

Light Pollution in the Shining Star of the Caribbean: Recovering the nightscape for future generations in island of Puerto Rico

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Puerto Rico Conservation Trust, University of Puerto Rico (Marine Science and Engineering Departments), Puerto Rico Sea Grant Program, US DOI Fish and Wildlife Service, Puerto Rico Power Authority, Puerto Rico Department of Natural Resources, Puerto Rico National Parks Company, Puerto Rico Astronomical Society, and the Vieques History and Conservation Trust.

Abstract:

As the first nighttime pictures of the Earth emerged in the mid 90's, the inhabitants of island of Puerto Rico (PR) visualized that truly they had become the Shining Star of the Caribbean, a popular slogan used by the State Tourism Company. Unaware of any light pollution consequences, most people reacted positively to the prominence of the island's artificial nightlights cover in the region. However, as amateur astronomers and biologists we knew that the extent of light pollution had gradually taking a heavy toll over nightsky observations, endangered sea turtle habitat, bioluminescent waterbodies, and on our oil-dependent economy (\$3,700 per year spent on electricity costs). Because of increasing population and urban sprawl trends (1,100 inhabitants per mi² on a 3500 mi² land area), we decided to investigate further and take action with the goal of recovering our nightscape.

In 2006, the Conservation Trust of Puerto Rico established a Light Pollution Management Task Force. The Task Force is comprised of representatives from local and federal government agencies (USDA Forest Service's International Institute of Tropical Forestry, USDOI Fish and Wildlife Service, PR Department of Natural Resources and PR Electrical Authority), universities (PR Sea Grant Program), non-profit organizations (PR Astronomy Society and Vieques Conservation Trust), and the private sector (El Conquistador Resort), among others.

The Task Force has met regularly to discuss light pollution issues, propose actions, and to coordinate a light pollution modification pilot project in the lightshed of one of the Conservation Trust's nature reserves. Located in northeastern Puerto Rico, the reserve includes endangered sea turtle nesting habitat, and one of three permanent bioluminescent lagoons in the island (Las Cabezas de San Juan Lagoon). Working with the Puerto Rico Electrical Authority, the pilot project has successfully modified more than 150 streetlights, 25 public beach lights and a number of external lights from a local resort. Also, as part of the pilot project, nighttime tours are now been offered in the lagoon to observe the bioluminescence exhibited by the dinoflagellate *Pyrodinium bahamense* and to educate about light pollution ecological and astronomical impacts within the Reserve lightshed and islandwide.

In addition, the Task Force designed and is implementing an extensive public outreach and awareness campaign to reduce light pollution titled *Puerto Rico Brilla Naturalmente* ("Puerto Rico Shines Naturally") that has received tremendous public support. The Task Force has developed educational materials in Spanish (brochures and posters), an educational video (in partnership with a local environmental education TV program), and a formal presentation. It is also in the process of developing a website and an educational curriculum for local school teachers.

The work of the Task Force has provided a unique opportunity to implement a pilot project that could be easily replicated in urban landscapes surrounding coastal protected areas across Puerto Rico and the Caribbean, especially where there are turtle nesting habitats or bioluminescent waterbodies. In addition, it has provided capacity building and technology transfer opportunities to local teams of resource managers, educators, and other professionals interested in light pollution management issues.

Author's Short Biography:

Olga M. Ramos-González (BS Zoology UW-Madison; MA Clark University) is a GIS Analyst at the GIS and Remote Sensing Lab of the USDA Forest Service's International Institute of Tropical Forestry, Río Piedras, Puerto Rico. Her research areas include: landcover changes in the periphery of El Yunque National Forest in Puerto Rico, the Caribbean, and other tropical regions; quantification of urban impacts on ecological services provided by green infrastructure including those related to artificial light pollution. She has been an amateur astronomer since age 11 and is currently an active member of the Puerto Rico Conservation Trust Light Pollution Task Force.