

Contents

1 Nitrogen Deposition, Critical Loads and Biodiversity: Introduction	1
W. Kevin Hicks, Richard Haeuber and Mark A. Sutton	
Part I Monitoring and Modelling Atmospheric Nitrogen Deposition	
2 Progress in Monitoring and Modelling Estimates of Nitrogen Deposition at Local, Regional and Global Scales	7
Frank Dentener, Robert Vet, Robin L. Dennis, Enzai Du, Umesh C. Kulshrestha and Corinne Galy-Lacaux	
3 Gaseous Nitrogen Emissions from Australian Cattle Feedlots	23
O. Tom Denmead, Deli Chen, Doug Rowell, Zoe Loh, Julian Hill, Stephanie Muir, David W. T. Griffith, Travis Naylor, Mei Bai, Frances Phillips and Sean McGinn	
4 Ammonia Emissions in the US: Assessing the Role of Bi-directional Ammonia Transport Using the Community Multi-scale Air Quality (CMAQ) Model	31
Megan L. Gore, Ellen J. Cooter, Robin L. Dennis, Jon E. Pleim and Viney P. Aneja	
5 Regional Scale Modelling of the Concentration and Deposition of Oxidised and Reduced Nitrogen in the UK	39
Anthony J. Dore, Małgorzata Werner, Jane R. Hall, Christopher J. Dore, Stephen Hallsworth, Maciej Kryza, Ron I. Smith, Ulrike Dragosits, Y. Sim Tang, Massimo Vieno and Mark A. Sutton	
6 High Rates of Wet Nitrogen Deposition in China: A Synthesis	49
Enzai Du and Xuejun Liu	

7 Enrichment of Atmospheric Ammonia and Ammonium in the North China Plain.....	57
Jianlin Shen, Xuejun Liu, Andreas Fangmeier and Fusuo Zhang	
8 Nitrogen Deposition within the Littoral-Highlands County of Croatia Between 1996 and 2008.....	67
Ana Alebic-Juretic	
9 Atmospheric Deposition of Reactive Nitrogen in India	75
Umesh C. Kulshrestha, Monika J. Kulshrestha, Jetta Satyanarayana and Loka Arun K. Reddy	
10 Dry and Wet Atmospheric Nitrogen Deposition in West Central Africa	83
Corinne Galy-Lacaux, Claire Delon, Fabien Solmon, Marcellin Adon, Véronique Yoboué, Jonas Mphepya, Jacobus J. Pienaar, Babakar Diop, Luc Sigha, Laouali Dungall, Aristide Akpo, Eric Mougin, Eric Gardrat and Pierre Castera	
11 Interannual Variability of the Atmospheric Nitrogen Budget in West African Dry Savannas	93
Claire Delon, Corinne Galy-Lacaux, Marcellin Adon, Catherine Liousse, Aaron Boone, Dominique Serça, Babakar Diop, Aristide Akpo and Eric Mougin	
12 Assessment and Characterisation of the Organic Component of Atmospheric Nitrogen Deposition	107
Sarah E. Cornell	
13 Wet Deposition of Nitrogen at Different Locations in India	117
P. S. P. Rao, P. D. Safai, Krishnakant Budhavant and V. K. Soni	
Part II Nitrogen Impacts on Terrestrial and Aquatic Ecosystems	
14 Factors Affecting Nitrogen Deposition Impacts on Biodiversity: An Overview	127
Roland Bobbink and W. Kevin Hicks	
15 What Happens to Ammonia on Leaf Surfaces?	139
J. Neil Cape	
16 Effects of Nutrient Additions on the Diversity of the Herbaceous-Subshrub Layer of a Brazilian Savanna (Cerrado)	147
Thiago R. B. de Mello, Cássia B. R. Munhoz and Mercedes M. C. Bustamante	

