

Press release

For immediate release

## HKU Ecologists Lead International Effort to Understand Declining Insect Biodiversity in the Tropics

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**Image 1.** Broad-nosed weevil beetle at Danum Valley Conservation Area, Borneo. (Photo courtesy: Marco Chan)

A team of ecologists from The University of Hong Kong (HKU) are leading an international initiative to investigate the decline of insect populations in the world's tropical forests. Insects, the most abundant and diverse group of animals on Earth, are experiencing alarming declines, prompting this research effort. The team's work has earned them an invitation to lead a review on the topic for *Nature Reviews Biodiversity*, a new journal from the high-impact *Nature Portfolio*, showcasing HKU's status as a global centre of excellence for tropical ecology and conservation.

The research was led by Dr Michael BOYLE and Professor Louise ASHTON from the HKU School of Biological Sciences, with contributions from Dr Adam SHARP, Dr Martha LEDGER, Dr Michel DONGMO and Professor Timothy BONEBRAKE from the same school. This collaborative effort spans continents, involving scientists from South America, Asia, Africa, Australia and Europe. It exemplifies how innovative insights into some of the most pressing current issues can arise from global scientific partnerships.

### Understanding the Status of Tropical Insects in a Changing World

Insects play a crucial role in the functioning of ecosystems, but alarmingly they may be facing declines globally. While most of our knowledge comes from studies conducted in Europe, most insect species inhabit in tropical rainforests, where our understanding remains surprisingly limited. In tropical regions, insects face

numerous threats including urbanisation, habitat loss and fragmentation, and pollution from agriculture and urban areas. The team notes that insects on tropical islands are particularly vulnerable to invasive species, with many unique species already extinct due to this threat. More broadly, climate change poses a huge threat to insect populations across the tropics, not just through rising temperatures but through disruptions to crucial weather cycles such as *El Niño* and *La Niña*.

The scientists explain how declining insect biodiversity may have knock-on consequences for ecosystem processes such as carbon cycling, which could impact the Earth globally. Changes in the ecosystem balance could also lead to increased outbreaks of pests and insect-vector-borne diseases such as dengue and malaria in humans, as well as similar diseases in livestock, affecting global health and reducing food security. The team emphasises that large gaps remain in our understanding due to insufficient data from tropical forests. However, recent advances in artificial intelligence and genetic methods are beginning to address these challenges.

‘Despite the relative lack of data in the tropics, the review highlights many reasons for concern regarding the status of tropical insects,’ said Professor Timothy Bonebrake, one of the key authors of the review. ‘We need more research, and our review points to directions to this end – but we also need to conserve habitats now and implement other conservation interventions to maintain tropical biodiversity.’

### Laying the Foundations for Future Research

Over the past three years, the team has conducted extensive field research across tropical Australia and Asia, revisiting forests where insect studies were previously undertaken. The ongoing research in Lamington National Park, Australia and Danum Valley Conservation Area, Borneo, involves collecting ants, moths, beetles and butterflies using specialised traps to assess how climate change has re-wired these populations over the last two decades. Similar studies are being carried out in Yunnan, China and Daintree, Australia, including the use of tower cranes to collect insects from the rainforest canopy.

The team’s diligent work lays the groundwork for future research at HKU. They plan to study the ecological roles and functions of insect species to understand how changing populations will impact tropical forest ecosystems. They suspect that the important processes provided by beneficial insects, including regulating forest growth through herbivory and nutrient cycling, are dwindling over time. Such analyses have never before been undertaken using such large volumes of data from so many tropical forest locations and over such long-time spans.

‘Most studies of insect declines are from modified landscapes in Europe and North America,’ said Professor Louise Ashton, corresponding author of the review. ‘However, most insect biodiversity is in the tropics. Due to a lack of long-term monitoring data, we do not fully understand how insect diversity changes over time. This review and our related projects highlight this issue and bring together new long-term insect data to help understand potential tropical insect declines and their consequences for ecological functioning.’

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The review paper can be accessed at *Nature Reviews Biodiversity*: [here](#)

Image download and caption: <https://www.scifac.hku.hk/press>



**Image 2.** Praying mantis (*Deroplatys* sp.) at Danum Valley Conservation Area, Borneo. (Photo courtesy: Marco Chan)



**Image 3.** Professor Louise Ashton (front) working in the field of Maliau Basin Conservation Area, Borneo, with Bartosz Majcher. (Photo courtesy: Louise Ashton)



**Image 4.** Dr Michael Boyle collecting leaf litter insects at Danum Valley Conservation Area, Borneo. (Photo courtesy: Louise Ashton)