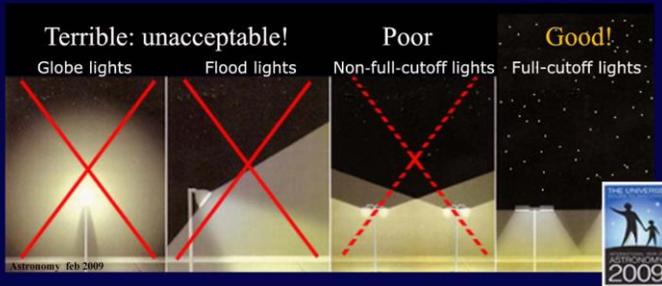


**OUTDOOR LIGHT POLLUTION is**  
 \* **HAZARDOUS TO YOUR HEALTH & SAFETY!**  
 \* **EASY to ELIMINATE!**

**DARK-SKY-FRIENDLY LIGHTING can be**  
**VISUALLY ATTRACTIVE!**



**What is Light Pollution?**

- **Sky glow:** bright halo over urban, suburban, and some rural areas at night due to bad outside lighting
- **Glare:** light that shines horizontally and directly into a person's eyes
- **Light trespass:** unwanted artificial light (floodlights, security lights, streetlights) that spills onto property which would otherwise be dark
- **Over-illumination:** artificial lighting that is brighter and on longer than required for a specific activity

**Night-Sky-Friendly Lighting**

- can be **aesthetically attractive & enhance neighbourhood appearance**
- allows people to move around safely – they are not blinded by glare
- keeps light on ground - where it is needed
- prevents light trespass onto other's property and into their homes
- saves energy, money, and the environment
- keeps night sky unpolluted ([www.starrynightlights.com](http://www.starrynightlights.com))

Our Vanishing Night. *National Geographic* (November 2008)

Can We Win the War Against Light Pollution? *Astronomy* (February 2009)

for more information: [www.darksky.org](http://www.darksky.org) // [www.rasc.ca](http://www.rasc.ca)

**LIGHT POLLUTION has LASTING, ADVERSE EFFECTS ON HUMAN & WILDLIFE HEALTH**



**Light Pollution** is one of the **fastest growing & most pervasive** forms of environmental pollution, according to many environmentalists, naturalists, and medical researchers.

**Scientific research** suggests that light pollution can have **lasting adverse effects** on both human and wildlife health.

**Why is Light Pollution so bad? It disrupts biological rhythms!**

- Plants and animals, including humans, have 24-hour (circadian) biological rhythms under the control of the daily light-dark cycle.
- Light pollution **hurts diurnal & nocturnal species** by disrupting:
  - **Physiological rhythms**, including hormone levels
  - **Behaviour patterns** (feeding, predator avoidance, courtship, migration)
  - **Reproduction**, leading to population declines & secondary effects on other species (due to the interdependence of plants & animals)
  - **Ecosystems**

*Ecological Consequences of Artificial Night Lighting*. Rich, Longcore (eds.) (2006)

*Environmental Health Perspectives* v117 (2009)

for more information: [www.darksky.org](http://www.darksky.org) // [www.rasc.ca](http://www.rasc.ca)

**BRING BACK THE NIGHT SKY**  
**FOR A HEALTHY ENVIRONMENT**



**USE GOOD OUTDOOR LIGHT FIXTURES**

**Light Pollution and Environmental Health**

- Insects flying around night lights become too exhausted to feed and reproduce, causing their populations to decline.<sup>1</sup>
- Insects are primary food source for many predators (e.g., bats, birds, lizards, frogs). Altering the balances compromises the food chain.
- Bright lights disarm flying moths & other insects of their bat evasion system, tipping this evolutionary arms-race in favour of the predator!
- Bright lights confuse navigation along migratory routes.
- Declines in populations of moths, spiders, sparrows, and amphibians have been correlated with light pollution in the UK & elsewhere.<sup>2</sup>
- Hatchlings of seed-eating as well as other birds need the protein from insects and spiders in their diet to survive.
- Insects are essential pollinators for many plants. Their decline leads to decline of many plant species – crops, shrubs and trees that provide habitat for many other species, ornamental plants, etc.

<sup>1</sup> The 50,000 streetlights in Zürich estimated to kill more than 1 million insects/night.

<sup>2</sup> In UK, large moth species declined by 1/3 in 28 years & some species by up to 98%.

