



"LIGHT POLLUTION"

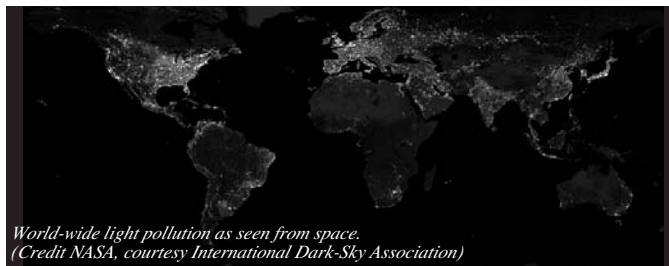
A threat to astronomy, light pollution also impacts human and environmental health - Life on earth evolved over the eons in the presence of a daily light-dark cycle with a seasonally shifting photoperiod. Not surprisingly, ecological processes are hardwired to a sharp contrast between the light of day and the dark of night. With the discovery of electricity and the widespread use of artificial lighting that it made possible during mankind's recent history, humans have eliminated or reduced darkness across the globe to such an extent that ecological processes have been disrupted. Excessive nighttime lighting is every bit as serious a form of pollution as the atmospheric contamination caused by the burning of fossil fuels to generate the electricity used. While it compromises the practice of earth-based astronomy, light pollution has very serious health consequences for humans and their environment. It is a problem that everyone can help fix with no sacrifice to lifestyle required.

Ecological impacts of light pollution - The bio-rhythms of all living things depend on a significant day/night contrast. In humans it sets the internal biological clock that controls the ebb and flow of various hormones that help our bodies to recover from work, stress and injury. Nighttime lighting reduces the day/night contrast and confuses the internal clock. This can lead to sleep disorders that affect physical and mental health. Many hormones and cells in the immune system, including those that combat certain cancers, function only in total darkness. The incidence of breast cancer is substantially higher in light-polluted areas and nighttime exposure to light is considered a risk factor for this disease. Melatonin is a hormone that is secreted internally only in the absence of light. It stimulates the immune system and helps to control daily biological rhythms. Low levels of melatonin have been linked to sleep disorders and to certain forms of cancer in night-shift workers.

Wherever man-made light spills into the natural world, some aspect of life – migration, reproduction, feeding – is affected. Many nocturnal animals depend on darkness for protection while foraging. Light is a powerful biological force and on many species it acts as a magnet. At night, birds are apt to collide with brightly lit buildings. Insects cluster around lights and become easy prey for bats and birds – this distraction from normal behaviour has consequences at other levels in the food chain. Adult fire flies can only find each other to mate in darkness and many populations near large cities have been destroyed. Sea turtle hatchlings emerge from their nests on sandy beaches at night and normally are attracted seaward by reflections off the ocean surface a short distance away. In Florida alone, hundreds of thousands perish every year because they head towards bright lights behind the beaches. These are but a few examples of how the presence of light and altered photoperiods affect all sorts of animal behaviour and disrupt normal ecological processes.

Loss of the night sky - Simply put, light that shines where it is not needed or not wanted is light pollution. It results mostly from poorly designed outdoor lighting fixtures which spray artificial light outward and upward into the sky instead of focusing it downward where it is needed. There is so much artificial light directed and reflected upwards in cities and towns around the world that all but the very brightest stars are hidden from view by a dome of light known as sky glow. It serves no useful purpose but effectively destroys the awesome beauty of the night sky. Also, the amount of light directed downwards is usually far more than required to illuminate the space below. Across North America, as much as half the nighttime outdoor light is wasted. Around the world, including North America, most electricity is produced by burning coal and oil. The energy consumed by wasted outdoor light, therefore, contributes needlessly to greenhouse gas emissions and should be a major energy conservation concern for everyone.

Excessive lighting creates glare - Our eyes adjust slowly to dark conditions as the pupils dilate to allow more light to fall onto the more sensitive rods of the retina. This dark adaptation enables us to see clearly at fairly low light levels. However, glare, which is caused by horizontally directed and bright reflected light, destroys this dark adaptation instantly and causes temporary blindness. Glare greatly reduces visibility and makes it more difficult to see and be seen. This can be a particularly serious problem for older people who dark adapt more slowly and whose lenses have become a little foggy.



World-wide light pollution as seen from space.
(Credit NASA, courtesy International Dark-Sky Association)

What is being done about light pollution? Astronomers have been much more aware of light pollution than most because of the practical problems of using a telescope in a light-polluted area. Amateurs sometimes drive considerable distances to get far enough away from sky glow to use their telescopes effectively. Some old observatories have even had to close and many operate at much reduced capability. Consequently, astronomy organizations have been leading a world-wide effort to control light pollution for a long time. However, its human and environmental health impacts make light pollution a serious issue for everyone.

The International Dark-Sky Association (IDA), whose mission is to preserve and protect the nighttime environment and our heritage of dark skies through quality outdoor lighting, is one of several bodies combating all aspects of light pollution on a broad scale.

