Loire Valley (France) : Leonardo da Vinci

The Loire Valley was inscribed for its outstanding cultural landscape of great beauty, containing historic towns and villages, architectural monuments (the châteaux), and cultivated lands.

However, within the World Heritage property, a house is located where Leonardo da Vinci lived. During his stay in Le Clos Luce , Leonardo da Vinci worked on a project draining the Sologne. Leonardo da Vinci, one of the most important painters of his times, was also a major engineer/inventor, scientist and philosopher. The site however is not recognized for this connection.

- Galapagos (Ecuador): Charles Darwin

The Galapagos Islands, termed the 'living museum and showcase of evolution' were inscribed on the World Heritage list for the abundance of marine and other rare species.

Simultaneously it is this area that has inspired Charles Darwin's theory of evolution following his visit in 1835. His theory has provided scientific evidence that all species of life have evolved over time from one or a few common ancestors through the process of natural selection. It builds a key foundation of biology, as it provides a unifying logical explanation for the diversity of life.

- Lednice – Valtice Cultural Landscape (Czech Republic) : Gregor Mendel

The World Heritage site of "Lednice-Valtice Cultural Landscape "was inscribed as a magnificent cultural landscape. It is one of the largest artificial landscapes in Europe, comprising Baroque architecture with a countryside designed according to English romantic principles of landscape architecture.

Despite the fact that it still contains botanical gardens the inclusion of the site was not based on the research by Gregor Mendel (1822-1884) who actually did his experimental research in the gardens of this landscape. The only recognition which can be found is in the title of the Faculty based there, the "Mendel University of Agriculture and Forestry Brno - Faculty of Horticulture Lednice".

- Thingvellir National Park: Alfred Wegner

The site of the Thingvellir National Park, Iceland, was inscribed in 2004 as a cultural landscape under criteria (iii) and (vi) mainly for the Althing – an open-air assembly. The site however illustrates the continental drift discovered by Alfred Wegner (1880 – 1930). The phenomenon is now taken into account by the working group on the transnational serial nomination of the Mid Atlantic Ridge.

- Alejandro de Humboldt National Park (Cuba) and Teide National Park (Spain): Alexander von Humboldt

The World Heritage Committee inscribed in 2001 the Alejandro de Humboldt National Park on the World Heritage List under natural criteria (ii) and (iv) and in 2007 the Teide National Park.

Despite the name, the Cuban natural site was not recognized for any of the scientific achievements of the German geographer Alexander von Humboldt (1769-1859). Humboldt was however referred to in the evaluation of the recent nomination of the Teide (Spain): "Teide National Park has attracted the interest of naturalists and geoscientists from all over the world, including pioneer work at the beginning of the 19th century by researchers such as Alexander von Humboldt, Leopold von Buch and Charles Lyell, who established basic concepts of geology and volcanology while studying this island." Again, even in the case of Teide the recognition was not based on the history of science.

- **Piazza del Duomo, Pisa (Italy) and Galileo Galilei**

The site of the Piazza del Duomo was inscribed on the World Heritage List in 1987 under criteria (i)(ii)(iv)(vi) mainly for the masterpieces of medieval architecture. Pisa is also the birthplace and workplace of one of the "Father of Sciences" Galileo Galilei. In the Advisory Body Evaluation ICOMOS makes the following references to the work of the scientist:

"Criterion VI: It was at the Cathedral of Pisa that Galileo Galilei (1564-1642), observing the oscillations of the bronze chandelier created by Battista Lorenzi, discovered at the age of 19 the theory of isochronism of small oscillations, a prelude to his pioneering work on dynamics. From the top of the campanile, he conducted experiments which led him to formulate the laws governing falling bodies. Two of the principal buildings of the Campo dei Miracoli are thus directly and tangibly associated with a decisive stage in the history of physical sciences."

6. Conclusions

The World Heritage List currently comprises a number of sites of which the Outstanding Universal Value is at least in part determined by their significance for science and technology. At the same time, there are a significant number of sites that can be associated with advances in science or technology or important scientific personalities, even if this was not part of the original justification for their inscription. If the World Heritage List is to be used as an instrument to celebrate key advances in science and technology, a more systematic approach would be needed, based on clear criteria and guiding principles. The expert meeting presents a good opportunity to provide the World Heritage Committee with guidance on this issue.