Attenborough (2005) *Life in the Undergrowth*

for more information: [www.darksky.org](http://www.darksky.org) // [www.rasc.ca](http://www.rasc.ca)



## NATURAL NIGHT LIGHT - HEALTHY ENVIRONMENT

Direct light to the ground

### Bring back the Night Sky

A child born today has less than a one in ten chance of **ever** experiencing a dark sky.

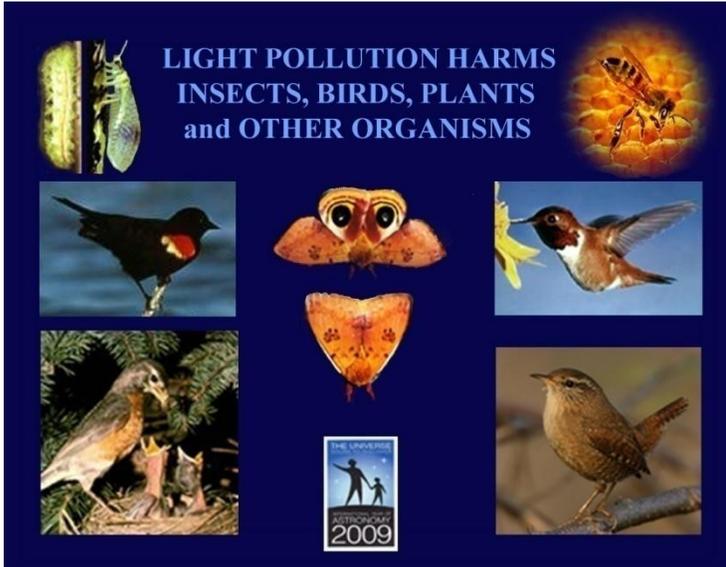
**From time immemorial, humans have marvelled at the night sky, and found inspiration, knowledge, understanding, and pleasure in its beauty...**

**Light Pollution** disrupts natural patterns of light and dark. It changes animal behaviors (confuses navigation, alters competition & predator-prey interactions) and adversely affects physiology and reproduction. **Light Pollution** contributes to lower water quality by preventing zooplankton from feeding on algae, which grow more in light!

**Light Trespass from Outdoor Lighting has Indoor Effects!** Excessive artificial light can affect production of hormones, disrupt sleep patterns, and have other adverse effects on human health.

Navara & Nelson (2007) The dark side of light at night. *J Pineal Res* 43:215-224  
<http://www.citeulike.org/article/1618565>

for more information: [www.darksky.org](http://www.darksky.org) // [www.rasc.ca](http://www.rasc.ca)



## LIGHT POLLUTION HARMS INSECTS, BIRDS, PLANTS and OTHER ORGANISMS

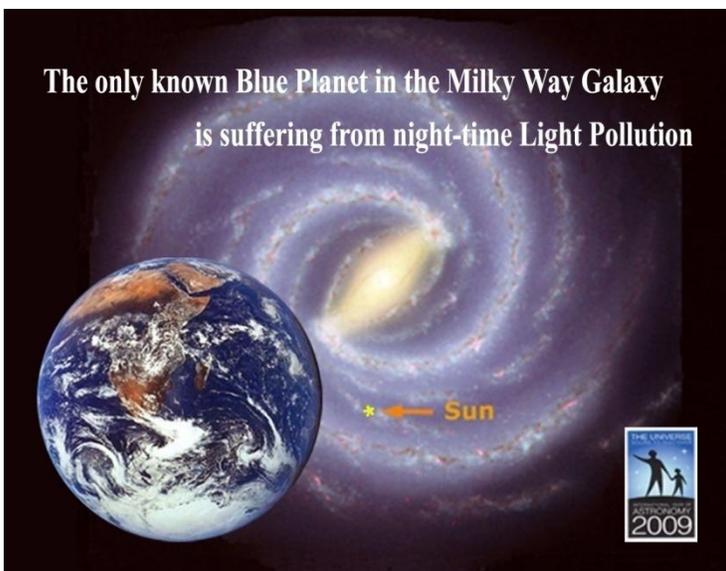
### Pernicious Effects of Light Pollution

- Prolonged exposure to artificial light prevents many **trees** and other **plants** from adjusting to seasonal variations.
- This, in turn, has implications for the wildlife that depends on trees as natural habitat.
- Research on insects, turtles, birds, fish, reptiles, and other wildlife species shows that **light pollution alters behaviours, foraging areas, migration timing and routes, and breeding cycles.**
- **Melatonin** is a hormone produced by the pineal gland and secreted at night which is known to help regulate the body's biologic clock.
- Melatonin levels drop precipitously in the presence of excessive artificial light.
- Melatonin triggers a host of biologic activities, possibly including the nocturnal reduction in the body's production of estrogen.