The Royal Astronomical Society of Canada (RASC) is very much involved in light pollution reduction and works for social and legislative changes which will result in better, more responsible lighting practices in Canada to preserve the night-time environment for all to enjoy.

Of all the pollutions we face, light pollution is the easiest to remedy, but lack of awareness is a major obstacle. There is a popular notion that nighttime safety and security requires lots of bright lights – this is an illusion. Bright lights are blinding and create hazards, while subdued lighting increases visibility thereby providing safer and more secure conditions outside at night. Simple changes to design of outdoor lighting fixtures that would eliminate the upward and outward spraying of light and direct it downwards in a narrow cone would achieve immediate reductions in light pollution. This re-direction of light would also greatly reduce the amount required for useful illumination making lower wattage bulbs adequate. The human eye is much more sensitive to yellow light and use of yellow bulbs would further reduce the amount of light needed.

Abatement programs have worked to greatly reduce light pollution in many communities and this has resulted in much more aesthetically pleasing neighbourhoods with higher property values. Individuals can contribute and provide example to neighbours. Everyone should write political representatives to make them aware of the issue and express their concerns about light pollution – this would be very effective if enough did so. Communities throughout Newfoundland and Labrador are just as light polluted as elsewhere and every one of us should give some thought to helping reduce the problem.

Sources/additional information

International Dark-Sky Association. www.darksky.org

Royal Astronomical Society of Canada

www.rasc.ca/committees/lpa.shtml

Sky and Telescope Magazine. www.skyandtelescope.com/savingdarksities

Sky News Magazine. www.skynews.ca/lightpollution

Starlight. www.starlight2007.net

Jerry Ennis RASC, St. John's Centre

ACTIVITIES

1. Look in The Telegram for other sources of pollution, which can effect the natural environment.
2. Scan The Telegram for any advertisements with environmentally friendly products.

For more activities go to www.thetelegram.com and click on

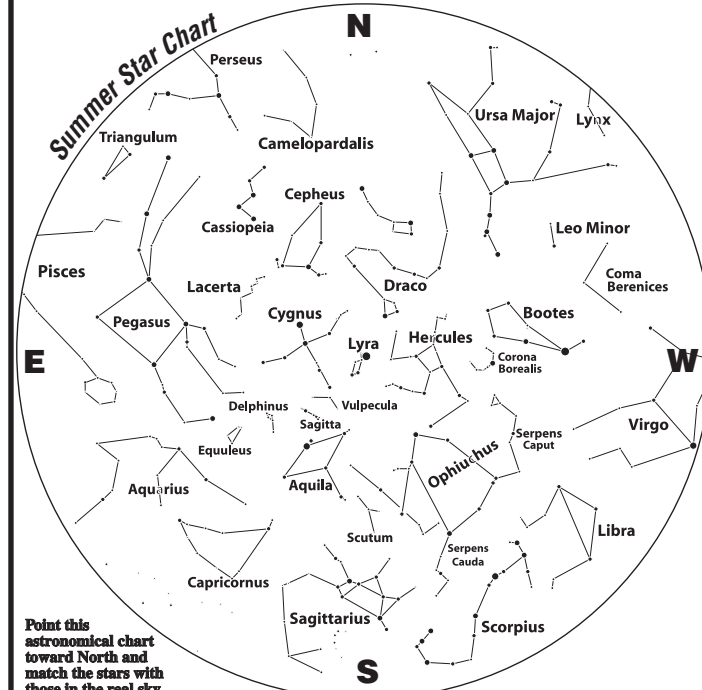


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"What's Up"

August 14 - Mid September

Shawn Martin Observing Director RASC, St. John's Centre



Point this astronomical chart toward North and match the stars with those in the real sky.

Planets

Viewable in a pair of Binoculars or small telescope

Mercury - (magnitude 0.1) continues a poor apparition deep in the glow of sunset.

Venus - (magnitude 4.0, in Gemini) blazes in the eastern sky before and during dawn.

Mars - (magnitude +1.0 in Taurus) is upper right of Venus before dawn.

Jupiter - (magnitude 2.9, in Capricornus) shines low in the east-southeast during twilight.

Saturn - (magnitude +1.1, in Leo) is sinking away into the sunset.

Uranus - (magnitude 5.8, in Pisces), is well up in the southeast by midnight.

Neptune - (magnitude 7.8, in Capricornus) appears about 3° from Jupiter.

Pluto (dwarf planet) - (14th magnitude, in northwestern Sagittarius) is highest in the south just after dark.

Moon

Waxing	First Quarter	Full	Last Quarter	Waning	New
August 25	August 27	September 4	August 16 September 11	August 14 September 13	August 20

Mare - Name given to plains composed of basalt on the Moon. From the Latin word for 'sea', so-called due to their large landmass. These basalt deposits were left by the eruptions of now-extinct volcanoes.

You can contact the Royal Astronomical Society of Canada, St. John's Centre at www.rasc.ca/stjohns/

WARNING! "When using a telescope or binoculars, always be sure NEVER TO LOOK AT THE SUN! This can cause serious and permanent eye damage. To be safe, always make sure the Sun is fully set below the horizon before going outside with your telescope or binoculars."