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# The Value of Dark Skies and of High-Quality Night Lighting—Building Public Awareness

## Introduction

**O**ur ancestors greatly enjoyed the solace and inspirational view of a blanket of stars above us ... to dream, to wonder, to be part of nature. Today, too many children only know hints of this splendor through planetarium shows. Our grandparents felt the richness of plant and animal life around them during the day and night. Today, it seems that we want to turn night into day, and let animals search for new habitats. Our parents thrived as society in tune with the richness of the Earth's resources. Tomorrow, what will be left for our children?

One small but too common aspect of modern society—low-quality outdoor lighting—has many detrimental effects. Fortunately, there are workable solutions. And so, as many are striving to regain a quality of life they find slipping away, the problems and solutions of light pollution are moving into view as one environmental problem that can be solved now.

Over the millennia, life on Earth developed with a day/night cycle. It is ingrained in our natures, and destroying it by turning night into day stresses our systems, including our immune system. This circadian rhythm, with its need for both light and dark, is required for the health of humans, animals, and plants.

Our natural environment can and

does relax us, but poor nighttime lighting can be a definite psychosocial stressor, similar to noise. Our systems need a break, a better ambience in life—indeed, better outdoor lighting. It is not hard to do; the technology exists.

Low-quality outdoor lighting creates glare that blinds us, hindering visibility, detracting from safety and security. Instead of guiding us, bad lighting creates clutter and confusion. Spill light pours in from our neighbor's yards or from the street. It wastes energy (and money) in a world that increasingly needs us to protect the environment. Poor lighting produces urban sky glow, a veil blocking our view of the once-pristine dark sky. We know that the

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steps necessary to preserve dark skies also improve the quality of our nighttime lighting.

### How to Do It—

#### The Keys to Good Lighting

- Determine if light is needed, and why. Use it only when actually needed.
- Use the right amount of light for the task; not too little nor too much.
- Direct the light only to the places where needed.
- Eliminate glare.
- Minimize “light trespass,” or obtrusive lighting.
- Minimize direct up-going light, a major cause of urban sky glow.
- Use the light only when it is needed. Turn lights off when not needed.
- Use motion sensors when possible.
- Install dimmers or multi-level lighting; they can also be effective.
- Use energy-efficient sources.
- Minimize energy waste.

#### The Components of

#### Poor-Quality Outdoor Lighting

**Glare.** Glare *never* helps visibility. The dictionaries call it “blinding light,” yet it is common in most outdoor lighting. Glare is never good, and we should not tolerate it. It is not necessary. It can be avoided with good lighting design in any installation.

**Obtrusive lighting, or light trespass.** This is our neighbor’s light bothering us; or that from the local automobile dealer, who has bad lighting; or from the local sports complex with its bad floodlighting. There is far too much light trespass; obtrusive lighting can even be considered offensive.

**Clutter and confusion.** This is light that is not adding anything to nighttime ambiance or to the convenience of life outdoors at night. Too much of our night lighting is actually ruining the nighttime environment, not adding to its value.

**Wasted light.** There is too much up-going, totally unused light. In addition, many still hold to the myth of “the more, the better.” More light is not always better, no more than more noise is. Certainly there are many locations with inadequate light, but there are also many with far too much. The issues of transient adaptation and luminance overload are important ones.

**Impact on the night sky.** Up-going light brightens the night sky, wiping out our view of the stars and the universe around us. This is a key adverse environmental impact. Shall our city dwellers, our children, never see the stars again?

**Energy waste.** Lots of energy (and money) is wasted by this bad lighting and by inefficient lamps and fixtures. Billions of dollars are wasted lighting up the sky and blinding us

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with glare—literally an astronomical amount.

In these days of increasing attention to energy crises, one can easily note that all of the factors above waste energy, and energy costs money. The amount involved is significant because the operating cost of a light fixture throughout its lifetime is usually much greater than the initial cost of the lighting fixture or lamp. Even where energy is relatively cheap (and where is that these days?), wasted energy produces unnecessary environmental pollution due to the production of that wasted energy, regardless of its cost.

### Good vs. Bad Lighting

Outdoor lighting allows us to see better at night and do more things than we can without such light. Unfortunately, there is too much bad nighttime lighting in most places. Good lighting has great value. It improves the quality of life, improves productivity and visibility, reduces energy waste, and promotes sustainability. We get rid of glare and most light trespass. We save a lot of energy by using the light effectively, not wasting it.

