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ABSTRACT BOOK



RS1 Algae

RS1_O1_Effects of artificial light at night on benthic primary producers in freshwaters

PhD awardee

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In recent decades, the use of artificial nocturnal illumination has rapidly increased worldwide, leading to light pollution in many areas – an increase of nocturnal light above natural levels, and a disruption of natural light/dark cycles. This widespread alteration of the natural light regime by artificial light at night (ALAN) contributes to global environmental change and raises concerns about potentially adverse effects in illuminated ecosystems. Ecological studies on ALAN report effects on a range of organisms along the food chain, however they have largely focused on nocturnal animals and terrestrial ecosystems. Effects on aquatic ecosystems, and in particular on primary producers, remain relatively understudied. We conducted manipulative field experiments in two different freshwater systems: a flume system on a sub-alpine stream and a lowland agricultural drainage ditch. We mimicked light conditions of urban and suburban areas (approx. 20 lux at the water surface) using white LED or high-pressure sodium (HPS) lamps and compared biomass and community composition of periphyton exposed to ALAN to those of periphyton grown under natural night lights. Nocturnal LED illumination over three to six weeks decreased the biomass of phytobenthos in both aquatic systems. In stream phytobenthos, LED illumination also changed proportions of diatoms and cyanobacteria in contrasting patterns that depended on periphyton growth stage and season. We found no impact of the nocturnal HPS illumination on the periphyton. We also show that ALAN can significantly impact primary producers in reality, with yet unknown consequences for higher trophic levels and/or ecosystem functions.

