Rising concerns over tree pests and diseases

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Damage to chestnut.

New research has found that the number of pests and disease outbreaks in trees and forests across the world has been increasing.

The review "The consequences of Tree Pests and Diseases for Ecosystem Services" by scientists from the universities of Southampton, Cambridge, Oxford and St Andrews is published today (15 November) in the journal *Science*.

The research shows that the experience of widespread death of trees, similar to that seen from Dutch elm disease and with the arrival last year of the new fungal disease of ash - Chalara fraxinea - has not been unique to the UK. Furthermore, there is growing concern that aspects of globalisation - in particular, high volumes and new forms of trade - may increase the risk of disease spreading and provide opportunities for genetic reassortment which can enhance pathogenicity (the ability of an organism to cause disease).

Trees and forests provide a wide variety of ecosystem* services in addition to timber, food, and other provisioning services, such as carbon sequester and storage, reducing flood risk and leisure use. The researchers say that new approaches to pest and disease management are needed that take into account these multiple services and the different stakeholders they benefit, as well as the likelihood of greater threats in the future resulting from globalisation and climate change.

However, identifying all species that may become pests will be impossible and researchers stress the importance of risk management at "pathways of introduction", especially where modern trade practices provide potential new routes of entry for pests and pathogens. They argue that science-based policy and practice can prevent the introduction of new diseases and improve recovery and ongoing management, this includes the breeding of resistant trees and development of effective bio-control systems.

One of the review authors Peter Freer-Smith, who is a visiting Professor in the Centre for Biological Sciences at the University of Southampton, said: "Modern pest and disease management for plants and the natural environment needs to be based on an extensive science base. We need to understand the molecular basis of pathogenicity and herbivores, as well as why some species reach epidemic prevalence and abundance."

Researchers also examined the difficulties of maintaining tree health and considered the consequences of pests and diseases for the full range of ecosystem services provided by trees. The term "pest" and "disease" was used to describe all pathogens and small-to medium-size insect herbivores that - by causing tree damage and death - disrupt the ecosystem services provided by trees.

Many of the benefits from woodlands and forests, for example carbon storage, maintenance of biodiversity and recreational use, are uncosted

and enjoyed by a range of stakeholders. This raises difficult questions about who should be responsible for measures to protect tree health.

More information: I. L. Boyd, P. H. Freer-Smith, C. A. Gilligan, and H. C. J. Godfray, "The Consequence of Tree Pests and Diseases for Ecosystem Services," *Science* 15 November 2013: 1235773 DOI: 10.1126/science.1235773