Iconic' plant family at risk: Scientists estimate more than half of palm species may be threatened with extinction
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Scientists used artificial intelligence (AI) to help estimate the extinction risk of nearly 1,400 species in the palm family, Arecaceae. They believe machine learning can aid conservation efforts by speeding up assessment efforts for the IUCN Red List of Threatened Species. Credit: RBG KEW

Scientists are, however, confident that preliminary evaluations of a species’ conservation status can be greatly sped up using AI. Towards this end, researchers at RBG Kew and partners are developing novel techniques to estimate the extinction risk for thousands of plant species, aiding efforts to expand and update the IUCN Red List.

Dr. Steven Bachman, research leader in Kew's Conservation Assessment and Analysis team, says, "The biodiversity crisis dictates that we take urgent action to stem biodiversity loss. We need to use all the tools at our disposal, such as prediction and automation, to generate rapid and robust assessments. The addition of plants to the Red List is one of the vital steps conservationists can take to raise awareness of species at risk."

In their latest study, the RBG Kew researchers and their collaborators employed machine learning to estimate the extinction risk of more than a thousand palm species. Using AI and existing Red List data, they were able to study how extinction risks relate to palm distribution and ecology, predicting in the process the extinction risk for 1,381 species. The newfound data was then combined with available Red List assessments to determine the extinction risk of 1,889 species or 75% of the palm family. Worryingly more than half (56%) of these species may be threatened, and if extrapolated for the

The IUCN Red List of Threatened Species is widely considered to be a gold standard for evaluating the conservation status of animal, plant, and fungal species. But there are gaps in the Red List that need to be addressed, as not all species have been listed and many of the assessments are in need of an update. Conservation efforts are further complicated by inadequate funding, the sheer amount of time needed to manually assess a species, and public perception favoring certain vertebrate species over plants and fungi.

In a new paper published today in the journal Nature Ecology and Evolution, scientists have estimated the conservation status of nearly 1,900 palm species using artificial intelligence, and found more than 1,000 may be at risk of extinction.

The international team of researchers from the Royal Botanic Gardens, Kew, the University of Zurich, and the University of Amsterdam, combined existing data from the International Union for Conservation of Nature (IUCN) Red List with novel machine learning techniques to paint a clearer picture of how palms may be threatened. Although popular and well represented on the Red List, the threat to some 70% of these plants has remained unclear until now.

The IUCN Red List of Threatened Species is...
whole family, more than 1,000 species may be threatened with extinction.

Dr. Sidonie Bellot, research leader in character evolution at Kew, says, "This is a bit less than extrapolations based on the Red List assessment only, but is still very concerning given the many interactions between palms and other living beings. These interactions range from the fungi and insects living on them, to the mammals and birds eating their fruits, to the many people relying on palm products."

Globally, the palm family is found across 227 regions and has been studied by RBG Kew scientists and partners for decades, securing a breadth of knowledge about their genetic diversity and uses. This knowledge is vital for ecologists, as threatened species may be earmarked for priority conservation if they are found to be genetically different, or "evolutionarily distinct," from their closest relatives; are "functionally distinct" due to their unusual features; or are known to be used by humans. But these data relating to aspects of evolution, functionality, and use by people are often scarce for plants, and rarely consolidated to support global extinction risk studies.

In their study, the authors found that just under half of the evolutionarily or functionally distinct species were threatened, as were just under a third of used species. Based on their findings, they designated Madagascar, New Guinea, the Philippines, Hawaii, Borneo, Jamaica, Vietnam, Vanuatu, New Caledonia, and Sulawesi as priority regions for palm conservation. The regions each host between 12 and 291 palm species, where more than 40% of the evolutionarily distinct, functionally distinct, and/or utilized species may be threatened. Similarly, another 15 regions were identified where less than 10 palm species exist, but the threat of extinction is equally high.

To better understand these risks, their impact on palm diversity and the wider environment, as well as their impact on human populations, the study's authors believe more work still needs to be done. Their findings have laid out a foundation for future research, by not only listing threatened palm species but also by identifying potential substitutes for threatened utilized palms in each region. However, 620 species of palms had to be excluded from the report due to a lack of available data, reflecting the importance of and need for ongoing baseline biodiversity surveys.

Wild palms contribute to supporting the livelihoods of millions of people globally, providing building materials for homes and tools, as well as food and medicine for hundreds of communities across the tropics. According to the research, at least 185 palm species that have a use may be threatened in 92 regions, further stressing the need to protect these plants.

Dr. Rodrigo Cámara-Leret, senior researcher at the University of Zurich, says, "Palms are the most iconic plant group in the tropics and one of the most useful too. After this study, we have a much better idea of how many, and which, palm species are under threat. It is our hope that the prioritized list we provide of useful palms facing extinction and of their non-threatened alternatives may foster collaborations across all stakeholders and accelerate actions to conserve them."


Provided by Royal Botanic Gardens, Kew