

Starlight Reserves

Where the Earth meets the Universe

Scientific, cultural and environmental values

THE INTERNATIONAL YEAR of Astronomy has brought us to rediscover and valorise the many windows on Earth that have always been open to the Universe. Some geographical sites present such windows, featuring expressions, events, and works of man and nature that acquire full meaning under a starry sky. This nocturnally-oriented recognition is the primeval basis of Starlight Reserves.

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The Declaration in Defence of the Night Sky and the Right to Starlight, adopted in 2007, states that “an unpolluted night sky that allows the enjoyment and contemplation of the firmament should be considered an inalienable right of humankind equivalent to all other environmental, social, and cultural rights.” Unfortunately, this as-yet unscathed right is in serious danger, and its degradation will lead to the irremediable loss of an extensive cultural, scientific, scenic and natural heritage.

With the idea of recognising and identifying the legacy associated with the starlit sky emerged the proposal to develop a “Starlight Reserve” concept as an additional recommendation to the Starlight Declaration. This proposal was supported by the organisations that promoted the Declaration and the Starlight Scientific Committee, and carried out in cooperation with the UNESCO-World Heritage Centre through its thematic initiative “Astronomy and World Heritage,” an IYA2009 Cornerstone Project that expands on the established concept of World Heritage Sites¹ to include recognition of locations of outstanding astronomical significance.

A Starlight Reserve is a site that has established a commitment to defend the natural night sky and the access to starlight. Its main function will be to preserve the quality of the night sky and its associated values.

Receding perspective: Why Starlight Reserves are necessary

A cultural loss

THE POWER OF the cultural dimension is irrefutable. The simple contemplation of starry skies has always had profound implications for philosophy, science, arts, culture—and for the general conception of the universe in every community all over the world. Each place has its own view of starlight handed down through generations: legends, folk tales, sacred landscapes, objects, monuments and traditional festivals.

However, we find ourselves in the face of manifestations that we can now consider as endangered. A large part of the present generation has grown up without any direct contact with the beauty of a starry sky, in an environment where these cultural references are falling into oblivion. An essential element of our civilisation and culture is rapidly becoming lost, and this loss will affect all countries on Earth².

A scientific setback

THE SCIENTIFIC AND technological dimension of a starry night is an essential part of the legacy of the sky. The ability of the planet’s astronomical sites and observatories to detect and interpret data from

- 1 A UNESCO World Heritage Site is a site of either cultural or physical significance such as a forest, mountain, lake, desert, monument, building, complex, or city that is on the list that is maintained by the international World Heritage Programme administered by the UNESCO World Heritage Committee.
- 2 Declaration of the IAU/ICSU/UNESCO-1992.

outside the world we live in should be considered sacrosanct. Dark skies are the windows to our knowledge of the greater Universe.

Unfortunately, unlike ancient monuments and technological tools related to astronomy, current areas devoted to astronomical observation do not enjoy appropriate recognition. Ground-based observatories have historically provided the vast majority of our knowledge of outer space. However, present technical requirements restrict suitable areas to very specific and limited locations offering good conditions for the development of advanced astronomy, of optical and infrared astronomy in particular.

In fact, the best astronomical sites must be located at high altitudes with little turbulence, such as on the west coasts of continents or on oceanic islands. They must also be located at sites with slight air pollution and low aerosol content. With few exceptions, high mountain areas isolated from the temperature of the ocean and coastal mountains near to cold oceans with stable, subtropical anticyclone conditions are the only possibilities for deep space observation. There are only a few places on the planet where we find this unique combination of environmental and natural circumstances: well conserved spaces with very little alteration to natural starlight. These comprise a limited and disappearing resource that must be recognised and protected. A World Heritage joint nomination for exceptional areas for astronomical observation that includes the observatories of Hawaii, Canary Islands, and Northern Chile is currently being prepared.

An eroding geography

THE LANDSCAPE DIMENSION and the conservation of nature as it relates to the beauty and quality of the night sky is another essential aspect. When we talk about natural or cultural landscapes of outstanding beauty, there are very few references to nightscapes—even fewer if we talk about nationally or internationally protected landscapes or natural areas. Nevertheless, the light of stars and other heavenly bodies has always enriched terrestrial nature's display as well as human habitats, creating reference landscapes universally perceived by people as an integral part of their natural and cultural heritage. In spite of their diversity and magnificence, nocturnal skies remain the most widely overlooked part of this kind of geographical recognition. However, there is hope. Evaluating nightscapes as a promotion of the starlit scenery at Arches NP (USA), La Palma (Spain) or Easter Island (Chile), highlights the enormous potential of incorporating the quality of the nighttime skies into the concept of the conservation of natural areas.

Reopening the windows to the Universe

ONE INDISPUTABLE BENEFIT to the nocturnal aspect of nature conservation is the fact that darkness and natural night skies are indispensable for the healthy functioning of organisms and ecosystems. We tend to forget that the sky is above the earth 24

hours a day and that ecosystems have adapted themselves to the natural rhythms of the moon and stars in the course of millions of years of evolution. As over half of the creatures living on this planet are nocturnal, any degradation in the quality of sky, by day or by night, has a profound effect on their behaviour and on the equilibrium of the biosphere. In addition, many diurnal species adjust their life cycle according to the duration of the night.

