
COASTAL LIGHT POLLUTION AND MARINE TURTLES IN BRAZIL

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Light pollution can impact species, ecosystems and their processes. Coastal areas provide critical nesting habitat for marine turtles and understanding how artificial light might be impacting these species is key to effectively guide management strategies. Here we assess the extent to which nesting populations of four marine turtle species (leatherback, olive ridley, hawksbill and two subpopulations for loggerhead turtles) are exposed to light pollution across 604 km of the Brazilian coast. We used yearly nighttime stable lights composite satellite images from two different 5-year periods (1992–1996 and 2008–2012, $n = 10$) from the US Air Force Defense Meteorological Satellite Programme (DMSP) Operational Linescan System (OLS) to determine the proportion of nesting areas experiencing detectable levels of artificial light and how this has changed over time. Significant increases in brightness were experienced in 63.7% of the 604 ~1 km nesting beach segments. We identified 54 reproductive hotspots based on the relative nest densities: 62.9% were located in areas considered exposed to light pollution and 64.8% had experienced increasing light levels. In 42.6% the presence of artificial light influences local management strategies. A negative relationship between nest density and light levels was found for olive ridley and leatherback turtles. For hawksbills and both the northern and southern loggerhead stocks, the relationship showed significant variation, with high nest densities also seen in areas where light levels are high. The status of all species/subpopulations has improved across the time period despite increased anthropogenic light levels. These findings suggest that (1) nest site selection is likely determined primarily by other variables rather than presence/absence of light and (2) conservation strategies in Brazil appear to have been successful. These include creation of protected areas, specific legislation to mitigate direct light incidence on some nesting beaches, as well as relocation of clutches away from heavily lit areas. There is, however, the possibility that the ecological trap posed by light on some beaches could take a longer period to fully manifest in nesting numbers.