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978-0-521-62309-4 - Plants at the Margin: Ecological Limits and Climate Change

R. M. M. Crawford

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Plants at the Margin

Ecological Limits and Climate Change

Plants at the limits of their distribution are likely to be particularly affected by climate change. Biogeography, demography, reproductive biology, physiology and genetics all provide cogent explanations as to why limits occur where they do. The book brings together these different avenues of enquiry, in a form that is suited to students, researchers and anyone with an interest in the impact of climate change. Margins are by their very nature environmentally unstable – does it therefore follow that plant populations adapted for life in such areas will prove to be pre-adapted to withstand the changes that may be brought about by a warmer world? This and other questions are explored concerning the changes that may already be taking place on this planet. Numerous illustrations are included to remind us that knowledge of the existence of plants in their natural environment is essential to our understanding of their function and ecology in a changing world.

R. M. M. CRAWFORD has taught and researched at the University of St Andrews since 1962, pursuing the study of plant responses to the environment in a wide range of habitats in Scotland, Scandinavia, North and South America and the Arctic. He is a Fellow of the Royal Society of Edinburgh, a Fellow of the Linnean Society and an associate member of the Belgian Royal Academy.

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For Barbara

*and all who inhabit, study and
value marginal lands*

Fortunatus et ille, Deos qui novit agrestes Virgil, Georgics: Book II

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Preface

Margins have long provided key questions for ecological investigation. Today with climatic warming becoming ever more apparent margins as regions of ecological change invite an assessment of their responses to environmental alteration. The purpose of this book is therefore to examine how marginal plant communities in different parts of the world are responding to climate change. Practically every aspect of modern biological enquiry can be used to address the nature of margins. Biogeography, demography, reproductive biology, physiology and genetics all provide cogent explanations as to why limits occur where they do. The aim of this book is to bring together, wherever possible, different avenues of enquiry in relation to explaining the existence of limits to plant distribution. Each of these disciplines can contribute to our understanding of the biological consequences of climatic warming.

Marginal areas have a number of features in common. These can be seen in demographic limits to population renewal, in adaptations to shortness of the growing season, in problems of access to resources, and impediments to reproduction. To avoid repetition an attempt is made therefore to discuss these common features before moving on to individual case studies.

Part I examines the nature of margins and their effects on biodiversity. Part II is functional, and explores how plants in marginal areas overcome the shortness of the growing season and other physical limitations in acquiring resources and reproducing. The remaining chapters look at individual examples of marginal areas which have been selected on the supposition that they may be sensitive to climatic change.

In a scenario of a warmer world it is highly probable that changing climatic conditions will have a particularly marked effect on human exploitation of

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marginal areas. The history of human settlement in peripheral areas is therefore discussed in relation to our use of plants in marginal areas. Climatic change will also create problems for conservation particularly in relation to the interactions between human beings, their livestock and the environment. The consequences of both higher temperatures and greater human populations create a worldwide problem with particularly serious consequences for marginal regions.

In this book an attempt is made to compare the sensitivity of different margins with climate change and to explore the question of whether or not all peripheral areas are equally likely to suffer losses in biodiversity as

a result of climatic change. The converse situation is also considered. Margins are by their very nature environmentally unstable. Does it therefore follow that plant populations adapted for life in areas of climatic uncertainty will prove to be pre-adapted to withstand the changes that may be brought about by a warmer world?

Numerous illustrations have been included as a reminder of the place of plants in their habitats and that whatever may be learnt from the application of sophisticated methods of investigation it is the existence of the plant in its environment that has prompted our initial curiosity.

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