17 Leaf Litter Decomposition and Nutrient Release Under Nitrogen, Phosphorus and Nitrogen Plus Phosphorus Additions in a Savanna in Central Brazil	155
Tamiel K. B. Jacobson and Mercedes M. C. Bustamante	
18 Diversity of the Shrub-tree Layer in a Brazilian Cerrado Under Nitrogen, Phosphorus and Nitrogen Plus Phosphorus Addition	165
Tamiel K. B. Jacobson and Mercedes M. C. Bustamante	
19 Model Predictions of Effects of Different Climate Change Scenarios on Species Diversity with or without Management Intervention, Repeated Thinning, for a Site in Central European Russia	173
Larisa G. Khanina, Maxim V. Bobrovsky, Alexander S. Komarov, Vladimir N. Shanin and Sergey S. Bykhovets	
20 Seasonal Changes in Photosynthetic Nitrogen of Tree Species Differing in Leaf Phenology in a South-eastern Brazilian Savanna	183
Sabrina R. Latansio-Aidar, Luciana D. Colleta, Jean P. H. B. Ometto and Marcos P.M. Aidar	
21 Atmospheric Nitrogen Deposition can Provide Supplementary Fertilization to Sugar Cane Crops in Venezuela	191
Danilo López-Hernández, Diego Sequera, Oswaldo Vallejo and Carmen Infante	
22 Competition Alters Responses of Juvenile Woody Plants and Grasses to Nitrogen Addition in Brazilian Savanna (Cerrado)	199
Viviane T. Miranda, Mercedes M. C. Bustamante and Alessandra R. Kozovits	
23 Pigment Ratios of the Mediterranean Bryophyte <i>Pleurochaete squarrosa</i> Respond to Simulated Nitrogen Deposition	207
Raúl Ochoa-Hueso, Cristina Paradela, M. Esther Pérez-Corona and Esteban Manrique	
24 Calibrating Total Nitrogen Concentration in Lichens with Emissions of Reduced Nitrogen at the Regional Scale.....	217
Pedro Pinho, Maria-Amélia Martins-Loução, Cristina Máguas and Cristina Branquinho	

25 The Impact of the Rural Land-Use on the Ecological Integrity of the Intermittent Streams of the Mediterranean 2000 Natura Network.....	229
Cristina Branquinho, Carla Gonzalez, Adelaide Clemente, Pedro Pinho and Otilia Correia	
26 Biodiversity of Acid Grasslands in the Atlantic Regions of Europe: The Impact of Nitrogen Deposition	243
Carly J. Stevens, Cecilia Duprè, Edu Dorland, Cassandre Gaudnik, David J. G. Gowing, Albert Bleeker, Martin Diekmann, Didier Alard, Roland Bobbink, David Fowler, Emmanuel Corcket, J. Owen Mountford, Vigdis Vandvik, Per Arild Aarrestad, Serge Muller and Nancy B. Dise	
27 Effects of Increased Nitrogen Availability in Mediterranean Ecosystems: A Case Study in a Natura 2000 Site in Portugal.....	251
Teresa Dias, Sandra Chaves, Rogério Tenreiro, Maria Amélia Martins-Loução, Lucy J. Sheppard and Cristina Cruz	
28 Species of Arbuscular Mycorrhizal Fungal Spores can Indicate Increased Nitrogen Availability in Mediterranean-type Ecosystems.....	259
Teresa Dias, Sidney Luiz Stürmer, Sandra Chaves, Cátia Fidalgo, Rogério Tenreiro, Patrícia Correia, Luís Carvalho, Maria Amélia Martins-Loução, Lucy J. Sheppard and Cristina Cruz	
29 Nitrogen Biogeochemistry Research at Fernow Experimental Forest, West Virginia, USA: Soils, Biodiversity and Climate Change.....	267
Frank S. Gilliam	
Part III Critical Loads and Levels Approaches and Regional Upscaling	
30 Development of the Critical Loads Concept and Current and Potential Applications to Different Regions of the World	281
Jean-Paul Hettelingh, Wim de Vries, Maximilian Posch, Gert Jan Reinds, Jaap Slootweg and W. Kevin Hicks	
31 Nitrogen Deposition as a Threat to the World's Protected Areas Under the Convention on Biological Diversity (CBD).....	295
Albert Bleeker, W. Kevin Hicks, Frank Dentener, James N. Galloway and Jan Willem Erisman	
32 How Much is too Much? Nitrogen Critical Loads and Eutrophication and Acidification in Oligotrophic Ecosystems.....	305
William D. Bowman, L'uboš Halada, Juraj Hreško, Cory C. Cleveland, Jill S. Baron and John Murgel	

