

Contents

List of contributors xi

Preface xvii

I Introductory Chapters

- 1 The Ecological Value of Bryophytes as Indicators of Climate Change 3

NANCY G. SLACK

- 2 Bryophyte Physiological Processes in a Changing Climate: an Overview 13

ZOLTÁN TUBA

II Ecophysiology

- 3 Climatic Responses and Limits of Bryophytes: Comparisons and Contrasts with Vascular Plants 35

MICHAEL C. F. PROCTOR

- 4 Effects of Elevated Air CO₂ Concentration on Bryophytes: a Review 55

ZOLTÁN TUBA, EDIT ÖTVÖS, AND ILDIKÓ JÓCSÁK

- 5 Seasonal and Interannual Variability of Light and UV Acclimation in Mosses 71

NIINA M. LAPPALAINEN, ANNA HYYRYLÄINEN, AND SATU HUTTUNEN

III Aquatic Bryophytes

- 6 Ecological and Physiological Effects of Changing Climate on Aquatic Bryophytes 93

JANICE M. GLIME

- 7 Aquatic Bryophytes under Ultraviolet Radiation 115
JAVIER MARTÍNEZ-ABAIGAR AND ENCARNACIÓN NÚÑEZ-OLIVERA

IV Desert and Tropical Ecosystems

- 8 Responses of a Biological Crust Moss to Increased Monsoon Precipitation and Nitrogen Deposition in the Mojave Desert 149
LLOYD R. STARK, D. NICHOLAS McLETCHE, STANLEY D. SMITH, AND MELVIN J. OLIVER
- 9 Ecology of Bryophytes in Mojave Desert Biological Soil Crusts: Effects of Elevated CO₂ on Sex Expression, Stress Tolerance, and Productivity in the Moss *Syntrichia caninervis* Mitt. 169
JOHN C. BRINDA, CATHERINE FERNANDO, AND LLOYD R. STARK
- 10 Responses of Epiphytic Bryophyte Communities to Simulated Climate Change in the Tropics 191
JORGE JÁCOME, S. ROBBERT GRADSTEIN, AND MICHAEL KESSLER

V Alpine, Arctic, and Antarctic Ecosystems

- 11 Effects of Climate Change on Tundra Bryophytes 211
ANNIKA K. JÄGERBRAND, ROBERT G. BJÖRK, TERRY CALLAGHAN, AND RODNEY D. SEPPELT
- 12 Alpine Bryophytes as Indicators for Climate Change: a Case Study from the Austrian Alps 237
DANIELA HOHENWALLNER, HAROLD GUSTAV ZECHMEISTER, DIETMAR MOSER, HARALD PAULI, MICHAEL GOTTFRIED, KARL REITER, AND GEORG GRABHERR
- 13 Bryophytes and Lichens in a Changing Climate: An Antarctic Perspective 251
RODNEY D. SEPPELT

VI Sphagnum and Peatlands

- 14 Living on the Edge: The Effects of Drought on Canada's Western Boreal Peatlands 277
MELANIE A. VILE, KIMBERLI D. SCOTT, ERIN BRAULT, R. KELMAN WIEDER, AND DALE H. VITT
- 15 The Structure and Functional Features of *Sphagnum* Cover of the Northern West Siberian Mires in Connection with Forecasting Global Environmental and Climatic Changes 299
ALEKSEI V. NAUMOV AND NATALIA P. KOSYKH

- 16 The Southernmost *Sphagnum*-dominated Mires on the Plains of Europe: Formation, Secondary Succession, Degradation, and Protection 317

JÁNOS NAGY

VII Changes in Bryophyte Distribution with Climate Change: Data and Models

- 17 The Role of Bryophyte Paleoecology in Quaternary Climate Reconstructions 335

GUSZTÁV JAKAB AND PÁL SÖMEGI

- 18 Signs of Climate Change in the Bryoflora of Hungary 359

TAMÁS PÓCS

- 19 Can the Effects of Climate Change on British Bryophytes be Distinguished from those Resulting from Other Environmental Changes? 371

JEFFREY W. BATES AND CHRISTOPHER D. PRESTON

- 20 Climate Change and Protected Areas: How well do British Rare Bryophytes Fare? 409

BARBARA J. ANDERSON AND RALF OHLEMÜLLER

- 21 Modeling the Distribution of *Sematophyllum substrumulosum* (Hampe) E. Britton as a Signal of Climatic Changes in Europe 427

CECÍLIA SÉRGIO, RUI FIGUEIRA, AND RUI MENEZES

- 22 Modeling Bryophyte Productivity Across Gradients of Water Availability Using Canopy Form-Function Relationships 441

STEVEN K. RICE, NATHALI NEAL, JESSE MANGO, AND KELLY BLACK

VIII Conclusions

- 23 Bryophytes as Predictors of Climate Change 461

L. DENNIS GIGNAC

- 24 Conclusions and Future Research 483

NANCY G. SLACK AND LLOYD R. STARK

Index 491