

LIGHTING FOR NIGHT-AND LIFE

BY LYNND A GREENE

Not so long ago, our ancestors could step out into night's vast dark dome and behold a galaxy of stars arching across the sky. Today, only three out of four of their city dwelling descendants have ever experienced the wonder of that same pristine darkness; and even fewer born today will ever see the Milky Way. Since its inception 120 years ago, artificial light has enhanced the way we live and work outdoors at night, affording us increased productivity, security and convenience—at a cost we rarely see to the natural world around us.

Today we know through a growing body of research that light pollution—the excessive use of lighting that beams artificial light outward and upward into the night sky where it's not wanted, rather than downward where it is—has become a leading pollutant with potentially shattering consequences we have been slow to realize. In engineering the night's natural darkness to accommodate our perceived needs, we are effectively disrupting critical natural light/dark rhythms to which many forms of life, including ours, have adapted over millennia.

Satellite imaging indicates that “sky glow”—the vaporous ceiling of glare over urban areas—is expanding around the globe at a rate of two percent annually, faster in some areas. Over 90 percent of North American and European populations now live under light-polluted night skies. St. Louis, a major stop along the migratory bird flyway, now ranks as the fifth most light-polluted city in the



Traditional landscape lighting, while attractive, can have harmful effects on insects, birds, and other wildlife. But there are steps homeowners can take to mitigate problems, most importantly, set a timer to turn off the lights after midnight.

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From an evolutionary perspective, artificial light at night is a very new stressor scientists have only recently begun to track.

“Little was known of light's eco-effects until the 1970s, when biologists began to study how light that disrupts humans can also disrupt plants and animals,” says Brett Seymoure, behavioral ecologist, postdoctoral fellow at Washington University-St. Louis, and lead author of a recent prominent study. “Today researchers are publishing about 250 papers a year documenting alarming changes in many species that we know are directly related to human light pollution.”

Their conclusions leave no doubt that outdoor lights we casually flip on are disrupting age-old biological cues and processes critical to the physiology of millions of species and the ecosystems they comprise. The thirty percent of vertebrates and sixty percent of invertebrates that are nocturnal have evolved to rely heavily on the moon and stars' natural light for orientation, mating, reproduction, pollination, migration, and food gathering, and more. Even insects active only in daylight are affected by disrupted night rest.

While all organisms are affected, insects are particularly at risk as nearly every aspect of their lives revolves around cycles of light and darkness, says Seymoure. And because insects comprise the biological foundation of all terrestrial ecosystems, the dramatic declines in their populations pose serious threats to humans.

“Think about it. What do humans need to live? Food, oxygen, and water—all of which depend upon functioning insect populations. These eco-engineers' cycle nutrients, pollinate plants, disperse seeds, maintain soil structure and fertility, control pests, filter air and water, and serve as a major food source to many other species. Without these ‘free’ services, estimated at a value of trillions of dollars annually, human life would not be possible. Insects are everything.”

Little of the natural world escapes the effects of our obsession for eternal daylight. Migrating birds, evolved to navigate their way by the light of moon and stars now largely obscured by sky glow, increasingly crash in to lighted buildings, dying by the billions every season. Sea birds, confused by gas flares and shore lights, circle wildly in dizzying vortexes until they drop. Species of trees and plants dependent on sustained periods of night darkness for proper evolutionary function, suffer stress and irregular growth.

Polluted night light affects humans too, short-circuiting sensitive biological rhythms that regulate sleep, thus contributing to obesity,



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A satellite image of St. Louis shows the significant nightlight imprint.

diabetes, cardiovascular disease and depression. Overbright street and car headlights create road glare that impairs vision in nighttime settings such as driving, walking, resulting in increased nighttime traffic accidents and deaths.

Then too there is the loss of a precious cultural experience. We have become so accustomed the pervasive glary haze above us that the very experience of the unlit night's beauty is almost beyond our imagining.

WHAT WE CAN DO

But for all the harm it inflicts, electric night light is the easiest pollutant to remedy—and homeowners can help reverse its effects by making modest changes to their outdoor and landscape lighting, starting with the right bulbs and fixtures.

Long promoted as cheap, long-lived and efficient, LEDs have gained near universal acceptance as a technological triumph in reducing carbon emissions. But without understanding their use, LEDs' best attributes too often end up being its worst. Misled by marketing, people burn more of them for longer periods—resulting in greater energy waste at a cost of \$3 billion annually.

“LEDs are a Pandora's box of paradoxes,” says Seymoure. “The technology's genius is that it can be designed to render exactly the right amount of light coloration for any situation. This gives us unprecedented control over light—but only if we understand how it works. Used carefully, LEDs can play a huge role in reducing light pollution's harmful effects.”

Essential to good night lighting is learning what it is—and there is no better resource than the International Dark Sky Association at <https://www.darksky.org/>. Founded in 1988 to promote responsible outdoor lighting and restore the earth's natural night-and-day balance, the IDA offers the most extensive body of information and guidance, including a full roster of “Dark Sky Friendly” fixtures and retailers.

In general, the principles of responsible outdoor lighting are simple, according to Don Ficken, president of Dark Sky Missouri (<https://darkskymissouri.org/>).

“Light with purpose, directing light only where it's needed, when it's needed, and always slanted downward,” he says. “Avoid overlighting by using fewer lights in down-casting fixtures, and use timers and dimmers to allow as much darkness as possible. If security is a concern, choose motion sensitive lights that will come on



Two examples of Dark Sky Association approved landscape lighting fixtures that direct light downward. Courtesy Kichler Lighting LLC.

briefly. And to truly support wildlife, turn all lights off through the overnight hours.”

Paying attention to temperature and color spectrums of LED bulbs is important. “Choose warm white (yellow-toned) LEDs rather than blue-rich white lights, which emit light at a temperature that increases pollution and negatively affects wildlife and human health.”

Be a good neighbor. Check your own night lighting footprint for possible effects on nearby homes as well as wildlife. Draw blinds and drapes at night to eliminate intrusive light trespass, as even small amounts can affect the environment.

The simple act of turning lights off or otherwise reducing their glare, is the most important thing we can do to reduce pollution, says Seymoure. “The effect is immediate. Once you turn off a light, it's gone, no clean up or restoration required. What's exciting is that by making small changes in our outdoor lighting design and habits, we can light our lives and still protect night's primordial function, and the natural world on which we depend.”

Starting with the flip of a switch, to “off.”

Lights Out Heartland

BirdSafeSTL is a program of the St. Louis Audubon Society that seeks to establish long-term community relationships supporting bird-safe practices and reduce bird fatalities in the St. Louis region. One component of that is reducing night light pollution, and as part of that effort, they are partnering with **Lights Out Heartland**, a collaboration of corporations and organizations in four Midwestern states, including Missouri. The program's goal is to encourage the public and businesses to turn off or modify artificial lighting during the peak spring nesting and fall wintering ground migration periods. In the St. Louis area, supporters include Ameren Missouri, Gateway Arch, Audubon Center at Riverlands, International Dark Skies Missouri, and The St. Louis Arts Chamber of Commerce. Last year, for example, the Arch turned off its upward facing lights from May 1-15 for the spring migration, and Sept. 18-30 in the fall. For more information on BirdSafeSTL, go to StLouisAudubon.org/birdsafestl. To find out more about Lights Out Heartland, visit LightsOutHeartland.org.--Ed.



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