The reasons for better outdoor lighting are compelling, and people with diverse backgrounds and interests are demanding improvement. As the demand increases, so does the supply of high-quality light sources and fixtures, so does the demand for environmentally friendly lighting de-

sign. We must both get rid of the bad stuff and use only good lighting for all new installations. It is worth the difference in initial cost, if any. The life-cycle costs of high-quality lighting are always lower than those for bad lighting. The challenge is to build awareness and overcome apathy.

Sky glow is not the inevitable price of progress. Population growth combined with residential and commercial developments, along with the growth in lighting technology, has led to greatly increased use of outdoor lighting. The increased usage was particularly apparent in the age of relatively cheap electrical energy. The main design approach seemed to be “the more, the better.” As energy costs rise, more ears open to the advantages of energy-saving luminaries and lighting design. Instead of quantity, we need to focus on the quality of lighting.

The Earth’s atmosphere scatters light coming from sources in an urban area, creating the halo visible over cities even from a great distance. Light emitted directly into the sky and that reflected from the ground, buildings, or other objects is scattered by molecules and aerosols (solid or liquid particles) present in the air. Even a single bright source in a dark locale can be a source of light pollution.

High-quality lighting is the key to dealing with sky glow issues. For example, the city of Tucson has

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grown greatly from the time the first outdoor-lighting control ordinances went into effect in 1970. It is now a city of over 800,000 people. Yet the sky glow, as seen from observatories about 70 km from the city, have not increased much over that period of great population growth. The solutions do work.

Hundreds of communities are benefiting from the use of outdoor-lighting ordinances. They help a lot, and the process of educating a community and developing a consensus on outdoor lighting builds many educated allies and partners. Six states in the USA now have statewide ordinances to control light pollution: Arizona, Colorado, Connecticut, Maine, New Mexico, and Texas. Others are pending. Australia has adopted national lighting standards. Likewise, cities and communities worldwide have recognized the need to address the problems of bad lighting and enacted ordinances.

The National Park Service has also recognized the problems, and is taking steps to preserve both the daytime and nighttime experience for visitors. National parks frequently have dark sky programs for visitors, and some are beginning special initiatives to address light pollution in their surrounding communities. The U.S. Forest Service is looking for more information on how to maintain wilderness while managing multiple-use needs and border-community developments. In addition, several

locales have created dark sky preserves to allow people to visit and enjoy the night experience. They have found that it has a strong positive impact on quality tourism. The night has value! These preserves include the Michigan Dark Sky Park at the Lake Hudson Recreation Area, McDonald Park in British Columbia, Torrance Barrens Conservation and Dark Sky Reserve in Ontario, Cherry Springs State Park in Pennsylvania, and the Manitoulin Island Dark Sky Preserve in Lake Huron, Ontario. Similar plans are well underway in other countries.

### **The International Dark-Sky Association (IDA)**

Growing public awareness is the key. As the public becomes aware, they are demanding such changes, and governments are beginning to respond. It is clearly an area where all benefit. The problem is to accelerate the growth of awareness. A recent grant by the National Science Foundation to the International Dark-Sky Association (IDA) was aimed at building public awareness of the issues, and a similar grant from the Pauley Foundation had the same purpose. IDA is a non-profit, environmental, education and research organization. Incorporated in 1988, IDA seeks to preserve and protect the nighttime environment and our heritage of dark skies through high-quality nighttime outdoor lighting. This membership-based organiza-

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tion has well over 7,000 members from every state in the USA and from 70 other countries. Its diverse membership includes organizations, city officials, lighting professionals, architects, professional and amateur astronomers, environmentalists, and concerned members of the public.

### Summary

Night is a vital part of our environment, and just as worthy of preservation as any other natural resource. It involves both the night around us and the view we have of the stars and the universe we live in. It is part of our culture, history, and nature. We lose something of ourselves when we can no longer look up and see our place in the universe. The worldwide problem of light pollution requires worldwide solutions. As we seek to educate everyone, everywhere, awareness is growing. While light pollution is still getting worse in most places, there are workable solutions. They improve the quality of our nighttime environment and our nighttime lighting, promoting safety and secu-

rity and conserving energy. We all win!

### Some Basic Web References

- International Dark-Sky Association (IDA). Pointers to useful resources such as a quarterly newsletter, over 170 information sheets, numerous papers and talks, images and slides, videos and CDs, links to manufacturers, and tips on how to identify good luminaires. IDA's *Outdoor Lighting Code Handbook* guides communities through the items to consider when enacting a lighting ordinance.  
<http://www.darsky.org>
- Illuminating Engineering Society of North America (IESNA) *Handbook 2000*. Various recommended practices, technical memoranda, design guides, and other documents.  
<http://www.iesna.org>.
- International Commission on Illumination (CIE). Various technical reports, guides, standards, and proceedings.  
<http://www.cie.co.at/cie/>.

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