33 Predicting Lichen-based Critical Loads for Nitrogen Deposition in Temperate Forests	311
Linda H. Geiser, Sarah E. Jovan, Douglas A. Glavich and Mark E. Fenn	
34 Using Fire Risk and Species Loss to set Critical Loads for Nitrogen Deposition in Southern California Shrublands.....	319
Edith B. Allen, Leela E. Rao, Gail Tonnesen, Robert F. Johnson, Mark E. Fenn and Andrzej Bytnerowicz	
35 Empirical Critical Loads of Nitrogen in China.....	329
Lei Duan, Jia Xing, Yu Zhao and Jiming Hao	
36 Challenges in Defining Critical Loads for Nitrogen in UK Lakes.....	337
Chris J. Curtis, Gavin L. Simpson, Rick W. Battarbee and Stephen Maberly	
37 Proposing a Strict Epidemiological Methodology for Setting Empirical Critical Loads for Nitrogen Deposition.....	345
Harald Sverdrup, Bengt Nihlgård, Salim Belyazid and Lucy J. Sheppard	
38 A Comparison of Empirical and Modelled Nitrogen Critical Loads for Mediterranean Forests and Shrublands in California	357
Mark E. Fenn, Hans-Dieter Nagel, Ina Koseva, Julian Aherne, Sarah E. Jovan, Linda H. Geiser, Angela Schlutow, Thomas Scheuschner, Andrzej Bytnerowicz, Benjamin S. Gimeno, Fengming Yuan, Shaun A. Watmough, Edith B. Allen, Robert F. Johnson and Thomas Meixner	
39 Source Attribution of Eutrophying and Acidifying Pollutants on the UK Natura 2000 Network.....	369
William J. Bealey, Anthony J. Dore, Clare P. Whitfield, Jane R. Hall, Massimo Vieno and Mark A. Sutton	
40 Mapping Critical Loads for Nitrogen Based on Biodiversity Using ForSAFE-VEG: Introducing the Basic Principles	375
Harald Sverdrup, Bengt Nihlgård and Salim Belyazid	
Part IV Nitrogen Deposition, Ecosystem Services and Policy Development	
41 Impacts of Nitrogen Deposition on Ecosystem Services in Interaction with Other Nutrients, Air Pollutants and Climate Change.....	387
Wim de Vries, Christine Goodale, Jan Willem Erisman and Jean-Paul Hettelingh	

42 The Form of Reactive Nitrogen Deposition Affects the Capacity of Peatland Vegetation to Immobilise Nitrogen: Implications for the Provision of Ecosystem Services	397
Lucy J. Sheppard, Ian D. Leith, Sanna K. Kivimaki and Jenny Gaiawyn	
43 Quantification of Impacts of Nitrogen Deposition on Forest Ecosystem Services in Europe.....	411
Wim de Vries, Maximilian Posch, Gert Jan Reinds and Jean-Paul Hettelingh	
44 Implications of Current Knowledge on Nitrogen Deposition and Impacts for Policy, Management and Capacity Building Needs: CLRTAP	425
Till Spranger, Keith Bull, Thomas A. Clair and Matti Johansson	
45 The Convention on Biological Diversity: How does Nitrogen fit into the Plans?.....	435
James M. Williams	
46 Agriculture and the Nitrogen Problem in India: Environmental Implications.....	439
Krishna P. Vadrevu and K.V.S. Badarinath	
47 Mitigating Increases in Nitrogen Deposition: The Challenge of Extending Symbiotic Nitrogen Fixation to Cereals and Other Non-legume Crops	447
Edward C. Cocking and Philip J. Stone	
Part V Conclusions and Outlook	
48 Progress in Nitrogen Deposition Monitoring and Modelling.....	455
Wenche Aas (Chair), Silvina Carou (Rapporteur), Ana Alebic-Juretic, Viney P Aneja, Rajasekhar Balasubramanian, Haldis Berge, J. Neil Cape, Claire Delon, O. Tom Denmead, Robin L. Dennis, Frank Dentener, Anthony J. Dore, Enzai Du, Maria Cristina Forti, Corinne Galy-Lacaux, Markus Geupel, Richard Haeuber, Carmen Iacoban, Alexander S. Komarov, Eero Kubin, Umesh C. Kulshrestha, Brian Lamb, Xuejun Liu, D. D. Patra, Jacobus J. Pienaar, Pedro Pinho, P. S. P. Rao, Jianlin Shen, Mark A. Sutton, Mark R. Theobald, Krishna P. Vadrevu and Robert Vet	

