MODELLING AND SIMULATION SOCIETY OF AUSTRALIA AND NEW ZEALAND INC.

MODSIM 2001

International Congress on Modelling and Simulation

The Australian National University
Canberra, Australia

10-13 December 2001

Integrating Models for Natural Resources Management across Disciplines, Issues and Scales

Proceedings

Volume 2: Natural Systems (Part Two)

Editors: ***Fereidoun Ghassemi, Peter Whetton, Richard Little and Mark Littleboy***

MODELLING AND SIMULATION SOCIETY OF AUSTRALIA AND NEW ZEALAND INC.

MODSIM 2001

International Congress on Modelling and Simulation

The Australian National University
Canberra, Australia

10-13 December 2001

Proceedings
Volume 2: Natural Systems (Part Two)

Editors: Fereidoun Ghassemi, Peter Whetton, Richard Little and Mark Littleboy

Editorial Board: Allen, D., Argent, R., Bidwell, V., Bond, W., Bormans, M., Braddock, R.D., Brooker, P.I., Chikumbo, O., Caccetta, L., Cuddy, S., Everingham, Y., Finnigan, J., Gallant, J., Ghassemi, F., Grayson, R., Gippel, C., Hare, M., Howden, M., Jakeman, A.J., Lim, C., Lim, L.K., Little, R., Littleboy, M., Maier, H., McAleer, M., McCarthy, M., McKenzie, C., Mole, N., Nakanishi, T., Newham, L.T.H., Oglesby, R.J., Oxley, L., Perez, P., Post, D., Rahman, J., Robinson, J., Saupin, M.G., Scoccimarro, M., Sequeira, J., Singh, K.P., Sivapalan, M., Soroczynski, T., Verhoeven, P., Vertessy, R., Watkins, C., Weber, R., White, D., Whetton, P., Woods, R., Young, W., Zhu, X. and Zoppou, C.

All papers in this Volume were refereed

Major Sponsors

IMACS International Association for Mathematics and Computers in Simulation

JSST Japan Society for Simulation Technology

SCS

CRES

Environmental Modelling & Software

Copyright © 2001 The Modelling and Simulation Society of Australia and New Zealand Inc.
All rights reserved.

ISBN 0 86740 525 2

Published by the Modelling and Simulation Society of Australia and New Zealand Inc.
President: *Anthony Jakeman,* Centre for Resource and Environmental Studies,
Institute of Advanced Studies, The Australian National University, Canberra, ACT 0200, Australia

Ph: + 61 2 6125 0652
Fax: + 61 2 6125 0757
Email: tony@cres.anu.edu.au

Responsibility for the contents of the papers published in these Proceedings rests upon the authors and not the Modelling and Simulation Society of Australia and New Zealand Inc.

NIWA LIBRARY
18 JAN 2002
PO BOX 8602
CHRISTCHURCH
127219-2001

Table of Contents

Volume 1: Natural Systems (Part One)

Keynote Papers

H.P. Possingham
Models, Problems and Algorithms: Perceptions about their Application to Conservation Biology? 1

C.W.J. Granger
Specification of Linear and Nonlinear Models Methodological Implications 7

A.L. Heathwaite
Modelling Nutrient Export from Agricultural Land: Approaches, Scales and End-Users 17

A. Harding
New Advances in Microsimulation Modelling: Improving Social and Economic Policy 25

A.J. Jakeman and R.A. Letcher
Integrated Assessment and Information Systems for Catchment Management 31

F. Bousquet
Multi-Agent Simulations and Ecosystem Management 43

Modelling of Hydrologic Systems
(Convener: D. Post)

Part One: Hydrological modelling
(Convener: D. Post)

J.K. Gilmour and B.F.W. Croke
Prediction of Streamflow to Assess Trade-offs from Water Policy Rules and Land Use Intensification 53

W.S. Merritt, B.F.W. Croke, A.J. Jakeman and P. Perez
Predicting Flows in Ungauged Catchments and Catchments Subject to Forest Cover Changes 59

