

THE IMPACT OF CLIMATE CHANGE ON POTENTIAL DISTRIBUTION OF SPECIES IN SEMI-ARID REGION: A CASE STUDY OF QINGHAI SPRUCE (*PICEA CRASSIOLIA*) IN QILIAN MOUNTAIN, GANSU PROVINCE, CHINA

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Abstract:

1. Introduction

Climate change has been shown to affect an increasing number of species across the world and that these changes will continue to accelerate. Prediction of species' potential distributions (PD) under climate change plays a key role in determining the impact of global change on agricultural, horticultural, and forestry ecosystems. In this study, the potential distribution of Qinghai spruce under current and future climate condition in Qilian mountain area (study area, SA) were simulated and a comparison between them showed that climate change will cause an increase of 1% on distribution range.

2. Method and data

Maximum entropy(Maxent) is a general-purpose method for making predictions from incomplete information. We chose Maxent model because it requires only presence data, its efficient deterministic algorithm and concise mathematical definition.

The real distribution (RD) of Qinghai spruce (*Picea crassifolia*) was extract from remote sensed images (TM) using supervised classification. The resolution was re-sampled to 1km in order to fit the environmental variables. 19 variables about precipitation and temperature under current climate condition that may influence the potential distribution of species were obtained using thin-plate smoothing spline interpolation. Variables of future climate condition were downscaled from output of GCM outputs and resampled too. The compare of observed and interpolated data showed that these 19 variables are applicable.

3. Results

Fig 1 shows the real and potential distribution of Qinghai spruce under current climate condition. We chose 0.21 (equal to cumulative threshold 10) as logistic probability threshold based on the comparison with real distribution, the fractional predicted area of potential distribution is 0.321. Real distribution and simulated potential distribution in areas including Sunan, Minle and Qilian (A in Fig.1) are conform, Temperature Seasonality and Max Temperature of Warmest Month are the most important environmental variables that influence the potential distribution of Qinghai spruce in study area.

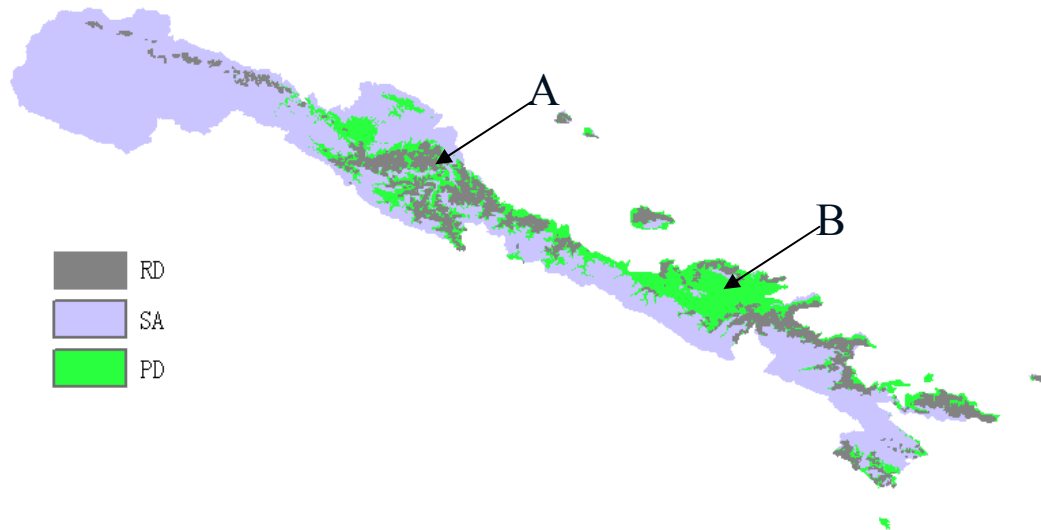


Fig 1 Real and potential distribution of Qinghai spruce under current climate conditions

Fig 2 shows the real distribution and potential distribution of Qinghai spruce under future climate condition, The logistic threshold 0.205 (equal to cumulative threshold 10) was chose based on comparison with real distribution, the fractional predicted area of potential distribution is 0.331. Max Temperature of Warmest Month and Mean Temperature of Wettest Quarter are the most important environmental variables contrast to Temperature Seasonality and Max Temperature of Warmest Month that influence potential distribution of Qinghai spruce under current climate condition.

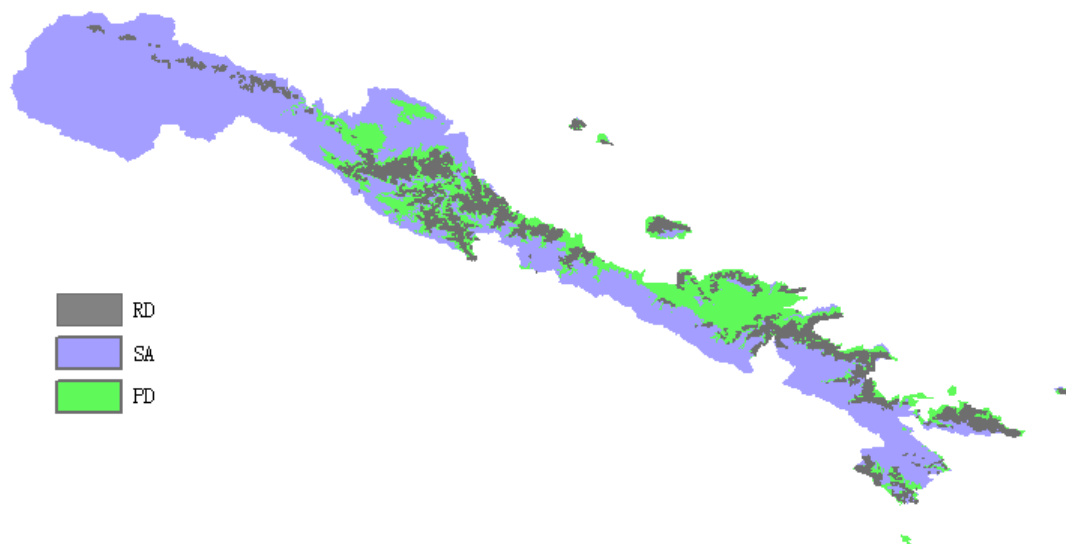


Fig 2 Real and potential distribution of Qinghai spruce under future climate conditions