## Insect Decline and the Future of our Planet – audio transcript

That was the sound of a healthy ecosystem. And this is the sound of insects now. Do you hear the difference? You might think that the first audio was a nuisance, but the fact is that humans need insects. So, how are street lights contributing to a mass extinction? Should you throw out the zapper on your back porch? At a quick glance, many first attributed the insect declines to climate change and habitat loss. Yes, climate change causes permanent damage. And yes, the diminishing of natural habitats can drive down populations. but there's a bigger fish to fry. Allen. No, no, not your pesky neighbor Allen with the industrial-sized lawnmower.

The acronym actually stands for artificial light at night, a major component in the universal light pollution crisis and what biologist Avalon Owens calls a potent evolutionary trap. Since 1992, levels of light pollution have doubled in high biodiversity areas. By 2014, over 23% of the Earth's land surface experienced artificially elevated levels of night sky brightness. You may ask, what's the issue, Trent? Don't these lights help us stay up late and keep the party going? Yes, but they're also a biological weapon. Some estimates predict that 1 million species, including up to 40% of insects, will go extinct within the next several decades, a number that humanity just can't live with.

A study conducted by Avalon Owens and other top biologists sought to identify the potential negative effects of artificial light at night on insect populations. This paper examined insect movement, foraging, reproduction, predation, and development, all of which are important aspects of night-dwelling insects. Their findings might concern you. An insect's instinct to go towards the light can result in what's called fatal attraction, and it's exactly that. For species that rely on migration and daily movement for food, Alan can act as a barrier that stops the insect in their path. These barriers confine populations, restricting insects from foraging. These lights cause the insect to become disoriented, leaving them vulnerable to predation as they tire themselves out. Not only does Alan decrease fitness levels, but they can actually eliminate an insect's reproductive time window. impacting the population for generations. As light pollution continues to increase, researchers are also finding a correlation in insect development, as Allen may encourage nocturnal activity in species that typically fly during the day.

By summarizing the findings of numerous studies, the research team was able to conclude that Allen is the main driving force behind insect declines, not climate change or habitat loss. And that's saying something. As I walk through Golden Gate Park, I stop and watch a moth fly around a lamppost. As it fluttered, the moth hit the light and fell to the ground, fatigued from its constant circles. Did I just witness death by exhaustion? I keep walking, but my mind wanders elsewhere. I've watched bugs fly around the motion-censored light in my backyard for hours. Insects swarm the fluorescent signs and streetlights that illuminate the city. They've even followed my bedroom light and bit me while I sleep. I knew these insects loved the light, but I didn't know that these deaths were widespread, never mind part of a bug apocalypse. To validate my thoughts, I asked an individual in the park if they too had seen this death by exhaustion, or if they had even seen any insects at all. No, I haven't heard many insects out tonight, not even by the lights. I did get bit by a mosquito, but that's about it. Also, who are you? An insectless void. Insects are a critical component of all land and freshwater food webs and provide humans with important ecosystem services such as nutrient recycling and decomposition. Their absence would have devastating consequences for life on Earth.

I sat down with my entomology professor, Dr. Sivan Suni, to learn more. So, Doctor, how do you think Alan impacts the flight and dispersal of nocturnal insects?

Dr. Suni: Lights at night have really profound impacts on insects. There are a lot of night flying moths that actually do their dispersal. So their movement from one place to another, their place of birth to their place of mating at night. And if they see an artificial light, they will fly towards that. They're trying to navigate via the moon and they'll get caught. And so it means that the exchange of genetic material across space is greatly diminished, which means that populations might become a lot more inbred. And it also just traps the insects in general and then leaves them in places devoid of food. So it has very negative consequences.

What would a world without insects look like?

Dr. Suni: A world without insects would be a world without a lot of other biodiversity. Insects are food for all sorts of organisms, and they of course are pollinators for the food that we eat. More than a third of all the food that we eat is directly tied to pollination by bees, and it's a lot higher for people that eat healthy, and it's probably going to get a lot higher with climate change as we stop eating so much meat. So a world without insects would be quite sad.

Well folks, you heard it here first. A planet without insects wouldn't be a planet at all. But what can the public do to help bring back these declining populations?

Dr. Suni: So a few things, the best thing to do to bring back insects is plant native plants and eat organic because pesticides are the most common class of pesticides. Neonicotinoids are neurotoxic to insects. And so when pesticides are put on agricultural fields, all the beneficial insects die as well. So plant native plants, eat organic and tell your neighbors.

Insect declines are happening on both a local and global scale. Declines that call for human concerns. To learn more about the light pollution crisis and its impact on insect populations, visit www.entomology.unl.edu or click the link below. Thank you.