Wood Wise update

Latest happenings in tree and woodland conservation

Are dormice waking up to global warming?

WTML/Kate West

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Hazel dormice are in steep decline across the UK, with the national population decreasing by around 72% since 1993[1]. A significant cause of this is loss and fragmentation of suitable habitat; however, the effects of climate change, particularly on hibernation behaviour and food availability, remain largely unstudied. This PhD project aims to address this by analysing the Woodland Trust's Nature's Calendar dataset[2] and the National Dormouse Monitoring Programme[3] dataset in conjunction with UK climate projections.

Climate change is altering the timings of natural events; trees are flowering, frogs are spawning and birds are laying eggs earlier than they did in the past. Due to unprecedented rates of environmental change, organisms are under pressure to adapt more rapidly, and differing abilities to adapt put some out of kilter with the world around them. Improving our understanding of such disruptions is crucial for the conservation of certain species.

Nature's calendar in disarray

The study of the timing of natural events is known as phenology, with individual events referred to as phenophases. Previous research[4] has shown that the spring phenophases of many species are happening earlier in the year, in synchrony with the warming occurring throughout the study periods. However, due to the varying environmental cues that different animal

and plant species use to time phenophases, in addition to physiological limits to their abilities to adapt, these changing weather patterns are decoupling previously coincident events. This can have a disruptive effect on the community dynamics of ecosystems, both within and between trophic levels.

Hungry hibernators

A common adaptation to resource-poor periods (generally winter in temperate environments) is the use of torpor or hibernation. An animal will lower its body temperature and metabolism to remain in a dormant state for prolonged periods. During this time they usually will not eat, and so the ready availability of food upon waking up from hibernation is crucial to their spring survival. Hibernators use various environmental cues to time their emergence from hibernation, which varies between species - these include air temperature and precipitation levels. This means that unseasonably warm and dry periods, such as those experienced in the UK in February this year, can bring animals out of hibernation far earlier than is optimal.

The hazel dormouse is a hibernating animal with specific dietary requirements. It cannot digest cellulose, and so is unable to feed on grass or leaves. Instead, it relies on the sequence of buds, flowers, insects, fruit and nuts that occurs across its active season, and hibernates through the winter months when these foods are unavailable. Early emergence from hibernation can therefore mean that dormice run the risk of starvation; some can survive on catkins and old hazelnuts, but this is rarely sustainable for a whole population. Understanding the potential influences of climate change on phenophase timings affecting dormice is therefore vital.

Looking to the future

By integrating long-term phenological records, including the Woodland Trust's Nature's Calendar dataset[2], and the National Dormouse Monitoring Programme dataset[3], it is possible to investigate how the timings of dormouse hibernation match up with food availability. Then, by using UK climate projections we can make predictions on how climate change might affect this. Understanding if, where and why these timing mismatches across trophic levels are happening will help conservationists and land managers create 'future-proof' woodlands and habitats to ensure ecosystems are resilient under a changing climate.

1. Goodwin, C. E. D. et al. (2017) Voluntary recording scheme reveals ongoing decline in the United Kingdom hazel dormouse Muscardinus avellanarius population, *Mammal Review*, 47(3), pp. 183–197. doi: 10.1111/mam.12091.

2. **https://naturescalendar.woodlandtrust.org.uk/**

3. **https://ptes.org/campaigns/dormice/**

4. Van Vliet, A. J. H. et al. (2006) European phenological response to climate change matches the warming pattern", *Global Change Biology*, 12, 1969-1976. doi: 10.1111/j.1365-2486.2006.01193.x

You can join a growing team of citizen scientists tracking seasonal changes with Nature's Calendar. You'll be contributing to a long biological record that dates back as far as 1736!

https://naturescalendar.woodlandtrust.org.uk/

Ash dieback will cost £15 billion

Dr Nick Atkinson – Senior conservation adviser

A recently published study shows that the full cost to the UK's economy of ash dieback, a deadly disease caused by the fungus *Hymenoscyphus fraxineus*, could be at least £15 billion. A team of researchers led by the University of Oxford's Dr Louise Hill based the estimate on costs relating to the felling of sick ash trees, replanting lost trees and the loss of ecosystem services such as timber, flood mitigation and shading, for both woodland and non-woodland trees.

The study, published in Current Biology[1], found that the felling of trees for safety reasons could cost almost £5 billion alone. This is mainly because ash loses stability as the fungus infects it, leaving the wood brittle and liable to fracture, meaning that felling has to be done in stages. Replanting costs are relatively modest by comparison, at £611 million. By far the greatest cost, at around £9.4 billion, is through the loss of ecosystem services, with £5.4 billion of that caused by loss of non-woodland trees (for example street trees, trees on farms and riparian trees).

The recovery of ecosystem services to pre-ash dieback levels will happen faster if more is invested in replanting, the study's authors argue. However, even the best case scenario suggests that it will take decades, and other issues such as rising deer populations, climate change and other tree diseases could impact on the recovery process.

This is the first attempt globally to estimate the full economic cost of a major tree disease. The shocking results have thrown light on the overlooked nature of trees and suggest that greater investment in improving biosecurity measures is easily justifiable. The authors identified a further 47 tree pests and diseases from the UK's plant health risk register with the ability to cause over a billion pounds' worth of damage, should they become established.

1. Hill L., Jones G., Atkinson N., Hector A., Hemery G. & Brown, N (2019) The £15 billion cost of ash dieback in Britain. *Current Biology* 29, R1-R3, May 6 2019. https://doi.org/10.1016/j.cub.2019.03.033

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