The report of the meeting and recommendations agreed upon by the Expert Meeting will be presented to the 32nd session of the World Heritage Committee in Quebec, Canada, in July 2008.

ANNEX I

List of key documents

Convention concerning the Protection of the World Cultural and Natural Heritage (UNESCO 1972)

Operational Guidelines for the Implementation of the World Heritage Convention (2005)

Properties included in the World Heritage List (2007)

Brief descriptions
(www.whc.unesco.org/en/list)

Decision: 31 COM 9

The World Heritage Committee,

1. Having examined Document WHC-07/31.COM/9,
2. Recalling Decision 30 COM 9 adopted at its 30th session (Vilnius, 2006),
3. Takes note of the progress reports by ICOMOS and IUCN on the first compendium on outstanding universal value and the inscription of proposed properties by criteria on the World Heritage List;
4. Requests ICOMOS and IUCN to harmonize their reports to include detailed analyses of criteria, lists of sites inscribed under each criterion, landmark cases as well as reflections on authenticity, integrity and management practices;
5. Requests the World Heritage Centre to:
 - (i) send electronically the draft compendium during the year to receive preliminary comments; and
 - (ii) prepare an overview introduction of the reports of the Advisory Bodies;
6. Requests ICOMOS to give consideration in the final report to archaeological sites and their threshold for inscription on the World Heritage List;
7. Requests ICOMOS and IUCN, in consultation with the World Heritage Centre, to finalize the first compendium for consideration by the Committee at its 32nd session (2008);
8. Accepts the offer of the United Kingdom to host an expert meeting on the recognition of the heritage of science and technology in the World Heritage Convention during late 2007.

ANNEX II

List of relevant World Heritage background documents

(available at whc.unesco.org)

1. **1994**
 WHC-94/CONF.003/INF.6
 Report of the Expert Meeting on the "Global Strategy" and thematic studies for a representative World Heritage List (UNESCO, 20-22 June 1994)
 Rapport de la réunion d'experts sur la "Stratégie globale" pour assurer la représentativité de la Liste du Patrimoine mondial (UNESCO, 20-22 juin 1994)
2. **1995**
 WHC-95/CONF.203/7
 Balanced representation of the natural and cultural heritage on the World Heritage List
 Représentation équitable des biens naturels et culturels sur la Liste du patrimoine mondial
3. **1996**
 WHC-96/CONF.202/INF.9
 Report of the Expert Meeting on Evaluation of general principles and criteria for nominations of natural World Heritage sites (Parc national de la Vanoise, France, 22-24 March 1996)
 Rapport de la Réunion d'experts sur l'Evaluation des Principes généraux et des critères pour les propositions s'inscription de biens naturels du patrimoine mondial (Parc national de la Vanoise, France, 22-24 mars 1996)
4. **1997**
 WHC-97/CONF.208/11
 Progress Report on the Global Strategy and thematic and comparative studies
 Etat d'avancement de la stratégie globale, des études thématiques et comparatives
5. **2004**
 WHC.04/28.COM/13
 Evaluation of the Global Strategy for a representative, balanced and credible World Heritage List (1994 - 2004)
 Evaluation de la stratégie globale pour une liste du Patrimoine mondial représentative, équilibrée et crédible (1994-2004)
6. **2005**
 WHC.05/29.COM/INF.9A
 Background paper prepared by the World Heritage Centre on the occasion of the Expert meeting on the concept of outstanding universal value
 Document de synthèse rédigé par le Centre du patrimoine mondial à l'occasion de la Réunion spéciale d'experts sur le concept de valeur universelle

 WHC.05/29.COM/9
 Assessment of the conclusions and recommendations of the special meeting of experts (Kazan, Russian Federation, 6-9 April 2005) established by Decision 28 COM 13.1
 Evaluation des conclusions et recommandations de la réunion spéciale d'experts (Kazan, Fédération de Russie, 6-9 avril 2005) établie par la décision 28 COM 13
7. **2006**
 WHC.06/30.COM/INF.9
 Joint ICOMOS-IUCN paper and papers by ICOMOS and IUCN on the application of the concept of outstanding universal value

 WHC.06/30.COM/8D
 Revision of Criteria of Properties inscribed on the World Heritage List according to the Operational Guidelines (2005) Révision des critères des biens inscrits sur la Liste du patrimoine mondial conformément aux Orientations(2005)

ANNEX III

Selected literature and web-pages on the history of science and technology and links to World Heritage

Cameron, C. and M. Rössler: Global Strategy: canals and cultural routes. In: The World Heritage Newsletter, No. 8, June 1995, 11-13.

