

Responsible Outdoor Lighting
Light Pollution
Dark Sky
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Five Lighting Principles for Responsible Outdoor Lighting



Responsible outdoor lighting is

1 Useful

Use light only if it is needed

All light should have a clear purpose. Consider how the use of light will impact the area, including wildlife and their habitats.



2 Targeted

Direct light so it falls only where it is needed

Use shielding and careful aiming to target the direction of the light beam so that it points downward and does not spill beyond where it is needed.



3 Low Level

Light should be no brighter than necessary

Use the lowest light level required. Be mindful of surface conditions, as some surfaces may reflect more light into the night sky than intended.



4 Controlled

Use light only when it is needed

Use controls such as timers or motion detectors to ensure that light is available when it is needed, dimmed when possible, and turned off when not needed.



5 Warm-colored

Use warmer color lights where possible

Limit the amount of shorter wavelength (blue-violet) light to the least amount needed.



Protecting the night sky starts with **YOU!**

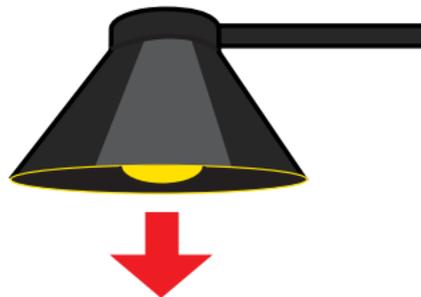
1 Light only what you need



2 Use energy efficient bulbs and only as bright as you need



3 Shield lights and direct them down



4 Only use light when you need it



5 Choose warm white light bulbs



6 Join IDA!

We need your help to continue the fight against light pollution.



Light pollution is reversible!

Unlike other forms of pollution, light pollution is a problem with solutions that are easy to implement. These solutions deliver immediate and lasting results.



SUCCESS STORY

In 2018, the City of Tucson, Arizona, U.S.A. (population 500,000) upgraded its streetlights. By doing so, it saved \$2.2 million per year in energy costs and reduced light pollution by 7%.

WE'RE MAKING AN IMPACT

1,000+

More than 1,000 DarkSky Approved lighting fixtures are available on the market.

200+

More than 200 International Dark Sky Places have been certified, protecting over 160,000 sq km of dark places around the globe.



2,000+

DarkSky supports more than 2,000 volunteer Advocates in 49 countries.

70+

DarkSky supports more than 70 chapters in 24 countries.

The stars are disappearing

Light pollution continues to grow at an alarming rate, harming our health, damaging the environment, and diminishing our view of the stars. DarkSky International has a plan to save the night, but we need your help.

Join the movement and help save the night



DarkSky is a global community working together to save the night. Sign-up today for DarkSky e-news updates to learn more.



Photo credit: Bin Chen



DarkSky
INTERNATIONAL

DarkSky International is a U.S.-based 501(c)(3) nonprofit that supports a global community and movement dedicated to preserving and protecting the natural nighttime environment.

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Protect the night

Preserving and restoring the natural nighttime environment is more urgent than ever.



What is light pollution?

Light pollution is the human-made alteration of outdoor light levels from those occurring naturally. When we over-light, fail to use timers and sensors, or use the wrong color of light, we negatively affect many parts of our world.



Learn more about light pollution ↷

Light pollution...

Destroys critical wildlife habitat



Plants and animals depend on Earth's daily light and dark cycle to govern life-sustaining behaviors. Research shows that artificial light at night has adverse and even deadly effects on many species.

Decreases safety and security



There is no clear scientific evidence that increased outdoor lighting deters crime. In fact, glare from unshielded streetlights can decrease personal safety, contributing to both crime and accidents.

Wastes energy and money



Most outdoor lighting is wasted. This energy waste increases greenhouse gas emissions contributing to climate change and wastes billions of dollars each year.

Robs us of our night sky heritage



Our ancestors experienced a night sky that inspired science, religion, philosophy, art, and literature. Now, millions of children across the globe will never know the wonder of seeing the Milky Way.

Harms human health



Studies indicate that artificial light at night negatively affects human health by increasing our risks for obesity, sleep disorders, depression, diabetes, breast cancer, and more.

Inhibits scientific research



Satellites in low Earth orbit create visible trails in the night sky, inhibiting astronomical research and jeopardizing NASA's early warning system for asteroid collisions.

What can I do?

DarkSky's Five Principles for Responsible Outdoor Lighting can help you make smart choices to reduce light pollution. Do your lights protect the night?



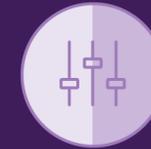
Is it useful?

All light should have a clear purpose. Use lights only when and where they are needed.



Is it targeted?

Shield and aim your light so it only falls downward and where it is useful.