T. G. Chapman
Modelling Stream Recession Flows 65

D.A. Post, A.E. Henderson, L.K. Stewart, C.H. Roth and J. Reghenzani
Simulating the Impact of Changes in Drainage Design on Hydrologic Response using a One-dimensional Flow-routing Model 71

B. Sivakumar
Streamflow Dynamics in the Western United States: A Nonlinear Dynamical Analysis 77

P.J. Dye and B.F.W. Croke
Evaluation of Streamflow Predictions by the IHACRES Rainfall-Runoff Model in Two South African Catchments 83

H. Koivusalo, T. Kokkonen, T. Karvonen, B.F.W. Croke and A.J. Jakeman
Accounting for Response Differences in Runoff Events of Different Magnitudes 89

J.F. Costelloe, R.B. Grayson, R.M. Argent and T.A. McMahon
Modelling Flow Routing and Transmission Loss Processes in Arid Zone Floodplain Rivers 95

P. Krause and W.-A. Flügel
J2000 - A Modelling System for Physically Based Simulation of Hydrological Processes in Large Catchments 101

M. Ilahee, A. Rahman and W.C. Boughton
Probability-distributed Initial Losses for Flood Estimation in Queensland 107

A. Rahman and A. Goonetilleke
Effects of Nonlinearity in Storage-discharge Relationship on Design Flood Estimates 113

A. Rahman
A Computer Program to Determine Derived Flood Frequency Curves 119

O.P. Droop and W.C. Boughton
Distributed Modelling of Catchment Surface Hydrology 125

S.G. McLin, M.E. Van Eeckhout, E.P. Springer and L.J. Lane
A Characterization Methodology for Post-Wildfire Flood Hazard Assessments 131

S. Liu, X. Mo, L.M. Leslie, M. Speer, R. Bunker and W. Zhao
Another Look at the Xinanjiang Model: From Theory to Practice 137

G. Capkun, A. C. Davison and A. Musy
Local Quasilikelihood in Catchment Modification Detection 143

Part Two: Water quality and sediment transport modelling (Conveners: D. Post and L.T.H. Newham)

L.T.H. Newham, I.P. Prosser, J.P. Norton, B.F.W. Croke and A.J. Jakeman
Techniques for Assessing the Performance of a Landscape-Based Sediment Source and Transport Model: Sensitivity Trials and Physical Methods 149

L.J. Lane, P.A. Lawrence, M.R. Kidwell and L.R. Levick
Hydrologic Modelling and Monitoring for Sediment Budgets on Small Rangeland Watersheds 155

F. C. Bell
An Appropriate Streamflow-Sediment-Pollutant Model for use by Non-specialist Landcare Groups 161

B. Sivakumar and A.W. Jayawardena
Understanding Sediment Transport Dynamics: Moving Towards a New Approach 167

A.L. Cogle, L.J. Lane and L. Basher
Testing the Hillslope Erosion Model for Application in India, New Zealand and Australia 173

D.E. Hall and W.J. Elliot
Interfacing Soil Erosion Models for the World Wide Web 179

P.G. Whitehead, H. Prior and B.J. Cosby
Modelling Bioremediation of Acid Mine Drainage in Constructed Ecosystems 185

L.R. Burton
Water Quality Functioning of the Mersey Basin, England: Historic Perspectives 191

B. Baginska, W. Milne-Home and P.S. Cornish
Modelling Nutrient Transport in Currency Creek, NSW with AnnAGNPS and PEST 197

S. Kralisch, M. Fink, W.-A. Flügel and C. Beckstein
Using Neural Network Techniques to Optimize Agricultural Land Management for Minimisation of Nitrogen Leaching 203

Md. R. Karim, M. Sekine and M. Ukita
Assessment of the Occurrence of Anoxic and Hypoxic Water Due to Coastal Construction in an Enclosed Water Area 209

J. Md. Abdul Hye and, S. Jahan
Modelling Response to Flow and Sediment Regimes Changes due to Construction of a Bridge Upstream of an Existing Bridge 215