Declaration in Defence of the Night Sky and the Right to Starlight. La Palma Declaration. Canary Islands, 2007. www.starlight2007.net

Fritzsche, Harald and Michael Helge. The Genius of the Century Albert Einstein. *Deutschland Magazine*, 2004

Galison, Peter, and Emily Thompson, ed. 1999. *The Architecture of Science*. Cambridge: MIT Press.

History of Science. Wikipedia, the free encyclopedia.
http://en.wikipedia.org/wiki/History_of_science

Le Boeuffle, André. 1997. *Le Ciel et la Mer : L'Astronomie dans la navigation ancienne*. Vannes : Burillier.

La Fabuleuse Conquête des Pôles : Deux Siècles de Missions Extraordinaires. *Historia No. 727*, Juillet 2007.

Meadows, Jack, ed. 1988. *The History of Scientific Discovery: The Story of science told through the lives of twelve great scientists*. Oxford: Phaidon.

Robic, Marie-Claire, Anne-Marie Briand and Mechtild Rössler (eds.), Géographes face au monde. L'Union Géographique Internationale et Les Congrès Internationaux de Géographie. Geographers and the World. The International Geographical Union and the International Geographical Congresses. Paris: Harmattan 1996 (=Histoire des Sciences Humaines), 464 pages (english/french edition).

Rössler, M.: Industrielles Welterbe. In: Industriedenkmalpflege und Geschichtskultur, Nr 1/2002 (Welterbe Industrielle Kulturlandschaft der Zeche Zollverein) Essen, 2002, 10-12.

Selin, Helaine, ed. 1997. *Encyclopedia of the History of science, Technology, and Medicine in Non-Western Cultures*. Dordrecht/Boston/London: Kluwer Academic Publishers

Table ronde - A la découverte du patrimoine de l'humanité. In: 60 ans d'histoire de l'UNESCO. Actes du colloque international, Paris 16-18 Novembre 2005, UNESCO 2007, 327 –332. http://www.unesco.org/archives/Archives/files/actes_FINAL_web.pdf

The Strategy of the UNESCO World Heritage Convention and the conservation of geological Heritage. In: *Naturupa*, No. 99, December 2003 (Memory of the heritage) (English and French edition), p 6.

The World Heritage List: Filling the gaps - an action plan for the future. 2005. ICOMOS International.
http://www.international.icomos.org/world_heritage/gaps.pdf

The World Heritage List: Future priorities for a credible and complete list of natural and mixed sites. 2004. IUCN.
<http://whc.unesco.org/?cid=60&&meeting=28COM>

ANNEX IV

Thematic Initiative on Astronomy and World Heritage

Background and justification

1. At its 28th session, the World Heritage Committee, by its Decision **28 COM 9**, paragraph 6, requested the World Heritage Centre to present the Thematic Initiative on **Astronomy and World Heritage**. Created in 2003, following a scientific study of the World Heritage List and the Tentative Lists, as a pilot activity for the identification, preservation and presentation of the sites with a relationship to astronomy, the Thematic Initiative on Astronomy and World Heritage was finalised in 2004, during the first meeting of the representatives of the scientific community of twelve States Parties, ICOMOS and the NASA.
2. Properties with a relationship to science are amongst the least represented on the World Heritage List and the values of these properties, located in all the regions of the world, are not sufficiently recognised. It is not easy for States Parties to evaluate the importance of this heritage, nor their benefits in terms of enrichment of the history and science of humanity, the promotion of cultural diversity and the development of exchanges.
3. The tangible witnesses of astronomy, dispersed throughout all the geographical regions of the world, span all eras, from prehistory to the present day. Architectural expressions of the interpretations of the sky represent as many direct and indirect links with astronomy.
4. Based on existing studies, the Dutch Government granted in 2003, under the Netherlands Funds-in-Trust, a financial contribution to carry out a scientific study of the World Heritage List and the Tentative Lists, with a view to identifying properties with a relationship to astronomy. This was the basis for the first proposal for the project entitled "Archaeo-astronomical sites and observatories".
5. With the encouragement of several States Parties, the World Heritage Centre, in collaboration with ICOMOS, and with the generous support of the Government of the United Kingdom and the UNESCO Regional Bureau for Science in Europe (ROSTE), organised a meeting of international experts in astronomy and astrophysics, archaeo-astronomy, archaeology, architecture and World Heritage site management, at the UNESCO Office in Venice, from 17 to 19 March 2004. The participants in the Venice meeting (March 2004) elaborated a strategy for the implementation of the Astronomy and World Heritage Initiative in conformity with the Global Strategy and the four strategic objectives adopted in Budapest. An information session at UNESCO Headquarters, on 3 June 2004, presented the results of this meeting to the Permanent Delegations of the States Parties.
6. A *Cyber Laboratory* structure was created, in the framework of the Initiative, on the Web site of the World Heritage Centre thanks to support of the *Royal Astronomical Society* of the United Kingdom.
7. From 30 May to 6 June 2005, the Institute of Astronomy of Russian Academy of Science organised a sub-regional round table in order to define the concepts and approaches related to the Astronomy and World Heritage Initiative. One of the objectives was the definition of actions aiming at the elaboration of a joint nomination of properties relating to astronomy to the World Heritage List.

