Forests, Trees and Human Health

K. Nilsson • M. Sangster • C. Gallis • T. Hartig
S. Vries • K. Seeland • J. Schipperijn Editors

## Forests, Trees and Human Health



*Editors* Kjell Nilsson University of Copenhagen Forest & Landscape Denmark Department of Parks and Urban Landscapes Rolighedsvej 23 1958 Frederiksberg C Denmark KJNI@life.ku.dk

Marcus Sangster Forestry Commission Land Use and Social Research Corstorphine Road 231 EH12 7AT Edinburgh United Kingdom marcus.sangster@forestry.gsi.gov.uk

Christos Gallis Forest Research Institute National Agricultural Research Foundatio 57006 Thessaloniki Greece cgalis@fri.gr

Terry Hartig Uppsala University Institute for Housing and Urban Research Radhustorget 1 80320 Gävle Sweden terry.hartig@ibf.uu.se Sjerp de Vries Wageningen UR Alterra 6700 AA Wageningen Netherlands Sjerp.deVries@wur.nl

Klaus Seeland Swiss Federal Institute of Technology Group Society, Environment & Culture Sonneggstrasse 33, SOL E 9092 Zurich Switzerland klaus.seeland@env.ethz.ch

Jasper Schipperijn University of Southern Denmark Institute for Sport Science and Clinical Biomechanics Øster Farimagsgade 5 A 1353 Copenhagen K Denmark jschipperijn@health.sdu.dk

ISBN 978-90-481-9805-4 e-ISBN 978-90-481-9806-1 DOI 10.1007/978-90-481-9806-1 Springer New York Dordrecht Heidelberg London

Library of Congress Control Number: 2010937428

© Springer Science+Business Media B.V. 2011

No part of this work may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, microfilming, recording or otherwise, without written permission from the Publisher, with the exception of any material supplied specifically for the purpose of being entered and executed on a computer system, for exclusive use by the purchaser of the work.

Printed on acid-free paper

Springer is part of Springer Science+Business Media (www.springer.com)

## Preface

The histories of European civilization and European forests are closely intertwined. Prior to industrialization wood, fodder and food from forests helped support our rural economies. Since then forest management has continuously adapted to meet the needs of industry and of urbanized society. Today cultural, amenity and environmental objectives inform all forest management, reflecting the concerns and requirements of contemporary society.

In the late twentieth Century lifestyle-related health problems emerged as an important new concern in all developed countries. Should this lead to a new objective for forestry in Europe? Can forests and forest management help in the promotion of healthier lifestyles and improved mental health?

This book summarizes research on these questions. Between 2004 and 2008 some 160 scientists from 24 European countries, with contributors from Asia, Australia, Canada and the United States, worked together in COST Action E39 'Forests, Trees and Human Health and Wellbeing' to promote our understanding of how forests contribute to health in Europe and elsewhere.

Funded by the EU through the European Science Foundation, COST is an intergovernmental framework for European Cooperation in Science and Technology. Its function is to encourage coordination of nationally funded research on a European level so that Europe will continue to hold a strong position in scientific and technical research.

In addition to this book, which has many contributors, the scientists and professionals in COST Action E39 prepared state-of-the-art reports on national research initiatives concerned with forests and health. National health policies and priorities of European countries have been described and the possibilities for forestry to help meet them have been analyzed.

A successful COST action leads to continuing collaboration. Members of the action continue to work together in new primary research and have produced individual and jointly authored peer-reviewed papers in international scientific journals. International co-operation continues between researchers from the USA, Australia and Asia through joint arrangements with IUFRO and ASEM.

Coordinating such a large group of participants has been a major task made possible by the professionalism, commitment and hard work of the COST secretariat in Brussels. Particular thanks are due to Arne Been and Günter Siegel, and most recently to Melae Langbein.

We gratefully acknowledge the help of Cecil Konijnendijk and Chris Baines, who facilitated and edited our efforts towards identifying future research needs. Jasper Schipperijn played an invaluable role in coordinating the final text and liaising with our publishers.

