

Darkness in Distress

By J. Kelly Beatty, Communications Officer for the or the International Dark-Sky Association's (IDA's) Massachusetts Chapter.

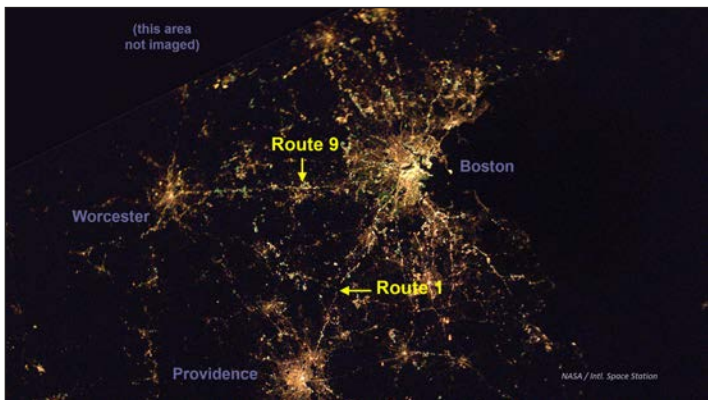
Thanks to light pollution, most of us have never seen the night sky in all its wonder. But a new mindset and new technology are poised to slow — and perhaps reverse — this bane of modern life.



Graphic courtesy of J. Kelly Beatty

Imagine driving through town as every fire hydrant gushes water into the street. Or stepping outside to find that the sprinkler system next door has gone berserk and is drenching the side of your house with a steady stream of water. That situation wouldn't last long — you'd quickly be giving City Hall and your neighbor an earful about it.

So why do we put up with the waste of so much light at night? Light pollution, simply put, is any unnecessary or excessive outdoor illumination. Sadly, it's become a pervasive and ugly consequence of modern 24/7 society. Most people associate lots of artificial light with enhanced safety and security at night (assumptions that are not well supported by evidence, by the way). Consequently, more lights get installed year after year, and our nights get brighter. And they're getting worse at an alarming rate. Research published January 20th in *Science* found that, over the past decade, the increase in nighttime skyglow has increased on average about 10% per year — far faster than had been thought.



Graphic courtesy of J. Kelly Beatty

Look around you the next time you're out at night. Much of the intense light generated by roadway and security fixtures never touches the ground. It never lights anyone's way, never provides any security, visibility, or guidance. Instead, it shines straight up into the sky. That ugly pall that envelops every city skyline is a collective consequence of all the streetlights that line our roadways, the over-the-top lighting at fast-food restaurants and gas stations, and even the intrusive glare from a neighbor's security light.

Without question, certain nighttime situations do require illumination. You wouldn't use an unlit ATM, or fumble in the dark with a gas pump. But when it comes to outdoor lighting, more is seldom better. Today, lighting scientists report, 99% of Americans live with light pollution to varying degrees, and more than two-thirds of us can't see the star-spangled Milky Way from our backyards.



Graphic courtesy of J. Kelly Beatty

Light pollution robs us of more than the night sky's beauty. It's an in-your-face waste of energy. According to an estimate by the International Dark-Sky Association

(IDA), skyward-directed light squanders more than \$3 billion in electricity in the U.S. every year. Poorly designed lighting causes harsh glare that can blind and distract drivers, especially in bad weather and for elderly drivers with poor vision.

It didn't used to be this way. Electric streetlights have been around for more than a century, but it wasn't until the 1950s that General Electric and Westinghouse lined America's roadways with tens of millions of "cobrahead" streetlights that remain today. Then, around 1970, light bulbs filled with high-pressure sodium gas began to blanket the landscape with their dazzling, ubiquitous, peach-colored glare.

Now we are in the midst of the wholesale evolution of the nighttime environment wrought by light-emitting diodes (LEDs). Without question, LEDs provide dramatic improvements in energy efficiency, customization, and controllability over previous lighting technologies. But they also increase light pollution in two major ways. First, because they're so energy efficient, we are all tempted to install even brighter outdoor lighting because it's so inexpensive to do so.

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Second, and most importantly, LEDs emit far more blue light than older lights do — and those blue photons create the most skyglow, and they disrupt the habits of nocturnal fauna

most profoundly (migrating birds, fireflies, and nocturnal pollinators, for example).



Graphic courtesy of J. Kelly Beatty

More ominous is a growing body of research suggesting that excessive blue light at night can disrupt the production of melatonin, a compound produced as we sleep — and only in darkness — that seems to play multiple roles in maintaining general human health. Clinicians around the world are racing to find out how disrupted darkness might impair the circadian (day-night) cycles. It's no wonder that the American Medical Society has declared not only that “Pervasive use of nighttime lighting disrupts various biological processes, creating potentially harmful health effects related to disability glare and sleep disturbance” (2012) but also has warned of the multiple harmful consequences of blue-rich lighting (2016).



Graphic courtesy of J. Kelly Beatty

Perhaps the tide of wanton wasteful lighting has begun to turn. In 2020, the IDA partnered with the Illuminating Engineering Society (which

establishes lighting standards nationwide) to advance “Five Principles for Responsible Outdoor Lighting”:

- All light should have a clear purpose.
- Light should be directed only to where needed.
- Light should be no brighter than necessary.
- Light should be used only when it is useful.
- Use warmer color lights where possible.

Fortunately, the spread of nighttime skyglow can be easily halted and even reversed. The most effective remedy is both simple and cost-effective: just make sure that all the light is directed downward, by using fixtures that send all their light below horizontal. Next, ensure that every outdoor light is no brighter than it needs to be — and is on only when necessary.

Then make sure that the outdoor lighting in our homes, businesses, municipal facilities, and streetlights emits as little blue light as possible. Get familiar with the concept of *correlated color temperature* (CCT), a metric that you'll now find on the packaging for any light you purchase. Ensure that its CCT value is no higher than 3000K (kelvins) and preferably lower.

I welcome your personal commitment to get involved. One person, asking the right question or offering informative comments at the right time and place, can have a positive and lasting impact on even major decisions involving outdoor lighting.

And while you're working locally to reduce light pollution locally, I'll be doing so at the state level. I've co-authored a bill, now pending in the Massachusetts Legislature, that would require all state- and municipally funded projects to install outdoor lighting that adheres to these common-sense principles. I urge you to contact your legislators to support and even co-sponsor SD.1219 or HD.2747 (identical versions were submitted to the Senate and House).

Think about this: light pollution is the only environmental threat that can be reversed or even eliminated easily — while saving money in the process. By reducing wasted light at night, energy use goes down. Environmental damage is reduced. We get to see more stars above. It's truly a win-win situation.

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