8. The European Society for Astronomy in Culture, with the patronage of Region of Sardinia (Italia) organized from June 28 to July 3 2005 in Isili, an International Conference during which more that 50 experts presented their researches linked to the theme of "Astronomy and Heritage".
9. The 29th session of the World Heritage Committee (July 2005) requested the World Heritage Centre to further explore the thematic initiative "Astronomy and World Heritage" as a means to promote, in particular, nominations which recognize and celebrate achievements in science.
10. Following this recommendation, the World Heritage Centre, in coordination with scientific institutions which were officially designated as responsible for the implementation of this initiative at the national level, started the elaboration of a project proposal for the nomination of serial and transnational cultural properties entitled "Worlds' Astronomical Monuments".

Objectives of the Thematic Initiative on Astronomy and World Heritage

11. The main objective of the Thematic Initiative on Astronomy and World Heritage is to establish a link between Science and Culture towards recognition of the scientific values of properties linked to astronomy. The identification, preservation and the promotion of these properties are the three fields of action in the implementation of this programme. It provides an opportunity not only of identifying the properties but also of keeping their memory alive and preserving them from progressive deterioration, through the recognition and the promotion of their scientific values through inscription on the World Heritage List of the most representative properties.
12. The properties that can be associated with astronomy have initially been defined in the following manner:
 - a) Properties which by their concept and/or the environmental situation have significance in relation to celestial objects or events;
 - b) Representations of the sky and/or celestial objects or events;
 - c) Observatories;
 - d) Properties with an important link to the history of astronomy.
13. All the activities have been carried out, since 2003, thanks to voluntary contributions of States Parties (Netherlands, United Kingdom), of a scientific organisation (Royal Astronomical Society of the United Kingdom) and of UNESCO's Regional Bureau for Science in Europe - ROSTE. No budget is available to date.
14. In May 2007, the Executive Board of the International Astronomical Union unanimously adopted the proposal to establish the official partnership with UNESCO within the framework of the Initiative. The Memorandum of Understanding is under finalisation.
15. Amongst the intersectoral activities of UNESCO, the Thematic Initiative on Astronomy and World Heritage is, to date, the only cultural activity created in support of the proclamation of 2009 as International Year of Astronomy.

WHC-04/28.COM/9

Item 9 of the Provisional Agenda: Report of the World Heritage Centre on its activities and on the Implementation of the Decisions of the World Heritage Committee

[...]

Activities undertaken in pursuit of the 4Cs

In addition to the activities related to the establishment and analysis of the World Heritage List, Tentative Lists, Periodic Reporting and reactive monitoring developed in close cooperation with the Advisory Bodies, the World Heritage Centre has undertaken other activities in support of the 4C's established by the Budapest Declaration of 2002.

Activities to make the World Heritage List more representative, balanced and credible have included:

[...]