This action not only encompassed many different countries it was also highly interdisciplinary. The leaders of the five working groups in E39 appear here as editors (Part I – Christos Gallis, Part II – Terry Hartig, Part III – Sjerp de Vries, Part IV – Klaus Seeland, Paul Mitchell-Banks/Fabio Sabitano) in cooperation with the Action's chairman and vice-chair. Over the slightly more than 4 years of the Action their leadership and inspiration has helped us navigate the rocks and shallows on which so many multi-disciplinary projects can founder.

Forests and woods occupy about 30% of the land area of Europe and extend from the centers of our towns to the most remote areas. Most forests are accessible at little or no cost. If by encouraging a new way of seeing forests, as a resource for health, we have made a difference in the quality of life of people in Europe then all participants of COST Action E39 have reason to take pride and find encouragement for future work in the field.

Kjell Nilsson Chairman, COST E39 Marcus Sangster Vice-chair, COST E39

## Contents

1	Forests, Trees and Human Health and Well-being: Introduction Kjell Nilsson, Marcus Sangster, and Cecil C. Konijnendijk	1
Par	rt I Forest Products and Environmental Services	
2	Urban Forests and Their Ecosystem Services	
	in Relation to Human Health	23
	Giovanni Sanesi, Christos Gallis, and Hans Dieter Kasperidus	
3	Forest Products with Health-Promoting	
	and Medicinal Properties	41
	Christos Gallis, Mariella Di Stefano, Paraskevi Moutsatsou,	
	Tytti Sarjala, Vesa Virtanen, Bjarne Holmbom, Joseph A. Buhagiar, and Alexandros Katalanos	
4	Negative Aspects and Hazardous Effects	
	of Forest Environment on Human Health	77
	Marek Tomalak, Elio Rossi, Francesco Ferrini, and Paola A. Moro	
Par	t II Physical and Mental Health and the Experience of Nature	
5	Health Benefits of Nature Experience:	
	Psychological, Social and Cultural Processes	127
	Terry Hartig, Agnes E. van den Berg, Caroline M. Hagerhall,	
	Marek Tomalak, Nicole Bauer, Ralf Hansmann, Ann Ojala,	
	Efi Syngollitou, Giuseppe Carrus, Ann van Herzele, Simon Bell,	
	Marie Therese Camilleri Podesta, and Grete Waaseth	
6	Health Benefits of Nature Experience:	
	The Challenge of Linking Practice and Research	169
	Ann Van Herzele, Simon Bell, Terry Hartig,	
	Marie Therese Camilleri Podesta, and Ronald van Zon	

7	Health Benefits of Nature Experience: Implications of Practice for Research Simon Bell, Ronald van Zon, Ann Van Herzele, and Terry Hartig	183	
Part III Promoting Physical Activity			
8	<b>Contributions of Natural Environments to Physical Activity:</b> <b>Theory and Evidence Base</b> Sjerp de Vries, Thomas Claßen, Stella-Maria Eigenheer-Hug, Kalevi Korpela, Jolanda Maas, Richard Mitchell, and Peter Schantz	205	
9	Natural Elements and Physical Activity in Urban Green Space Planning and Design Paolo Semenzato, Tuija Sievänen, Eva Silveirinha de Oliveira, Ana Luisa Soares, and Renate Spaeth	245	
10	Motivating People to Be Physically Active in Green Spaces Amalia Drakou, Rik De Vreese, Tove Lofthus, and Jo Muscat	283	
Part IV Therapeutical and Educational Aspects			
11	Nature-Based Therapeutic Interventions Ulrika K. Stigsdotter, Anna Maria Palsdottir, Ambra Burls, Alessandra Chermaz, Francesco Ferrini, and Patrik Grahn	309	
12	Outdoor Education, Life Long Learning and Skills Development in Woodlands and Green Spaces: The Potential Links to Health and Well-Being Liz O'Brien, Ambra Burls, Peter Bentsen, Inger Hilmo, Kari Holter, Dorothee Haberling, Janez Pirnat, Mikk Sarv, Kristel Vilbaste, and John McLoughlin	343	
Part V Forest and Health Policies and Economics			
13	Measuring Health Benefits of Green Space in Economic Terms Ken Willis and Bob Crabtree	375	
14	Postscript: Landscapes and Health as Representations of Cultural Diversity Klaus Seeland	403	
Inde	Index		