The effects of artificial light at night on wildlife, ecosystems, and diversity are widespread and can be devastating. However, compared to climate change, acid rain, exotic species, habitat destruction and other stresses, natural darkness and artificial light are often overlooked when considering and protecting biodiversity and our appreciation of the natural world³.

The Starlight Reserve concept connects to the international movement in favour of mitigating the effects of light pollution (defined as the direct or indirect introduction of artificial light into the environment by humans). We are currently facing a growing abuse of artificial lighting, of which impacts and consequences have not been sufficiently evaluated. But what we can be certain of is the loss of the capacity to observe the stars and the destruction of nightscapes, together with unnecessary impacts

The concept of Starlight Reserves goes further than the mere protection of the astronomical integrity of the sites. It aims to recover and identify existing values related to the night sky, encompassing landscape, nature, opportunities for science, and the vast arena of cultural heritage, tangible and intangible.

on people's quality of life, waste of energy, habitat deterioration and negative effects on wildlife.

The Starlight Reserve Guidelines⁴ were prepared with the participation of over 100 international experts and developed in cooperation with the World Heritage Centre and organisations like the International Astronomical Union (IAU), the IAC (Canary Island Astrophysics Institute), UN-World Tourism Organization, the International Commission on Illumination (CIE) and the MaB Programme, with input from IDA representatives. Board member Friedel Pas, former board member Malcolm Smith, and Chad Moore of the National Parks Night Sky Team have represented IDA at the several Starlight Workshops and Conferences held since 2007. Sharing much criteria with IDA's International Dark Sky Places (IDSPlaces) program, the Starlight Reserve Guidelines provide two essential tools for preserving natural darkness. First, the guidelines delineate the functions: cultural, astronomical, ecological, and scenic, that certain places on the planet can fulfill by preserving the quality of night sky and its associated values. Second, the guidelines

3 Welch, D., Trzyna, T., Lopoukhine, N., Prologue by IUCN Dark Sky Advisory Group to the Report of the Expert Meeting "Starlight Reserves and World Heritage," Fuerteventura, March 2009.

4 www.starlight2007.net/pdf/StarlightReserve.pdf

provide an efficient guide to “intelligent lighting” — lighting that covers the real needs for nighttime illumination without degrading the quality of the night sky.

A Starlight Reserve must have a core, or dark zone, an unpolluted area where natural night sky conditions are kept intact. This core will be protected by a buffer or protection zone, which will be surrounded by an external zone where criteria of responsible lighting will be enforced. World Heritage Sites, Biosphere Reserves, protected areas recognised by the UN Conventions such as Ramsar sites⁵, and national parks are the primary adherents to these guidelines. Specific site restrictions are determined and lighting plans implemented by the managers of each site, and the evaluation and certification of results is made

attracts 1.4 million visitors annually. The intention to ensure the continued quality of this astronomical habitat is expected to create new responsible and imaginative forms of tourism for generations to come. Likewise, dark sky sites at Pic du Midi in France, the MacKenzie Basin in Scotland, and Hortobágy National Park Directorate in Hungary (all under consideration for IDA’s International Dark Sky Places program) and places such as Fuerteventura, Northern Chile, La Palma, and the Amalfi Coast are all inspiring new economic possibilities in starlight tourism that include companion industries such as lodging, and cultural enrichment programs that disseminate local activities and folklore. These possibilities not only draw interest from visitors, but can strengthen local ties to the region.



Dan and Cindy Duriscoe

Starlight Reserves establish a core zone to protect views of dark skies like this vista at Arches National Monument in Utah, USA.

through a Starlight Committee report in conjunction with a report from the declaring institution (UNESCO-MaB, World Heritage Centre, etc). The International Astronomical Union has been involved in the implementation of Starlight Reserve guidelines at astronomical observation sites.

Beyond starlight

THE DEFENCE OF the right to observe the stars and the preservation of our astronomical heritage is providing a new form of benefits to local communities. New possibilities for responsible tourist destinations and products appear before our very eyes in an enormous spectrum. Such diverse activities as watching starry skies, aurorae, eclipses, visits to astronomical observatories, sailing holidays featuring navigation by the stars, some pilgrimage routes, or the innovative experiences offered by desert tourism at night are becoming viable, sustainable sources of income for an increasing number of areas around the world.

Lake Tekapo, New Zealand is a widely celebrated Starlight Reserve designee. Boasting Mt. John, considered the most accessible observatory in the world, Lake Tekapo currently

Jointly with UN-WTO (World Tourism Organization) and UNESCO, a certification standard for Starlight Tourist products and areas is under development. It should be ready for application by the end of 2009.

The vision given by the Starlight Initiative takes on a special meaning in 2009, a year that celebrates two emblematic events. It is the 400th anniversary of Galileo building his first telescope and it is the 150th anniversary of Darwin’s publication of his work *On the Origin of Species*. Within this context, where science, technology, knowledge, nature, beauty and the heritage of the star-studded sky converge, we can better understand the scope of some creative nomination proposals that, like Lake Tekapo in New Zealand, offer new windows and references to the diversity of world heritage.

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5 Wetland recognized by an intergovernmental treaty signed at the Convention on Wetlands in Ramsar, Iran, 1971.