- The elaboration of a thematic initiative, “Astronomy and World Heritage” to establish the links between science and culture on the basis of research aiming at the acknowledgement of the cultural and scientific values of properties connected with astronomy;

28 COM 9

Document : WHC-04/28.COM/9Rev

The World Heritage Committee,

1. Noting the Report of the World Heritage Centre presented in Part I of the document WHC-04/28.COM/9 Rev,
2. Recalling Decisions 27 COM 4 and 27 COM 5.1 and the need for the Committee to be kept informed on the implementation of its Decisions,
3. Takes note with appreciation of the special activity in support of World Heritage in the Democratic Republic of Congo;
4. Expresses its strong concern at the critical shortages of permanent staff in the World Heritage Centre – in particular in the Latin America and the Caribbean, Europe and North America and Policy and Statutory Implementation units, which seriously impinge upon the responsibilities of the World Heritage Centre as Secretariat for the World Heritage Convention, and considers that such shortages need to be urgently addressed – at the latest, starting from the Programme and Budget of UNESCO for the biennium 2006-2007;
5. Takes note of the proposal for an on-line database for the implementation of the decisions of the Committee presented in Part II of document WHC- 04/28.COM/9 Rev;
6. Requests the World Heritage Centre to submit, for its consideration at its 29th session (2005), the thematic initiatives of the World Heritage Centre on “Astronomy and World Heritage” and “Marine Conservation”;
7. Decides that the World Heritage Centre shall finalize and submit for the approval of the Chairperson of its 27th session (2003) the revised Operational Guidelines for the Implementation of the World Heritage Convention, as adopted at its 6th extraordinary session (2003). The revised Operational Guidelines shall be applied, if finalized, from 1 November 2004, with appropriate transitional arrangements where necessary. In particular, nominations submitted for consideration by the Committee at its 30th session in July 2006 will be considered and evaluated in accordance with the Operational Guidelines of 2002. Furthermore, the Chairperson of the 27th session of the Committee is authorized to include observations made by the Committee during its 28th session ;
8. Requests the World Heritage Centre to report on the on-line database at its 29th session (2005), on the understanding that such database will become operational from 1 April 2005, and that it will include information on the implementation of the decisions adopted at all its sessions, both ordinary and extraordinary, since its 26th session (2002);
9. Further requests the World Heritage Centre to develop a similar database for the decisions adopted by the General Assembly of the States Parties to the World Heritage Convention, and to report on such development at its 29th session (2005).

Decision 29 COM 5B

The World Heritage Committee,

1. Having examined Annex 1 of Document WHC-05/29.COM/5,
2. Approves the World Heritage Programme for Small Island Developing States (SIDS) and the World Heritage Marine Programme;
3. Requests the Director of the World Heritage Centre to further explore the thematic initiative “Astronomy and World Heritage” as a means to promote, in particular, nominations which recognize and celebrate achievements in science;
4. Approves a biennial budget of US\$20,000 for the World Heritage Programme for Small Island Developing States and US\$50,000 for the World Heritage Marine

Programme, to be financed through the World Heritage Fund, as proposed in Document WHC-05/29.COM/16.

WHC-06/30.COM/6

D. 3) Thematic Initiative "Astronomy and World Heritage"

34. Recognising the importance of the Thematic Initiative "Astronomy and World Heritage" in the promotion, in particular, of nominations which recognize and celebrate achievements in science, the following States Parties have designated national institutions responsible for implementing activities in the framework of this Initiative: Costa Rica, Islamic Republic of Iran, Germany, Turkey, Portugal, Russian Federation, Ukraine, United Kingdom. The first activity, a project proposal for the nomination of serial transnational properties entitled "The World's Ancient Observatories" is under elaboration.
35. The World Heritage Centre wishes to assist States Parties in the implementation of the Thematic Initiative "Astronomy and World Heritage" as part of UNESCO activities leading to the possible proclamation, by the United Nations General Assembly, of the Year of Astronomy in 2009 which was supported by the UNESCO General Conference at its 33rd session.

ANNEX V

“Starlight Reserve” and World Heritage

I. “Starlight Reserve” Concept

Introduction

Recognizing the importance to promote the **Declaration in Defense of the Night Sky and the Right to Starlight** (adopted in La Palma, April 2007) through the different UNESCO Programmes and Initiatives within the framework of the UNESCO Conventions,

Considering that the light pollution as one of the causes of the gas emissions must be considered as an imminent threat for the environment, as well as that climate change poses a threat to the outstanding universal values of World Heritage sites,

Recognizing that the preservation of dark skies is an important and necessary part in the process of the protection and safeguarding of natural and cultural properties world wide,

Following the call of the UNESCO Director-General for "an integrated approach to issues of environmental preservation and sustainable development" (the UNESCO publication "Case Studies on Climate Change and World Heritage"),