*Environmental Health Perspectives* 116:A160-A167 (2008)

Navara & Nelson (2007) The dark side of light at night. *J Pineal Res* 43:215-224

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The only known Blue Planet in the Milky Way Galaxy  
is suffering from night-time Light Pollution

**The blue planet: 3<sup>rd</sup> from the sun - not too close, not too far  
A planet of life to nurture, so life will continue  
far into the future.**

\*\*\*\*\*

**Light Pollution = Wasted Energy, Wasted Money, and  
Untoward Modifications of Earth's Surface & Atmosphere**

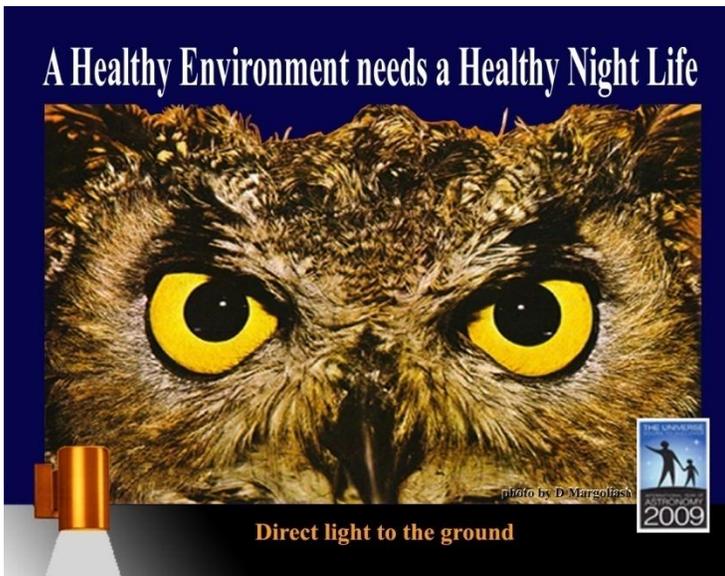
- One-quarter of all energy consumption worldwide is used for lighting. Lights in homes and offices account for 20%-50% of this.
- Natural resources are wasted (hundreds of millions of barrels of oil & tons of coal burned needlessly; hydroelectric energy wasted).
- Environmental destruction, water and air pollution, and ecological malfunction are increased.

for more information: [www.darksky.org](http://www.darksky.org) // [www.rasc.ca](http://www.rasc.ca)



Direct light to the ground!

see:  
[www.starrynightlights.com](http://www.starrynightlights.com)



### Warblers eat insects, and some capture most of their food on the wing.

- Warblers tend to be **food specialists**. Species having specific food requirements play important roles in limiting insect pest populations.
- Tennessee, Cape May, and Bay-breasted warblers require spruce budworms in their diet to thrive. Their numbers explode in response to budworm outbreaks and decline sharply thereafter.
- **Flood lights & other improper outdoor lighting** impede migration and contribute to reproductive failure and population decline by:
  - causing disorientation of migratory species, including warblers;
  - attracting insectivores to the artificially elevated numbers of insects that become trapped in the glare, thus inducing abnormal behaviour. (See card: *Bring Back the Night Sky for a Healthy Environment*)

for more information: [www.darksky.org](http://www.darksky.org) // [www.rasc.ca](http://www.rasc.ca)



### Light Pollution & Human Health

- The 24-hour day/night cycle (circadian clock) affects physiologic processes, • brain wave patterns, • hormone production, • cell regulation, and other biologic activities.
- The circadian cycle controls from ten to fifteen percent of our genes.<sup>1</sup>
- **Disruption of the circadian clock** is linked to several medical disorders in humans (e.g., depression, insomnia, cardiovascular disease, cancer).  
<sup>1</sup> P Sassone-Corsi, Pharmacology Dept, Univ Cal, Irvine
- Dramatic increases in the risk of breast and prostate cancers, obesity, and early-onset diabetes have mirrored the dramatic changes in the amount and pattern of artificial light generated during the night and day in modern societies over recent decades.
- Researchers have concluded that excessive artificial light exposure early in life may contribute to an increased risk of depression & other mood disorders in humans (see card: *Pernicious Effects of Light Pollution*).
- **Excessive artificial light from outside at night** may affect production of hormones, prevent healthy sleep, and have other adverse effects.

Navara & Nelson (2007) The dark side of light at night. *J Pineal Res* 43:215-224  
<http://www.citeulike.org/article/1618565>

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