Is it low-level?

Lights should be no brighter than necessary to save money and reduce glare.



Is it controlled?

Lights should only be on when needed. Use timers and motions sensors.



Is it warm-colored?

Warm-colored light causes less skyglow. Use amber-toned lights whenever possible.

Learn more



Visit darksky.org to learn more about the importance of the night and what you can do to reduce light pollution around your home and community.

What is light pollution?

Light pollution is the human-made alteration of outdoor light levels from those occurring naturally.

When we over-light, fail to use timers and sensors, or use the wrong color of light, we can negatively affect many parts of our world, including migratory birds, pollinators, sea turtles, and mammals, including humans.



What can I do about it?

The good news is that light pollution, unlike many other forms of pollution, is reversible, and each one of us can make a difference! Just being aware that light pollution is a problem is not enough – we need to take action.

- ✓ Use only fully shielded, DarkSky Approved fixtures for all outdoor lighting, so lights shine down, not up.
- ✓ Use only the right amount of light needed. Too much light is wasteful and harms wildlife.
- ✓ Install timers and dimmer switches and turn off lights when not in use. If you must have security lighting, use motion sensors.



- ✓ Turn off lights in office buildings and homes when not in use.
- ✓ Use only lighting with a color temperature of 3000 K and below to reduce the blue cool light that's more harmful to many animal species.
- ✓ Work with your neighbors and local governments to ensure outdoor lighting isn't harming the wildlife in your area.

Learn more at www.DarkSky.org

LIGHT POLLUTION FACTS

Components of light pollution

- **Glare** — excessive brightness that causes visual discomfort
- **Sky glow** — brightening of the night sky over inhabited areas
- **Light trespass** — light falling where it is not intended or needed
- **Clutter** — bright, confusing, and excessive groupings of light sources

Harmful effects of light pollution

A growing body of evidence links the brightening night sky directly to measurable negative impacts on:

- [Wildlife and ecosystems](#)
- [Human health](#)
- [Energy and climate change](#)
- [Crime and safety](#)
- [Night sky heritage](#)
- [Scientific research](#)

The problem is growing

Research indicates that light pollution is increasing at a global average rate of ten percent per year.



DarkSky.org
facebook.com/IDAdarksky/
instagram.com/darksky_intl/

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Learn more by signing up for DarkSky e-news



Light pollution destroys critical wildlife habitat.



Plants and animals depend on natural light cycles to govern life-sustaining behaviors such as reproduction, nourishment, sleep, and protection from predators. Scientific evidence suggests that artificial light at night has deadly effects on many creatures, contributing to the decline of biodiversity worldwide.



Migratory birds

Artificial lights can cause migrating birds to wander off course towards dangerous nighttime landscapes and cities. Millions of birds die colliding with needlessly illuminated buildings and towers every year.



Sea turtles

Hatchling sea turtles find the sea by detecting the bright horizon over the ocean. Artificial lights draw them away from the ocean. In Florida alone, millions of hatchlings die this way every year.



And many more...

We are just starting to understand the devastating effects of artificial light on habitats. Every year, new research adds even more wildlife to the list of affected animals, including:

- Hummingbirds
- Wallabies
- Little penguin
- Zebrafish
- Sweat bees
- Songbirds
- Peahens
- Bats
- Owls
- Mice
- Seabirds
- Monarchs
- Atlantic salmon
- Zooplankton
- European perch
- Insects
- Geckos
- Fireflies

WHAT CAN I DO?



Protect wildlife through sensitive lighting choices.

- **Get to know your neighborhood at night.** It's hard to protect what you're not familiar with.
- **Use only fully shielded, fixtures for all outdoor lighting,** so lights shine down, not up.
- **Use only the right amount of light needed.** Too much light is wasteful and harms wildlife.
- **Install timers and dimmer switches** and turn off lights when not in use. If you must have security lighting, use motion sensors.
- **Turn off office and home lights when not in use.**
- **Use only lighting with a color temperature of 3000K and below** to reduce the blue cool light that is more harmful to wildlife.
- **Work with your neighbors and local governments** to ensure outdoor lighting isn't harming the wildlife in your area.



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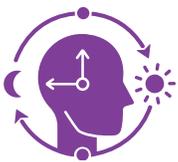
Learn more about light pollution and wildlife habitats.

darksky.org/resources/what-is-light-pollution/effects/wildlife-ecosystems

Light pollution harms our health and wellbeing.



Over the past 100 years, humans have transformed the night, erasing the natural darkness with which we evolved. While artificial light at night is crucial to our modern world, it comes at a cost. Increasing scientific research indicates that artificial light at night has detrimental effects on human health and well-being.