The participants² recommended adopting the following plan of actions aiming:

- to elaborate the Concept of “Starlight Reserve”
- to identify the different categories of areas, reserves and properties accordingly to this Concept
- to establish general technical recommendations in regard to the starlight protection, related with the safeguarding of natural and cultural properties, lighting pollution and intelligent lighting;
- to integrate these recommendations to the different World Heritage Programmes and Initiatives
- to evaluate the possibilities of the nomination of the “Starlight Reserve” on the World Heritage List and/or as the Biosphere Reserve

Action plan and timeframe

1. “STARLIGHT” Scientific Committee in consultation with IAU – UNESCO – WH Committee Advisory Bodies (ICOMOS-IUCN):

- **by November 2008** : to request the presentation of the Starlight Declaration during the Celebration of the International Year of Planet Earth in 2008
- **by 15 December 2007** : to prepare the draft Concept proposal on “Starlight Reserve”
- to request the integration of the evaluation of the Starlight Reserve Concept proposal to the programme of the experts meeting on Heritage of Science and Technology initiated and organized by UK authorities (London, 21-23 January 2008)
- **by March 2008** : to finalize document on the “Starlight Reserve” Concept proposal for its submission by Spanish authorities to the World Heritage Committee (June-July 2008) during the expert meeting held in Tenerife in February 2008
- **by February 2008** : to finalize the “Starlight” activities could be organized by Spanish authorities during the International Year of Astronomy in 2009,
- **by September 2008** : to prepare an implementation strategy of the Starlight Reserve Concept

2. “STARLIGHT” Scientific Committee in coordination with New Zealand authorities and in consultation with UNESCO-WHC – WH Committee Advisory Bodies:

² List of participants in Annex 1

- to evaluate the possibilities of the nomination of the Starlight Reserves within the framework of the World Heritage Convention : case-study / preparation of the nomination of the Lake Tekapo (NZ)

3. "STARLIGHT" Scientific Committee in consultation with UNESCO-MAB:

- to propose during the special session of 3rd World Congress of Biosphere Reserves: Biosphere Futures, UNESCO Biosphere Reserves for Sustainable Development (4-9 February 2008 - Madrid) to adopt the Starlight Declaration and to promote the implementation of the Starlight Recommendations (For more information: <http://www.madrid2008mab.es/>)

4. "STARLIGHT" Scientific Committee in consultation with UNESCO-WHC:

- to integrate "Starlight" recommendations to the WH programmes and initiatives (Cities, Tourism, Cultural Landscape, Climate Change & World Heritage, Astronomy & World Heritage etc) (this proposal could be added to the document to be presented by Spain during 32nd session of the World Heritage Committee)

- to prepare the document concerning the implementation strategy of the Starlight Reserve Concept taking into account following documents :

- report on "Predicting and Managing the Effects of Climate Change on World Heritage" and "Strategy to Assist States Parties to Implement Appropriate Management Responses"
- recommendations of the expert meeting on the World Heritage properties' Buffer zones (xxx, March 2008)
- recommendations of the 32nd session of the World Heritage Committee on serial nominations (Canada, June-July 2008)

II. "Astronomy and World Heritage" - first UNESCO Thematic Initiative to promote the Heritage of Science and Technology

Introduction

Noting the considerable progress in the implementation of this Initiative initiated in 2003

Considering the World Heritage Committee requested to further explore the thematic initiative "Astronomy and World Heritage" as a means to promote, in particular, nominations which recognize and celebrate achievements in science (29th session, July 2005)

Taking into account the Resolution of the UNESCO General Conference mentioned which noted that the International Year of Astronomy is the excellent opportunity to raise public awareness, especially within the young generation, of scientific issues and to demonstrate the links between science, education, culture and communication in the framework of "... the thematic initiative "Astronomy and World Heritage",

The participants recommended the following plan of actions:

1. IAU in coordination with UNESCO/WHC:

- **by January 2008** : to prepare a list of most exceptional astronomical properties world-wide from point of view of science which are not World Heritage properties, in conformity with WH criteria, as well as using the classification established during the Venice meeting in 2004

- **by May 2008** : to prepare and edit the International Appeal Paper mentioned the importance of identification, safeguarding and recognition of astronomical scientific heritage world wide within the framework of the World Heritage Convention (**TBC by IAU**) – for its distribution to the Permanent Delegations to UNESCO as well as during the World Heritage Committee in June-July 2008

