

SYMPOSIUM REPORT

The Night: Why Dark Hours Are So Important

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Carnegie Institution, Washington, DC

Trip Report by Peter Lord

As we anticipated, this was a worthwhile event. Specialists in cancer research, human physiology, security, energy, environmental research, and astronomy, as well as National Park staff, gave the symposium great depth.

Dark sky advocates repeatedly emphasized the need for civic engagement and education. I left with a deeper appreciation for how well-timed our dark sky program is.

Here are highlights from the presentations and my networking.

National security is enhanced by fully shielded lighting:

According to Richard Cofer of the Naval Facilities Engineering Command, each branch of United States Armed Forces has approved Department of Defense (DOD) Lighting Design Criteria that address outdoor lighting. It specifies that fully shielded fixtures and appropriate levels of lighting be used to increase visibility. The new criteria, which are in response to heightened security threats since 9/11, address the reduction in visibility caused by glare from unshielded lighting.

Richard explained the need to maximize visibility at entrance stations for tasks such as inspections under vehicles and the surveillance of perimeters and buildings. He recognizes that it is an uphill battle to convince base commanders that brighter is not better.

The DOD's requirements include energy conservation and life-cycle cost analysis.

Fully shielded lighting reduces energy consumption:

The California Energy Commission's 2005 Efficiency Standards for Nonresidential Buildings require that all outdoor lighting fixtures be cutoff or full cutoff. The requirements are now part of California's commercial building code. Permissible lighting levels are established via zones, which specify how much electricity can be used for a given task. The zones recognize parks, rural, and urban areas as having unique lighting needs based on their ambient light levels. A 4th zone was created for needs in excess of urban lighting, California has no zone 4s at this time. The code requires that half of commercial exterior lighting be switched so that it can be turned off by the owner.

The commission is charged only with reducing California's electrical consumption; it cannot not take ecological and social factors into consideration. Roadway and residential lighting is not addressed.

The commission's concept of lighting zones has been incorporated in the International Dark Sky Association's Model Lighting Ordinance. This will include a zone for no lighting.

All living organisms respond to a natural day/night cycle:

From phytoplankton to humans, all living organisms tested to date produce melatonin in response to low levels of light. This metabolic regulator is an adaptation we share with plants. One study at Utica College showed significant changes in tadpole development due to variations in length of darkness.

The human eye has a non-visual light sensor:

Within the last decade scientists have established the existence of photosensitive cells in the retina that are not connected to the visual cortex. Instead, they connect directly to the portion of the brain that regulates metabolic functions such as melatonin production. They are more sensitive to blue light than the rods and cones that provide vision.

The suppression of melatonin increases tumor growth rates:

Research suggests there is a correlation between artificial lighting and the high rates of breast cancer in industrialized societies. While positive proof is not in, the fundamentals are sound, and other causes do not explain the observed rates. Tests have proven that the presence of light at night suppresses melatonin levels in the human blood stream. Tests have independently shown that tumor growth rates are significantly higher in the absence of melatonin.

GLOBE at Night to use Sky Quality Meters:

This component of Project GLOBE is run by the National Optical Astronomy Observatory (NOAO). I met with three of the NOAO team. This year they will be piloting the use of Sky Quality Meters to build light pollution maps in a dozen locations across the US. I expect we will become an official partner in this project. Funding for the meters is coming from the National Science Foundation.

Roadway lighting is controversial:

Several presentations were made on current research in this area. Continuous roadway lighting reduces fatalities, particularly for pedestrians. It is not known exactly how much lighting, and what kind, does this best.

The symposium's most controversial topic was how to light rural areas intermittently. A half-mile all-weather smart road test track at Virginia Tech Transportation Institute will soon conduct research into what turns out to be a very complicated topic.

The transition in and out of lighting leads to problems such as: Is it better to see a pedestrian as dark against a lit background, or lit against a dark background.