C.T. Hoanh, T.P. Tuong, S.P. Kam, N.D. Phong, N.V. Ngoc and E. Lehmann
Using GIS-Linked Hydraulic Model to Manage Confilicting Demands on Water Quality for Shrimp and Rice Production in the Mekong River Delta, Vietnam 221

L.C. Heath, S. Beavis and I. White
Hydrological Modelling of Coastal Catchments with Acid Sulfate Soils 227

A.I.J.M. van Dijk and L.A. Bruijnzeel
Modelling Runoff and Soil Loss from Bench Terraced Hillslopes in the Volcanic Uplands of West Java, Indonesia 233

H.M. Knoflacher
Dealing with Problems in Surface Water Quality Management in Upper Austria 239

C. He
Integration of GIS and Simulation Model for Watershed Management 245

S. El-Kafafi
TQM: An Optimum Model for Water Utilities Management? 251

M.M. Zahid Ahmed, Md.Mahboob-ul-Kabir and J. Md. Abdul Hye
Modelling of Heat Dispersion of Hot Water Discharge of the Cooling Plant of the Meghnaghat Power Plant 257

Part Three: Modelling rainfall, temperature and evaporation (Conveners: D. Post and Y. Everingham)

J.E. Ruiz, I. Cordery and A. Sharma
An Empirical Method for Forecasting Low Rainfall Using the Southern Oscillation Index (SOI) and Dipole Model Index (DMI) 263

S. Chumchean and A. Sharma
Comparison of Calibration Algorithms for Estimation of Rainfall Using Weather Radar 269

T.I. Harrold, A. Sharma and S. Sheather
Predictor Selection for a Daily Rainfall Occurrence Model using Partial Informational Correlation 275

T.I. Harrold, A. Sharma and S. Sheather
A Nonparametric Model for Daily Rainfall Occurrence that Reproduces Long-term Variability 281

T.G. Chapman
Refinements to the Srikanthan–McMahon Stochastic Model for Daily Rainfall 287

T.G. Chapman
Estimation of Daily Potential Evaporation for Input to Rainfall-Runoff Models 293

Part Four: Modelling lakes and reservoirs (Conveners: D. Post and M. Bormans)

A. Badamchizadeh, S.M. Hashemiparast, M. Alaghehmandan and O. Titidezh
Mathematical Modelling for Optimal Operation of Integrated Multireservoir Systems: New Approach 299

A.J. Bath
Role of Hydrodynamic and Water Quality Reservoir Modelling in Water Resource Decision Support in South Africa 305

D.M. Lewis, J.P. Antenucci, J.D. Brookes and M.F. Lambert
Numerical Simulation of Surface Mixers used for Destratification of Reservoirs 311

Scale Problems in Hydrologic Modelling and Measurement
(Conveners: M. Sivapalan, R. Grayson and R. Woods)

S.P. Charles and B.C. Bates (Invited)
Statistical Downscaling: Linking Climatic Processes Between Spatial Scales 317

A.W. Seed (Invited)
Theory and Measurements of the Distribution of Rainfall in Space and Time 323

B. Sivakumar
Fractal Analysis for Rainfall Characterization: Some Remarks and Possible Future Directions 329

M. Menabde, M. Sivapalan and A. Seed
Generalised Scaling, Extreme Rainfall and Areal Reduction Factors 335

C.H. Luce and D.G. Tarboton (Invited)
Modeling Snowmelt Over an Area: Modeling Subgrid Scale Heterogeneity in Distributed Model Elements 341

A.W. Western, R.B. Grayson and G. Blöschl (Invited)
Spatial Scaling of Soil Moisture: A Review and Some Recent Results 347

D.J. Wilson, A.W. Western, R.B. Grayson, Y. Shao, R.A. Woods and R.K. Munro
Application of ALSIS to the Hydrological Modelling of New Zealand's Mahurangi Catchment; Comparisons of Temporal Distribution of Soil Moisture 353

T.R. Green, R.H. Erskine, A. Martinez, M.R. Murphy, L.R. Ahuja, J.D. Salas and J. A. Ramirez
Spatial Crop Yield and Soil Water Content: Measurement, Scaling and Topographic Analyses 359

