

A landscape succession plan for Kew Gardens: findings and recommendations

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The living landscapes of our botanic gardens provide tangible benefits to science, amenity and wellbeing. In response to the looming threat of climate change, botanical institutions worldwide are taking proactive measures to plan the succession of the dominant plants within our landscapes.

Following the lead of Royal Botanic Gardens Victoria, the Royal Botanic Gardens, Kew have undertaken comprehensive multivariate analyses of our woody plant collections using tools, data and techniques made available by the botanical community. Strategic areas for action have been identified, including species adaptation, landscape development, resource use, partnerships, and visitor understanding. Among the key results are that charismatic British natives such as Oak (*Quercus robur*), Beech (*Fagus sylvatica*) and Holly (*Ilex aquifolium*) are vulnerable in some scenarios, and as many as 2 in 5 extant trees and shrubs could be at risk in a worst-case scenario.

Vulnerable and resilient species within our landscape have been identified, as have species and genotypes absent but suitable for Kew's projected scenarios. Techniques to identify potentially resilient populations of a target species have been developed and areas of the world that align with Kew's modelled future climate have been highlighted. To further enhance accuracy and utility, areas for development and future collaboration have been pinpointed, such as the incorporation of artificial hybrids into species distribution models, evaluation of morphological bases for resilience, and refinement and calibration of climatic models. Finally, it is our intention that our findings and methods are shared widely and transferred to applicable urban environments, with London being the most obvious beneficiary.

This work underscores the importance of sharing knowledge and resources across botanical institutions. By harnessing collective information on site-specific plant performance, gardens worldwide can work together to safeguard plant diversity, mitigate the impacts of climate change and extend our reach into the urban environment.