Circadian rhythm disruption

Largely influenced by the light and dark, our circadian rhythm is our body's natural 24-hour regulating clock. Circadian disruption occurs when our internal clock is out of sync with the day-night cycle. Circadian disruption has been linked to an increased risk of obesity, diabetes, mood disorders, reproductive problems, and cancers.



Decreased melatonin production

While we are still learning about the relationship between artificial light and human health, we know that exposure to light at night—even at dim levels—can suppress the body's production of melatonin, a hormone that regulates our sleep-wake cycle, metabolism, and immune system.



Glare impairs vision

Irresponsible outdoor lighting at night decreases safety. Overly bright and poorly shielded lighting creates blinding glare, impairing vision leading to dangerous missteps and accidents. Blue light, often used in newer LED streetlights, is more likely to create dangerous glare.

WHAT CAN I DO?



Live a healthy life in a world filled with artificial light.

- Use fully shielded outdoor light fixtures to minimize the light that streams into your home.
- Use indoor light bulbs that emit warm white light with a color temp. of 3000K or lower.
- When it's time for bed, keep your bedroom dark by using blackout curtains and covering all light sources such as clock radios and charging stations.
- If you need a nightlight, use one with dim red or amber light. Red light is least likely to be disruptive.
- Try not to use devices with screens 30-minutes prior to sleeping. If you must use devices at night, install a color temperature app that reduces blue light levels.
- Work with your neighbors and local government to reduce light pollution in your community.



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Learn more about light pollution and human health.

Bright lights do not equate to greater safety.



Glare from unshielded lighting reduces safety.

Lighting up the nighttime environment does not necessarily increase safety and security. Effective lighting that helps people be safe—not just feel safe—is a win-win situation for everyone.

Busting the myth of bright lights and safety.



At home: Poor lighting can create a false sense of security.

Poorly designed outdoor lighting can backfire on safety. Bright and misdirected lights create shadows for criminals to hide, and some crimes, like vandalism, thrive in well-lit areas. Floodlights, for example, may highlight potential targets.



In town: Light for light's sake doesn't equal increased safety.

While towns, cities, and businesses aim to enhance safety with lighting, poorly aimed and inadequately shielded lights can attract criminals. A Chicago study identified a correlation between increased crime and overly bright alleyways.



On the road: bad lighting creates unsafe driving conditions.

Inadequate roadway lighting causes glare, contributing to accidents, especially affecting older individuals. A 2015 Journal of Epidemiology and Community Health study revealed that streetlights don't effectively prevent accidents or crime but they do cost a lot of money.

WHAT CAN I DO?



Make your home safer with **smart** lighting choices.

- Use fully shielded, dark-sky friendly fixtures so light shines where it's needed and does not create glare or extreme contrasts.
- Only use lights when and where needed. Install timers and dimmer switches, and turn off lights when not in use. If you must have security lighting, use motion sensors.
- Use the right amount of light. Too much light is wasteful and impairs vision.
- Use long-wavelength lights with a red or yellow tint to minimize negative health effects.
- Work with your local government to improve lighting conditions along roadways and shared spaces. Cities and towns can also restrict the use of bright signs and flashing lights near roadways.



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Learn more about light pollution, crime, and safety.

darksky.org/resources/what-is-light-pollution/effects/safety

Light pollution wastes money and resources.



Lighting levels that are higher than necessary and light that shines when and where it's not needed is wasteful. Wasting energy on bad lighting design has huge economic and environmental consequences.

Tracking the cost of light pollution.



Light pollution wastes billions of dollars.

DarkSky estimates that 30 percent of all outdoor lighting in the U.S. is wasted, mostly due to unshielded or excessively bright lights. This adds up to \$3.3 billion dollars wasted annually. Installing quality outdoor lighting could cut energy use by 60 to 70 percent, saving billions of dollars.



Light pollution contributes to the growing climate crisis.

Artificial lighting at night and the energy required to produce it has a large carbon footprint. In the U.S. alone, unnecessary lighting produces 21 million tons of carbon dioxide each year! 875 million trees would need to be planted annually to offset this waste.



WHAT CAN I DO?



Maximize the efficiency of your home lighting.

- Outdoor lighting should be fully shielded and directed downward where it is needed. Fully shielded fixtures can provide the same level of illumination on the ground as unshielded ones, but with less energy and cost.
- Unnecessary indoor lighting – particularly in empty office buildings at night – should be turned off, preventing leakage of that light into the night sky.
- LEDs can help reduce energy use and protect the environment, but only warm-white bulbs should be used.
- Dimmers, motion sensors, and timers can help to reduce average illumination levels and save even more energy.



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Learn more about light pollution and waste.

darksky.org/resources/what-is-light-pollution/effects/energy-climate