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Light Pollution

People all over the world are living under the nighttime glow of artificial light, and it is causing big problems for humans, wildlife, and the environment. There is a global movement to reduce light pollution, and everyone can help.

GRADES

3 - 12

SUBJECTS

Conservation, Earth Science, Astronomy




IMAGE

Hong Kong Light Pollution

Boats, buildings, street lights, and even fireworks contribute to the light



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BACKGROUND INFO **VOCABULARY**

Most environmental pollution on Earth comes from humans and their inventions. Take, for example, the automobile or that miraculous human-made material, plastic. Today, automobile emissions are a major source of air pollution contributing to climate change, and plastics fill our ocean, creating a significant health hazard to marine animals.

And what about the electric lightbulb, thought to be one of the greatest human inventions of all time? Electric light can be a beautiful thing, guiding us home when the sun goes down, keeping us safe and making our homes cozy and bright. However, like carbon dioxide emissions and plastic, too much of a good thing has started to negatively impact the environment. Light pollution, the excessive or inappropriate use of outdoor artificial light, is affecting human health, wildlife behavior, and our ability to observe stars and other celestial objects.

That Earthly Sky Glow

Light pollution is a global issue. This became glaringly obvious when the World Atlas of Night Sky Brightness, a computer-generated map based on thousands of satellite photos, was published in 2016. Available online for viewing, the atlas shows how and where our globe is lit up at night. Vast areas of North America, Europe, the Middle East, and Asia are glowing with light, while only the most remote regions on Earth (Siberia, the Sahara, and the Amazon) are in total darkness. Some of the most light-polluted countries in the world are Singapore, Qatar, and Kuwait.

Sky glow is the brightening of the night sky, mostly over urban areas, due to the electric lights of cars, streetlamps, offices, factories, outdoor advertising, and buildings, turning night into day for people who work and

People living in cities with high levels of sky glow have a hard time seeing more than a handful of stars at night. Astronomers are particularly concerned with sky glow pollution as it reduces their ability to view celestial objects.

More than 80 percent of the world's population, and 99 percent of Americans and Europeans, live under sky glow. It sounds pretty, but sky glow caused by anthropogenic activities is one of the most pervasive forms of light pollution.

Is it Time to Get Up?

Artificial light can wreak havoc on natural body rhythms in both humans and animals. Nocturnal light interrupts sleep and confuses the circadian rhythm—the internal, twenty-four-hour clock that guides day and night activities and affects physiological processes in nearly all living organisms. One of these processes is the production of the hormone melatonin, which is released when it is dark and is inhibited when there is light present. An increased amount of light at night lowers melatonin production, which results in sleep deprivation, fatigue, headaches, stress, anxiety, and other health problems. Recent studies also show a connection between reduced melatonin levels and cancer. In fact, new scientific discoveries about the health effects of artificial light have convinced the American Medical Association (AMA) to support efforts to control light pollution and conduct research on the potential risks of exposure to light at night. Blue light, in particular, has been shown to reduce levels of melatonin in humans. Blue light is found in cell phones and other computer devices, as well as in light-emitting diodes (LEDs), the kinds of bulbs that have become popular at home and in industrial and city lighting due to their low cost and energy efficiency.

Animals are Lost and Confused, Too

Studies show that light pollution is also impacting animal behaviors, such as migration patterns, wake-sleep habits, and habitat formation. Because of light pollution, sea turtles and birds guided by moonlight during migration get confused, lose their way, and often die. Large numbers of insects, a primary food source for birds and other animals, are drawn to artificial lights and are instantly killed upon contact with light sources. Birds are also affected by this, and many cities have adopted a “Lights Out” program to turn off building lights during bird migration.

A study of blackbirds (*Turdus merula*) in Germany found that traffic noise

than birds in natural areas—waking and singing as much as five hours sooner than their country cousins. Even animals living under the sea may be affected by underwater artificial lighting. One study looked at how marine animals responded to brightly lit panels submerged under water off the coast of Wales. Fewer filter feeding animals, such as the sea squirt and sea bristle, made their homes near the lighted panels. This could mean that the light from oil rigs, passing ships, and harbors is altering marine ecosystems.

Even in places meant to provide protected natural habitats for wildlife, light pollution is making an impact. The National Park Service (NPS) has made maintaining a dark night sky a priority. The NPS Night Skies Team has been monitoring night sky brightness in some one hundred parks, and nearly every park showed at least some light pollution.

You Shouldn't Need Sunglasses at Night

There are three other kinds of light pollution: glare, clutter, and light trespass. Glare is excessive brightness that can cause visual discomfort (for example, when driving). Clutter is bright, confusing, and excessive groupings of light sources (for example, Times Square in New York City, New York). Light trespass is when light extends into an area where it is not wanted or needed (like a streetlight illuminating a nearby bedroom window). Most outdoor lighting is poorly positioned, sending wasted electricity up into the sky.

Bring Back the Dark Sky

There are several organizations working to reduce light pollution. One of these is the U.S.-based International Dark Sky Association (IDA), formed in 1988 to preserve the natural night sky. IDA educates the public and certifies parks and other places that have worked to reduce their light emissions. In 2017, the IDA approved the first U.S. dark sky reserve. The massive Central Idaho Dark Sky Reserve, which clocks in at 3,667 square kilometers (1,416 square miles), joined eleven other dark sky reserves established around the world. As of December of 2018, IDA lists thirteen dark sky reserves on their site.

Stop Wasting Energy: Things We Can All Do

More people are taking action to reduce light pollution and bring back the natural night sky. Many states have adopted legislation to control outdoor lighting, and manufacturers have designed and produced high-efficiency light sources that save energy and reduce light pollution.

Individuals are urged to use outdoor lighting only when and where it is needed, to make sure outdoor lights are properly shielded and directing light down instead of up into the sky, and to close window blinds, shades, and curtains at night to keep light inside.

NASA: Blue Marble Navigator

Cooperative Institute for Research in Environmental Sciences: The New World Atlas of Artificial Sky Brightness

NOAA: Light Pollution – Artificial Sky Brightness

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