### **ENVIRONMENTAL SOFTWARE SYSTEMS** Environmental Information and Decision Support

### IFIP - The International Federation for Information Processing

IFIP was founded in 1960 under the auspices of UNESCO, following the First World Computer Congress held in Paris the previous year. An umbrella organization for societies working in information processing, IFIP's aim is two-fold: to support information processing within its member countries and to encourage technology transfer to developing nations. As its mission statement clearly states,

IFIP's mission is to be the leading, truly international, apolitical organization which encourages and assists in the development, exploitation and application of information technology for the benefit of all people.

IFIP is a non-profitmaking organization, run almost solely by 2500 volunteers. It operates through a number of technical committees, which organize events and publications. IFIP's events range from an international congress to local seminars, but the most important are:

- The IFIP World Computer Congress, held every second year;
- open conferences;
- working conferences.

The flagship event is the IFIP World Computer Congress, at which both invited and contributed papers are presented. Contributed papers are rigorously refereed and the rejection rate is high.

As with the Congress, participation in the open conferences is open to all and papers may be invited or submitted. Again, submitted papers are stringently refereed.

The working conferences are structured differently. They are usually run by a working group and attendance is small and by invitation only. Their purpose is to create an atmosphere conducive to innovation and development. Refereeing is less rigorous and papers are subjected to extensive group discussion.

Publications arising from IFIP events vary. The papers presented at the IFIP World Computer Congress and at open conferences are published as conference proceedings, while the results of the working conferences are often published as collections of selected and edited papers.

Any national society whose primary activity is in information may apply to become a full member of IFIP, although full membership is restricted to one society per country. Full members are entitled to vote at the annual General Assembly, National societies preferring a less committed involvement may apply for associate or corresponding membership. Associate members enjoy the same benefits as full members, but without voting rights. Corresponding members are not represented in IFIP bodies. Affiliated membership is open to non-national societies, and individual and honorary membership schemes are also offered.

# ENVIRONMENTAL SOFTWARE SYSTEMS

## Environmental Information and Decision Support

IFIP TC5 WG5.11 3<sup>rd</sup> International Symposium on Environmental Software Systems (ISESS'99) August 30–September 2, 1999, Dunedin, New Zealand

Edited by

**Ralf Denzer** Saarland State University for Applied Sciences Germany

**David A. Swayne** University of Guelph Canada

Martin Purvis University of Otago New Zealand

Gerald Schimak Austrian Research Centers Austria



SPRINGER SCIENCE+BUSINESS MEDIA, LLC

#### Library of Congress Cataloging-in-Publication Data

International Symposium on Environmental Software Systems (3<sup>rd</sup>:1999: Dunedin, N.Z.) Environmental software systems : environmental information and decision support ; IFIP TC5 WG5.11, 3<sup>rd</sup> International Symposium on Environmental Software Systems (ISESS'99), August 30–September 2, 1999, Dunedin, New Zealand / edited by Ralf Denzer ... [et al.]. p. cm. — (International Federation for Information Processing ; 39) Includes bibliographical references.

ISBN 978-1-4757-5158-1 ISBN 978-0-387-35503-0 (eBook) DOI 10.1007/978-0-387-35503-0

1. Environmental sciences—Data processing—Congresses. 2. Information storage and retrieval systems—Environmental policy—Congresses. 3. Information and retrieval systems—Environmental protection—Congresses. I. Denzer, R. (Ralf) II. Title. III. International Federation for Information Processing (Series); 39.

GE45.D37 I62 1999 363.7'00285-dc21

00-025367

**Copyright** © 2000 by Springer Science+Business Media New York Originally published by Kluwer Academic Publishers in 2000

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, mechanical, photo-copying, recording, or otherwise, without the prior written permission of the publisher, Springer Science+Business Media, LLC.

Printed on acid-free paper.

### **Table of Contents**

PART I	ENVIROMATICS INTRODUCTION1	
Environmental Information and Environmental Decision Support		
PART II	ENVIRONMENTAL ISSUES7	
<ul> <li>Will "environmental" be replaced by "extrasensory"?</li></ul>		
PART III	ENVIRONMENTAL INFORMATION SYSTEMS TOOLS AND TECHNIOUES	
Self-Organising Maps for the Classification and Diagnosis of River Quality from Biological and Environmental Data		
Case Libraries and Information Theoretic Case Matching for Soil and Water Resources Management		
M. Purvis et al. Predicting Patterns in Spatial Ecology Using Neural Networks: Modelling Colonisation of New Zealand Fur Seals		
Patterns of Use of Computer Support for Environmental Accreditation in Rural New Zealand		
<ul> <li>B-Spline Surface Modelling with Adaptive de Boor Grids in Hydroinformatics</li></ul>		
C. Maul The Use of U C. Maul	ML for Model Design and Scientific Software Development95	
PART IV	ENVIRONMENTAL INFORMATION SYSTEMS IMPLEMENTATIONS101	
Integration o Software: <i>R. Argent</i> An EIS Calle <i>R. Güttler</i>	f Remote Data Into Water Resources Simulation Now or Never?	

A Computer-Based Emission Inventory	
G. Schimak et al. Soil Quality Indicators on the World Wide Web	131
BUBI: An interactive Water Utility Benchmarking Website	142
Treaching EIS Development - The EU Canada Curriculum on Environmental Informatics	152
Broad-Scale Land Condition Monitoring using Landsat TM and DEM-Derived Data F. Evans et al.	157
PART V ENVIRONMENTAL DECISION SUPPORT SYSTEMS	169
WWW Technology based Hydrological Information and Decision Support System V. Keskisarja et al.	171
Lessons from an Environmental Information System Developed to Select a Radioactive Waste Disposal Site	177
Water Quality Model Integration in a Decision Support System	187
Integrated Assessments of River Health using Decision Support Software W. Young et al.	195
Assessment of Ecological Responses to Environmental Flow Regimes using a Decision Support System Framework W Booty et al	204
Which Buttons and Bars? An Exercise in Community Participation in Decision Support Software Development	213
Integration of Environmental Management into Production Organization and Information Systems	221
A Decision Support System for Real-Time Management of Water Quality in the San Joaquin River, California N. Quinn	232
PART VI SPECIAL TOPICS	247
Environmental Software Systems in Water Resources: Problems and Approaches Workshop Report	249
K. Argent Environmental Decision Support Systems: Exactly What Are They? Workshop Report. D. Swayne et al.	259