



Image Credit: Bettymaya Foott

## Light Pollution Matters

6%

Annual increase in artificial light at night

50%

Increase of developing breast cancer in heavily light polluted areas

97%

Americans unable to see the Milky Way at night

35,000 years

Length of documented stargazing

98 million

Number of bird deaths annually from collisions with lighted buildings

\$7 billion

Cost of energy waste in the US each year due to poorly designed lighting

180 billion

Approximate number of outdoor light fixtures in the US

## Resources

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### NASA DEVELOP National Program – Virginia – Wise

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*in collaboration with*

Colorado Plateau Dark Sky Cooperative; National Park Service, Intermountain Region; National Park Service, Natural Sounds and Night Skies Division; International Dark-Sky Association; National Park Service, Grand Teton National Park; and Wyoming Stargazing

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Light Pollution  
in the Colorado Plateau





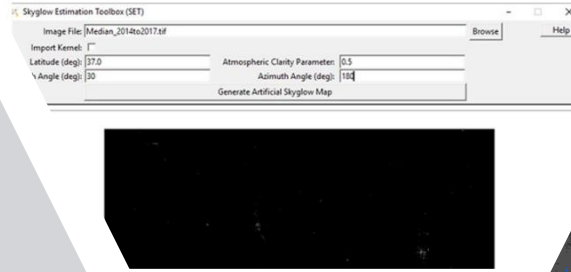
## About Light Pollution

**Light pollution** is any excessive or unwanted artificial light that obscures the view of the stars. There are many different types of light pollution (Figure 3):

- **Glare:** an extreme contrast of light and dark areas in one's line of sight; often causes visual discomfort
- **Light trespass:** artificial light introduced into an area where it is unneeded or unwanted
- **Over lighting:** the excessive use of artificial lighting
- **Sky glow:** the faint light seen in the night sky, usually over densely populated urban areas
- **50%** of the light produced by a typical outdoor light fixture is wasted due to poor shielding, and is the main cause of light pollution.

Since the Colorado Plateau region is known for its pristine environment, light pollution from sky glow is a pertinent concern for National Park Service officials and the Colorado Plateau Dark Sky Cooperative. Artificial sky glow threatens the visitor experience and tourism by obstructing views of the stars and galaxies.

**Fig. 2. >**  
*The Skyglow Estimation Toolbox creates maps that will help officials better understand nighttime sky quality.*



## A Way Forward

In 2017, the National Park Service, Colorado Plateau Dark Sky Cooperative, International Dark-Sky Association, and Wyoming Stargazing partnered with the NASA DEVELOP National Program to better understand the impacts of sky glow on the Colorado Plateau. The teams at NASA DEVELOP created and implemented the Skyglow Estimation Toolbox (SET) that utilizes the Day/Night Band collected by the NASA/NOAA Suomi National Polar-orbiting Partnership satellite's Visible Infrared Imaging Radiometer Suite sensor to calculate the effect of light scattering. The software creates Artificial Skyglow Maps measuring sky glow at various viewing angles and lines of sight in the region. This will help local communities determine the current sky conditions and identify sources of light pollution that are diminishing its quality. Moreover, the data produced by SET will help government officials make informed decisions regarding lighting ordinances in and around the Colorado Plateau.

< **Fig. 1.** *An unshielded light fixture (top) as compared to a shielded one (bottom). In a typical unshielded light fixture, 50% of the light produced is wasted. This portion illuminates the surrounding air instead of its intended target on the ground.*

< **Fig. 3.** *Use minimum amount of lighting needed to illuminate target. In this case, excess light escapes into the sky, degrading nighttime visibility.*

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**Fig. 4. >**  
*Artificial Skyglow Map for the Colorado Plateau (outlined in orange). Values are a ratio between artificial and natural sky brightness, with cooler colors indicating smaller ratios.*

## Raise Awareness

Although light pollution has serious ramifications, it is a problem that can easily be reversed. You have the opportunity to highlight the impacts of light pollution with others:

- **Discuss** the impacts of light pollution, especially on the night sky, human health, as well as the wasted energy costs
- **Offer** suggestions on how each visitor to the Colorado Plateau can reduce light pollution
- **Install** outdoor lighting only if absolutely necessary
- **Use** the minimum amount of lightning needed to illuminate the target
- **Ensure** fixtures are properly shielded
- **Turn** on lights only for the time it is needed
- **Encourage** local governments to establish lighting ordinances that limit light pollution