2. UK Organizing Committee (Meeting on HERITAGE of SCIENCE and TECHNOLOGY, London 21-23 January 2008) in coordination with UNESCO-WHC and WH Committee Advisory Bodies:

- To invite IAU, as well as “STARLIGHT” *Scientific Committee* representatives to the meeting on scientific heritage
- To evaluate the implementation of the Astronomy and World Heritage Initiative, including the examples of the WH activities could be organized by different State Parties during the International Year of Astronomy in 2009
- To study the WH existing criteria in the context of identification of the cultural heritage properties/monuments which are of outstanding universal value **from the point of view of history, art or science**, in conformity with the Article 1 of the World Heritage Convention
- To prepare the draft of the Guidelines on the inscription of the properties of science and technology on the World Heritage List, including the definition and categories of these properties which should be used in association with Chapter II the *Operational Guidelines* (with the recommendation to revise the Annex 3 of the *Operational Guidelines* in order to add these Guidelines)
- To evaluate an eventual creation of the new World Heritage Programme on Heritage of Science and Technology
- **by March 2008** : to prepare a draft of document to the attention of the World Heritage Committee June-July 2008
- **by April-May 2008** : To edit the meeting proceedings and recommendations and to add the meeting report to the web address : <http://whc.unesco.org/en/globalstrategy>

3. IAU and ICOMOS:

- **by March 2008** : to prepare the specific guidelines for identification of astronomical properties on the base of the Venice meeting (2004) and UK meeting (2008) recommendations
- **by March 2008** : to prepare the proposal to the attention of the World Heritage Committee requesting to undertake the comparative and thematic studies on astronomical scientific heritage, including the identification of the serial transnational properties in order to provide a context for their evaluation
- **by June 2008** : to signed an agreement of collaboration in order to provide necessary expertise to the State Parties for the identification and nomination for inscription of astronomical scientific heritage on the World Heritage List
- to evaluate the possibility to create the International Scientific Committee for Astronomical Heritage
- to establish the guidelines for recognition of scientific values of the inscribed World Heritage properties connected with astronomical observations

4. UNESCO-WHC in coordination with WH Committee Advisory Bodies – IAU – State parties involved:

- **by February 2008** : to finalize the programme of the meeting on serial nominations of astronomical properties (proposed by Egypt) on the base of recommendation of the UK meeting
- **by March 2008** : to consolidate and finalize the document concerning the Heritage of Science and Technology to be presented to the WH Committee in June-July 2008 including :
 - The proposal of the Guidelines on the inscription of the properties of science and technology on the World Heritage List with the recommendation to revise the Annex 3 of the *Operational Guidelines*
 - the implementation report of the Thematic Initiative “Astronomy and World Heritage” including the International Appeal Paper of IAU, the request to undertake the comparative and thematic studies on astronomical scientific heritage, the request to approve the list (with a budget proposal) of WH activities could be organized by different State Parties during the International Year of Astronomy in 2009
 - document on the “Starlight Reserve” Concept, as well as on the proposal to integrate the Starlight Recommendations to the World Heritage Programme and Initiatives

Participants

« Astronomy and World Heritage » & Starlight Scientific Committees' members:

1. Prof. Alexander Boksenberg, Chairperson, UK National Commission for UNESCO
2. Mr Miguel Clusener-Godt, Ecological Sciences and Biodiversity Section SC/EES/ESB

3. Mr Cipriano Marin, Coordinator Starlight Initiative (IAC)
4. Ms Anna Sidorenko-Dulom, Coordinator Astronomy and World Heritage Initiative, CLT/WHC

UNESCO World Heritage Centre / Culture Sector:

5. Mrs Mechtild Rossler, Chief Europe & North America Section, CLT/WHC/EUR
6. Ms Celine Fuchs, CLT/WHC/EUR
7. Ms Ekaterina Lichtenstein, CLT/WHC/EUR
8. Mr Marc Patry, CLT/WHC

Advisory Bodies of the World Heritage Committee:

9. Mrs Regina Durighello, Director World Heritage Programme, ICOMOS

IAU

10. Prof. Karel A. van der Hucht, General Secretary International Astronomical Union
11. Prof. Richard Wainscoat, President IAU Commission 50, University of Hawaii