Chapter 5
Restoration Techniques to Mitigate Plant Invasions Under Climate Change

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ABSTRACT

In recent decades, the convergence of plant invasions and climate change has emerged as a critical concern for ecosystems and human societies worldwide. Plant invasions occur when non-native species spread into new areas, often outcompeting native flora and disrupting local ecological balances. Conversely, climate change can weaken native plants, making them more susceptible to invasion. Additionally, climate changes can disrupt plant-pollinator relationships, further complicating ecosystem

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dynamics and potentially accelerating the spread of invasive species. Furthermore, climate change can facilitate the movement of invasive species across regions by altering habitat connectivity and allowing species to colonize new areas that were previously climatically unsuitable. This dynamic poses significant challenges for conservation efforts, as traditional management strategies may become less effective in the face of rapidly changing conditions. Addressing the dual challenges of plant invasions and climate change requires a multifaceted approach.

INTRODUCTION TO PLANT INVASIONS AND CLIMATE CHANGE IMPACTS

In recent decades, the convergence of plant invasions and climate change has emerged as a critical concern for ecosystems and human societies worldwide. Plant invasions occur when non-native species spread into new areas, often outcompeting native flora and disrupting local ecological balances. Conversely, climate change can weaken native plants, making them more susceptible to invasion. Additionally, climate changes can disrupt plant-pollinator relationships, further complicating ecosystem dynamics and potentially accelerating the spread of invasive species. Furthermore, climate change can facilitate the movement of invasive species across regions by altering habitat connectivity and allowing species to colonize new areas that were previously climatically unsuitable. This dynamic poses significant challenges for conservation efforts, as traditional management strategies may become less effective in the face of rapidly changing conditions. Addressing the dual challenges of plant invasions and climate change requires a multifaceted approach. Overall, the intersection of plant invasions and climate change presents a significant challenge for both ecological conservation and human well-being. By advancing our understanding of how climate change influences plant invasions and implementing comprehensive management strategies, we can better protect vulnerable ecosystems and ensure the sustainability of natural resources for future generations.

Assessing invasion risk through predictive models and mapping is an essential component of modern ecological management, offering valuable insights into how invasive species might spread and impact ecosystems. Predictive models use various algorithms and data sources to forecast the potential distribution of invasive species based on environmental variables, species traits, and historical invasion patterns. These models integrate data on climate, land use, soil types, and ecological interactions to estimate areas at high risk of invasion. They often employ ecological niche modeling (ENM), which evaluates the suitability of different environments for an invasive species by comparing the conditions of known invasion sites to those across potential new habitats (Mudereri B T., et al, 2020). Machine learning and statistical

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