ILP response to research into inspect decline and artificial light at night

Many will have read with some concern the recent publicity surrounding the publication of the research article in Science Advances “Street lighting has detrimental impacts on local insect populations”[i].

The scientists evaluated the impacts of night time lighting on wild caterpillars in southern England (Oxfordshire, Buckinghamshire and Berkshire) using a matched-pairs design, comparing habitat directly lit by existing street lights with carefully matched unlit habitat located nearby. The team concentrated on the caterpillar stage of moths in hedgerows and adjacent grass verge. The light sources compared high pressure sodium (HPS), LED and a small number of low pressure sodium (LPS) installations. In an additional separate experiment, LED and HPS lighting rigs were installed in field grass margins with no history of lighting to test the hypothesis that artificial light at night (ALAN) would disrupt the feeding behaviour of nocturnal caterpillars.

Caterpillar numbers were substantially lower in habitat areas illuminated by street lighting; by up to 47%. There were fewer caterpillars in lit hedgerows at all sites lit by LED and HPS and generally fewer caterpillars in grass margins. However, monochromatic LPS lighting had a non-significant impact on caterpillar numbers. Strangely, it is reported that caterpillars sampled from lit areas were heavier than unlit areas, but no conclusive explanation is offered for this phenomenon.

In the separate experiment, lighting rigs were erected along homogeneous, previously unlit grass field margins 1 hour before sunset. Sampling was conducted between 1 and 2 hours after dusk to test whether ALAN disrupted the normal feeding behaviour of nocturnal caterpillars. Fewer caterpillars were sampled under white LED lighting compared to unlit. However, there was no statistically significant difference under HPS lighting compared with the unlit margin.

Previous research suggested LEDs tend to attract similar numbers of (or slightly fewer) moths than sodium lamps. LEDs would, therefore, be expected to be less damaging to moth populations, but the additional experiment found that the LEDs had greater impacts than HPS lamps. This could suggest that flight-to-light behaviour is not the principal mechanism via which moth populations are negatively affected by ALAN.

The report suggests this hypothesis requires further confirmation and research.

So, where does that leave the lighting asset manager? We have known for some considerable time that ALAN does affect insect populations, but not the extent to which they are affected. Indeed, we still don't know exactly what feature (or features) of ALAN is detrimental, intensity, spectral power distribution or persistence. The report does not give figures regarding the matched pair lit and unlit road sections, nor does it give information as to the colour temperature of the LEDs. However, it does say that the additional field-based experiment used 5,000K LEDs and HPS light sources. The report also says the HPS scheme produced 2.2 lux whereas the LED produced 25 lux. Don't jump to the conclusion that the higher LED lighting level and a cool correlated colour temperature (CCT) must be the answer. Most LED street lighting uses a blue LED onto which there is a coating to adjust its output to produce a warmer CCT. However, they still produce a considerable amount of light in the blue area of the electro-magnetic spectrum. Though this can be outside the visual range of human sight who knows if this is the same for insects?

This report just investigated the effect of ALAN on nocturnal moth caterpillars and may not be representative of wider inspect populations. It was also restricted to rural street lighting installations.

The range and availability of LED outdoor lighting products encourages their proliferation in domestic and commercial outdoor installations was not discussed. We know from driving through our towns and cities at night that many unoccupied offices and commercial premises leave their lighting on all night. In addition, it seems the vogue in rural areas for glass to be used in properties to bring the outside in. All well and good during the day but at night there can be massive light spill if the curtains or blinds aren't closed.

The ILP mantra of right light in the right for the right time has, probably, never been more important. There is, it seems, a common belief that brighter is better. Security lighting is being sold without installation advice as to the amount of light or how the product should be mounted. Lighting asset managers have been acting responsibly when changing luminaires to LED; introducing variable lighting and part-night regimes.

As for mitigations, the article suggests dimming and presence switches could be options to reduce the impact of ALAN on insects. Most UK LED street lighting installations incorporate dimming and ILP PLG 08 "Guidance on the application of adaptive lighting within the public realm" has been advocating this since 2016. With regard to presence detectors, this is currently impractical for unmetered supplies, unless CMS can be used for metering. The article does not suggest warmer colour temperatures are less harmful nor any illuminance thresholds, flicker or glare as being significant. It would be churlish for us to use these factors to suggest our street lighting isn't a factor in altering insect behaviour or populations. Let's use this as an opportunity to demonstrate our responsible use of ALAN.

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[i] https://advances.sciencemag.org/content/7/35/eabi8322