

# Evaluating the impact of climate change on the distribution of rare and endangered tree *Firmiana kwangsiensis* using Maxent modeling

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## Abstract

An upsurge in anthropogenic climate change has accelerated the habitat loss and fragmentation of wild animal and plants. The rare and endangered plants is an important elements of biodiversity, but holistic conservation management has been hampered by lacking of detailed and reliable information about their spatial distribution. Our aim is to study the consequences of climate change on geographical distributions of a rare tree species *Firmiana kwangsiensis* (Malvaceae) to provide reference for conservation, introduction and cultivation of this species. Based on 30 effective occurrence records and 27 environmental variables, we modeling the potential distribution of *F. kwangsiensis* under current and two future climate scenarios in maximum entropy. We found that the potential suitable habitat boundary of *F. kwangsiensis* were limited by precipitation-associated variables and temperature-associated variables. Our model predicted 259,504 km<sup>2</sup> of *F. kwangsiensis* habitat based on 25 percentile thresholds in contemporary, of which the high suitable area is about 41,027 km<sup>2</sup>. Guangxi's protected areas provide the most coverage for *F. kwangsiensis* habitat. However, the existing reserves encompass 2.7% of the total suitable habitat and 4.2% of the high suitable habitat, which is lower than the average protection intensity in Guangxi (7.2%), meaning protected areas network is currently insufficient and alternative conservation mechanisms are needed to protect the habitat. Our findings will help to identify additional localities where *F. kwangsiensis* may exist, and also where it may spread to. It provides important information for the conservation management and cultivation of such rare tree species.

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