49 The Effects of Atmospheric Nitrogen Deposition on Terrestrial and Freshwater Biodiversity	465
Jill S. Baron (Chair), Mary Barber (Rapporteur), Julius I. Agboola, Edith B. Allen, William J. Bealey, Roland Bobbink, Maxim V. Bobrovsky, William D. Bowman, Cristina Branquinho, Mercedes M. C. Bustamente, Christopher M. Clark, Edward C. Cocking, Cristina Cruz, Eric Davidson, O. Tom Denmead, Teresa Dias, Nancy B. Dise, Alan Feest, James N. Galloway, Linda H. Geiser, Frank S. Gilliam, Ian J. Harrison, Larisa G. Khanina, Xiankai Lu, Esteban Manrique, Raúl Ochoa-Hueso, Jean P.H.B. Ometto, Richard Payne, Thomas Scheuschner, Lucy J. Sheppard, Gavin L. Simpson, Y. V. Singh, Carly J. Stevens, Ian Strachan, Harald Sverdrup, Naoko Tokuchi, Hans van Dobben and Sarah Woodin	
50 The Critical Loads and Levels Approach for Nitrogen	481
Thomas A. Clair (Chair), Tamara Blett (Co-Chair and Rapporteur), Julian Aherne, Marcos P. M. Aïdar, Richard Artz, William J. Bealey, William Budd, J. Neil Cape, Chris J. Curtis, Lei Duan, Mark E. Fenn, Peter Groffman, Richard Haeuber, Jane R. Hall, Jean-Paul Hettelingh, Danilo López-Hernández, Scot Mathieson, Linda Pardo, Maximilian Posch, Richard V. Pouyat, Till Spranger, Harald Sverdrup, Hans van Dobben and Arjan van Hinsberg	
51 Nitrogen Deposition Effects on Ecosystem Services and Interactions with other Pollutants and Climate Change	493
Jan Willem Erisman (Chair), Allison Leach (Rapporteur), Mark Adams, Julius I. Agboola, Luan Ahmetaj, Didier Alard, Amy Austin, Moses A. Awodun, Simon Bareham, Theresa L. Bird, Albert Bleeker, Keith Bull, Sarah E. Cornell, Eric Davidson, Wim de Vries, Teresa Dias, Bridget Emmett, Christine Goodale, Tara Greaver, Richard Haeuber, Harry Harmens, W. Kevin Hicks, Lars Hogbom, Paul Jarvis, Matti Johansson, Zoe Russell, Colin McClean, Bill Paton, Tibisay Perez, Jan Plesnik, Nalini Rao, Susanne Schmidt, Yogendra B. Sharma, Naoko Tokuchi and Clare P. Whitfield	
52 Workshop on Nitrogen Deposition, Critical Loads and Biodiversity: Scientific Synthesis and Summary for Policy Makers	507
W. Kevin Hicks, Richard Haeuber, Mark A. Sutton, Wenche Aas, Mary Barber, Jill S. Baron, Tamara Blett, Silvina Carou, Thomas Clair, Jan Willem Erisman, Allison Leach and James N. Galloway	
Appendix	527
Glossary of Key Terms	529
Index	531

Nitrogen Deposition, Critical Loads and Biodiversity
Sutton, M.A.; Mason, K.E.; Sheppard, L.J.; Sverdrup, H.;
Haeuber, R.; Hicks, W.K. (Eds.)
2014, XXIX, 535 p. 137 illus., 82 illus. in color.,
Hardcover
ISBN: 978-94-007-7938-9