European Commission

Science for Environment Policy

Moth behaviour disrupted by street lighting, may affect pollination

23 September 2016
Issue 471
Subscribe to free weekly News Alert

Street lighting reduces the number of moths at ground level and increases flight activity at the level of the lights, shows new research. Less pollen was transported by moths at lit sites in the UK study as a result of the disruptive effects on moth behaviour. The study highlights the need to consider both the direct and indirect ecological impacts of artificial light.

Moths in many European countries are undergoing long-term declines in population size and distribution of species. Habitat degradation and climate changes are likely to be the main causes of these declines, but artificial lighting is also a potential contributor as it affects moths in a number of ways; for example, lighting can alter moth behaviour (i.e. by inhibiting sex hormones, thereby reducing reproduction) and direct contact with hot parts of lights can kill moths or damage their wings and antennae; lighting may also facilitate the hunting of moths by predators such as bats.

Light pollution from industrial and street lighting is increasing globally. As a mainly nocturnal group, artificial light can affect moth behaviour, but the effects of these changes have been little studied. Moths are also important pollinators and so artificial lighting could have knock-on effects for ecosystems. For example, pollination of plant species around lighting could be reduced if moths are attracted upwards to the lights. Conversely, if moths are drawn away from unlit areas by lighting in adjacent areas, this could reduce pollen transport in the unlit areas.

In this study, researchers investigated the influence of street lighting on moth communities and their transport of pollen. Twenty pairs of artificially lit and naturally dark agricultural field margins in Oxfordshire, UK, were selected to make the comparison. The pairs had similar surrounding habitat in terms of adjacent crops and hedgerows.

The researchers assessed which moth species were present and their abundance from spring to late summer (May–September). This was achieved using three methods: light traps — lit boxes to attract and trap moths; transects, which involve walking along the field margin and capturing moths using a hand net; and overhead surveys, which measured moth activity at the level of street lights at both unlit and lit sites. The researchers examined moths that were kept for species identification to compare the abundance and diversity of pollen transported.

A total of 609 moths across 124 species were caught using transects and 990 moths across 139 species were caught in light traps. The overhead activity surveys recorded a total of 434 moth passes. Overall, around half the number of moths were recorded at ground level on night-time transects at lit sites, compared to unlit sites.

This difference in abundance was not identified using light-trap sampling. However, the researchers consider light-trap sampling a less reliable means of measuring moth communities affected by light. Overhead activity was 1.7 times higher at lit sites, indicating that moths were more active at the level of street lights, although there was some seasonal variation.

Continued on next page.

Source: Macgregor, C.J., Evans, D.M., Fox, R. & Pocock, M.J.O. (2016) The dark side of street lighting: impacts on moths and evidence for the disruption of nocturnal pollen transport. *Global Change Biology*. DOI: 10.1111/gcb.13371.

Contact:
calmac@ceh.ac.uk

Read more about:
Biodiversity, Urban environment

The contents and views included in Science for Environment Policy are based on independent, peer-reviewed research and do not necessarily reflect the position of the European Commission.

To cite this article/service: "Science for Environment Policy": European Commission DG Environment News Alert Service, edited by SCU, The University of the West of England, Bristol.

European Commission

Science for Environment Policy

Moth behaviour disrupted by street lighting, may affect pollination

(continued)

23 September 2016
Issue 471
Subscribe to free weekly News Alert

Source: Macgregor, C.J., Evans, D.M., Fox, R. & Pocock, M.J.O. (2016) The dark side of street lighting: impacts on moths and evidence for the disruption of nocturnal pollen transport. *Global Change Biology*. DOI: 10.1111/gcb.13371.

Contact:
calmac@ceh.ac.uk

Read more about:
Biodiversity, Urban environment

These results show that moths are affected by street lights, which draw them upwards. Lit sites were also found to have between half to a quarter lower species richness compared to unlit sites. Nearly a quarter of moths caught (representing 83 species) were carrying the pollen of at least 28 plant species. The probability of a moth carrying pollen was significantly lower at lit sites compared with unlit sites for light-trapped moths, but not for transect-collected moths. However, pollen load and pollen species richness per moth was not significantly associated with the presence of street lighting.

The study does not indicate whether artificial lighting has any long-term effect on moth populations. It is also unclear whether the impact of lighting is at a local level or whether moths are attracted from further afield. The study did, however, demonstrate that a range of the moth species at lit sites were significantly less likely to be carrying pollen. In addition, the number of pollen types transported on moths captured on night-time transects was significantly lower at lit sites, likely as a result of reduced moth abundance at vegetation level.

As moths are drawn upwards towards street lighting, this may result in reduced flower visitation and therefore lower the contribution of moths towards pollination, although the researchers caution that this effect has not been proven. Further research should help understand the links between light pollution, moth population declines and the potential loss of pollination services as a result.

The research focused on high-pressure sodium lights, which account for almost 50% of outdoor lighting in the EU. The EU Ecodesign Directive will force the outdoor lighting sector to replace certain lighting systems with more energy efficient alternatives. Light emitting diodes (LED) are one such alternative and their impact on moths also merits further study.

The contents and views included in Science for Environment Policy are based on independent, peer-reviewed research and do not necessarily reflect the position of the European Commission.

To cite this article/service: "Science for Environment Policy": European Commission DG Environment News Alert Service, edited by SCU, The University of the West of England, Bristol.