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Modelling Nature-based Solutions

Integrating Computational and Participatory Scenario Modelling for Environmental Management and Planning

Nature-based Solutions (NBS) are essential to ensure a sustainable society and healthy ecosystem over the coming decades. However, the systems to be managed are both broad and complex, requiring an integrated understanding of both biophysical systems, such as soils and water, and economic and social systems, such as urban development and human behaviour. This edited book joins these domains of knowledge together from an applied perspective and considers how computer science can help. It takes a strategic look at the benefits and barriers to using modelling within environmental management and planning practice. It delves further by providing an in-depth comparative review of a wide range of models from a variety of scientific disciplines of interest with examples of their use for NBS. As such, this illustrated guide is designed to help students, researchers and practitioners navigate the huge range of modelling options available and develop the common understanding to work interdisciplinarily.

DR NEIL SANG is a researcher in Geographical Information Science (GIS) at the Department of Landscape Architecture, Planning and Management, Swedish University of Agricultural Sciences (SLU). His research interests are broad, spanning a range of modelling approaches such as GIS, optimisation and AI, simulation modelling, remote sensing, citizen science and GeoDesign. Formerly at the James Hutton Institute (UK), he has worked in a wide range of subject areas within socio-environmental science.

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Edited by

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Frontmatter
More Information

Contents

List of Contributors *page* vii
Foreword xi
CARL STEINITZ
Acknowledgements xii

Introduction 1
NEIL SANG

1 Landscape Modelling and Stakeholder Engagement: Participatory Approaches and Landscape Visualisation 19
DAVID MILLER, ÅSA ODE-SANG, IAIN BROWN, JOSÉ MUÑOZ-ROJAS, CHEN WANG AND GILLIAN DONALDSON-SELBY

2 Agent-based Models of Coupled Social and Natural Systems 56
JIAQI GE AND GARY POLHILL

3 Modelling Nature-based Solutions from Soil Ecosystem Services 82
MATTHEW AITKENHEAD

4 Modelling Water Resources for Nature-based Solutions 100
SARAH DUNN

5 Models at the Service of Marine Nature-based Solutions 152
IOANNA AKOUMIANAKI AND ARTHUR CAPET

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CAMBRIDGE

Cambridge University Press
978-1-108-42893-4 — Modelling Nature-based Solutions
Edited by Neil S. Sang
Frontmatter
More Information

6 Coastal and Freshwater Flood Models: A Review in the Context of NBS 210
NEIL SANG

7 Nature-based Solutions to Urban Microclimate Regulation 247
JOHANNA DEAK SJÖMAN AND ERIK JOHANSSON

8 Data Mining, Machine Learning and Spatial Data Infrastructures for Scenario Modelling 276
NEIL SANG AND MATTHEW AITKENHEAD

9 Can Geodesign Be Used to Facilitate Boundary Management for Planning and Implementation of Nature-based Solutions? 305
SARAH GOTTWALD, RON JANSSEN AND CHRISTOPHER RAYMOND

10 Integrating Models into Practice – Recommendations 341
NEIL SANG, IOANNA AKOUMIANAKI, MATTHEW AITKENHEAD, DAVID MILLER AND ÅSA ODE-SANG

Appendix: List of Models/Software 352
Index 356

The colour plate section can be found between pages 180 and 181

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Foreword

Modelling Nature-based Solutions: Integrating Computational and Participatory Scenario Modelling for Environmental Management and Planning is an important book. It examines issues involved in deciding how to plan for the profound, complex, uncertain and contentious changes which are expected to occur in the coming generations related to climate and demographic change. It focuses on human and scientific aspects related to the United Nations Development Goals, and especially on the key natural systems of soil, water and green infrastructure. In each of these, modelling methods applicable to planning vary, and there are choices related to an appropriate balance between scientific accuracy and public understanding which must be made – and these are not simple choices.

Originally conceived as being specifically directed to Swedish circumstances, the themes discussed in the book have broad global implications, as all countries will have to consider similar issues. Yet even then, these decisions are likely to be insufficient, as the natural systems which need to be planned and managed at the national level do not respect political boundaries. As the authors point out, we are faced with a 'wicked problem'. Nonetheless, and with an awareness of the complexity facing the world, it is a problem which needs feasible solutions. The authors provide an illuminating contribution towards that end.

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I hope this book will be of interest to modellers, practitioners, students and stakeholders from a range of fields and that we have succeeded in making the subject accessible. I reflect that my own modelling knowledge is built on foundations in mathematics, language and critical thinking from teachers in many disciplines from postgraduate to school level, many of whom had probably never heard of GIS. These skills are the fundamental prerequisites for a healthy conversation around evidence-based policy to address socio-environmental issues and that they are in fact widely taught should be a source of encouragement; so I would also like to thank the teachers who lay those foundations.

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