

Protecting the night

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Abstract: Light pollution exists almost everywhere and is growing rapidly. Fortunately, there are solutions. The main problem is a lack of awareness, and apathy and inertia. However, progress is being made.

The beauty of the night sky is a wonderful thing. In addition, decreasing urban sky glow helps greatly to improve the quality of night lighting for everyone. With good lighting, we improve visibility, safety, and security, and minimize energy waste, and we have a more comfortable nighttime environment. The International Dark-Sky Association has a great deal of helpful information on its Web site, www.darksky.org.

1 Introduction to the issues

For most people on earth, the dark skies our ancestors knew have disappeared. The problem is urban sky glow, mostly due to too much bad lighting. Unfortunately, it continues to grow worse in most locations.

Solutions to the problem exist, but a key point is to join together in our efforts against this bad lighting, encouraging the use of only good nighttime lighting for all applications.

With good lighting, we all win. We help preserve dark skies, we see better at night (and are safer and more secure), we have a more pleasant and comfortable nighttime environment, and we save a great deal of energy and money. Neither astronomers nor the public, anywhere, need any of the adverse environmental effects of poor lighting, nor should they tolerate it. We must do all we can to preserve the beauty of the night sky, for astronomy and for all of mankind.

2 The problem

Good reasons for artificial lighting at night include helping us see better, for security,

safety, utility, and providing an attractive nighttime environment around us. Nighttime lighting is not going to disappear, even if there is another energy crisis. The problem is not lighting, but **bad** lighting. Far too much of our present nighttime lighting does not meet its objectives. The common components of bad lighting are:

(1) **Urban sky glow** (the brightening skies over our towns and cities) that destroys our view of the universe. We don't live up in the sky; we don't need all that light up there. It is a problem both for astronomers and for the general public, most of whom really enjoy the beauty of the night skies. This sky glow has also removed the view of the universe for most of the public, the majority of whom are urban dwellers. It would be a crime if our children and their children lose the beauty of the night sky.

(2) **Glare.** Glare never helps visibility, and it is far too common. We should strive for and accept only a glare-free environment. Far too much outdoor lighting blinds us with glare.

(3) **Light trespass.** Many lighting installations bother us as much or more than they help. The wasted light shines into our yards, our windows, even our telescope buildings. As with noise pollution, we don't need these intrusions. Such obtrusive lighting is not meeting the goals for which it was installed.

(4) **A trashy looking, confusing nighttime environment.** We should all be striving for an attractive nighttime environment, just as we do in the daytime. An obtrusive nighttime environment is part of the stress of today's life. We should help with the problem, not compound it. Remember, the night is part of the environment, too.

(5) **Adverse impact on wildlife and vegetation, and on humans.** All living things have evolved with a day-to-night cycle, brightness and darkness (circadian rhythm). This rhythm is part of our nature, and we need it. Not having it stresses our system, both physically and mentally. There is a growing research literature about these ef-

fects, and we need to become aware of it.

(6) **Energy waste.** We waste an astronomical amount of energy and money on this bad lighting, shining it where it is not needed or wanted (including up into the sky) and by using energy-inefficient light sources and lighting designs. In the United States alone, more than one billion dollars is wasted every year just to light up the night sky.

3 There are solutions

We all suffer from these problems. Fortunately, there are solutions. The key is quality nighttime lighting. Let me list briefly the components of these solutions.

(1) **Use only good lighting.** Quality designs are really all just common sense approaches to lighting. Let's not tolerate bad lighting; let's get rid of it.

(2) **Shine the light down,** where it is needed. Control the light output to locations where visibility is needed; don't waste it. Use quality lighting fixtures.

A few key reference sources

These three basic web sites discuss lighting and light pollution. They give an excellent introduction to the issues, and many links to other sites.

The **IDA** web site: [<http://www.darksky.org>]. Much good information and many, many links to other sites. Everyone at all interested in dark skies, a nice nighttime ambiance, and good vision at night should be a member.

The **IAU Commission 50 Working Group on Controlling Light Pollution** [http://www.ctio.noao.edu/light_pollution/iau50/]

I note with great regret and condolences that Dr. Robert Stobie, a good personal friend, was an active and productive member of this Working Group. He is sadly missed by so many in so many ways.

The **International Commission on Illumination (CIE)** web site, and links there to its Technical Committees. [<http://http://www.cie.co.at/cie/>]

(3) **Use time controls** (or dimmers or other controls) to ensure that light is only there when needed.

(4) **Design and install lighting to minimize glare.** Almost all glare comes from poor fixtures or poor installations. There is no excuse for glare. When not blinded by glare, the eye is a marvelous instrument and can see very well at what seems to be quite low lighting levels.

(5) **Use the right amount of light** for the task, not overkill. "More light" is not good design. Going from over-lit areas to darker areas means that we do not see well for a while (transient adaptation), and the opposite holds as well.

(6) **Use energy efficient light sources.** Light sources vary greatly in their efficiency. Use the most energy-efficient ones that meet the task. Near observatories, consider the use of low pressure sodium (LPS) lamps; they are the most efficient of all. They are strongly preferred by astronomers since the light output by LPS is essentially all one color and can be filtered out quite well.

4 Progress in implementing solutions

Quality lighting design is being used now in many locations. Such areas are benefiting by better lighting, by energy savings, and by darker skies (but not darker streets). We all win. Awareness of the problems and of the solutions is increasing rapidly, in the public area and especially in the lighting community.

The International Commission on Illumination (CIE) and many national organizations have technical committees addressing the issues, and reports and recommendations are appearing regularly. Most of the national lighting organizations also are becoming quite active. After all, who can be against

good lighting, given all its advantages? I am an active member of most of these committees, as are a number of other IDA members, and I am pleased with the growing awareness and activities.

One effective method for communities to attack the problem is to appoint an Outdoor Lighting Working Group to consider the issues and to recommend specific solutions tailored to local needs (including lighting control ordinances that set community standards; hundreds of these have now been enacted). Such "committees" have been very effective in all locales where they have been implemented. They have the added advantage of educating many people about the issues.

5 So what's the problem?

The main problem is continuing lack of awareness of the issues, the problems, and the common sense solutions. Education is the main thrust of most current activities. The second large problem is apathy. Even with awareness, action is needed. Some consider it too big an issue to become involved with, others feel that it is not important enough. Neither is a good enough reason for apathy. Astronomers, both amateur and professional, must be educated and get involved. IDA membership is an excellent start.

6 Help is available

The International Dark-Sky Association (IDA), a non-profit organization, is a powerful ally to help with educational efforts. It is a membership-based organization with more than 9000 members, from 70 countries, and it is growing rapidly in size and in impact. IDA has produced more than 180 information sheets discussing the issues, and they are an important resource for those who

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want to become informed and who want to help spread the word to others. Check out IDA's Web site (<http://www.darksky.org>), which contains a lot of excellent information (and images and other resources) about the issues and links to many other interesting sites. While there is a growing awareness of the problems and of the solutions, much more educational outreach is needed. IDA needs many more individual and organizational members.

7 Summary

Light pollution is a problem, for astronomy and for the public, and it is continuing to grow worse. However, effective solutions exist, and they work. These also improve the quality and effectiveness of our nighttime lighting, and they help us save a great deal of energy and money. We know that for sure. Lack of awareness and apathy are the main problems. Action is called for. Now. By all of us. The bottom line: "We All Can Win."