D.D. Kandel, A.W. Western, R.B. Grayson and H.N. Turral
Testing Current Generation Soil Erosion Models at Two-minute and Daily Scales Against Plot Scale Data from a Mid-hill Catchment of Nepal 365

R.A. Woods (Invited)
Scale, Complexity and Variability in Catchment Hydrology: The Need for Classification 371

G.B. Chirico, R.B. Grayson, A.W. Western, R. Woods and A. Seed
Sensitivity of Simulated Catchment Response to the Spatial Resolution of Rainfall 377

N.R. Viney and M. Sivapalan
Scaling of Hydrologic Conceptualisations: Approaches to Handling Subgrid Variability 383

K. Bongartz and W.-A. Flügel
Applying Different Concepts of Hydrological Response Units (HRUs) in Three Nested Mesoscale Catchments for Distributed Hydrological Modelling 389

A. Bourgeat
Modelling of Flow Through Fractured Porous Media 395

W.S. Verwoerd and G.D. Kulasiri
The Effects of Variable Flow Velocity on Contaminant Dispersion in Porous Flow 401

W.L. Berendrecht, A.W. Heemink, F.C. van Geer and J.C. Gehrels
Modelling Interval of Transfer Function-Noise Models in Groundwater Hydrology 407

P.T.M. Vermeulen, A.W. Heemink and C.B.M. Testroet
Model Reduction in Groundwater Hydrology 413

Modelling the Water Cycle in Forests
(Convener: R. Vertessy)

F.X. Dunin, D.A. White, T.J. Hatton and T. Ellis
Evapotranspiration Characteristics of Woody Communities, Natural and Exotic, Across Southern Australia 419

R.P. Silberstein, M. Sivapalan, N.R. Viney, A. Held and T.J. Hatton
Parameterising the Evapotranspiration and Energy Balance of a Natural Eucalypt Forest 425

K. Tamai
Modelling and Annual Estimation of Canopy Interception, Transpiration and Evaporation from the Forest Floor in a Deciduous Secondary Forest in Western Japan 431

J.D. Morris and J.J. Collopy
Validating Plantation Water Use Predictions from the 3PG Forest Growth Model 437

C.C. Daamen, P.I. Hill, S.C. Munday, R.J. Nathan and P.M. Cornish
Assessment of the Impact of Forest Logging on Water Quantity in the Otway Ranges 443

S. Munday, R. Nathan, C. Daamen and P. Cornish
Development and Application of an Operational Model to Assess the Impact of Plantation Forestry on Water Yields 449

D.L. McJannet, R.P. Silberstein and R.A. Vertessy
Predicting the Water Use and Growth of Plantations on Hillslopes: The Impact of Planting Design 455

F.G.R. Watson, R.B. Grayson, R.A. Vertessy, M.C. Peel and L.L. Pierce (Invited)
Evolution of a Hillslope Hydrologic Model 461

J. Helmschort and W.-A. Flügel
Landuse Characterisation and Change Detection Analysis for Hydrological Model Parameterisation of Large Scale Afforested Areas Using Remote Sensing 469

Simulating the Unsaturated Zone
(Convener: W. Bond)

R.E. White, B. Christy, A.M. Ridley and L.K. Heng
Estimating Deep Drainage Under Pasture 475

P.R. Ward
Comparative Modelling of Water Leakage Under a Lucerne or Annual Pasture. 1. Role of Initial Soil Water Content and Frequency of Rainfall Data 481

P.R. Ward
Comparative Modelling of Water Leakage Under a Lucerne or Annual Pasture. 2. Phase Rotations in Two Environments 487

S. Asseng, P.J. Dolling, J.S. Fisher and I.R.P. Fillery
Nitrate Leaching under Wheat Crops in the Mediterranean-type Environment of Western Australia 493

D.W. Rassam and F.J. Cook
Modelling the Transport of SO_4^{2-} Ions in Acid Sulphate Soils 499

F. Gandola, G. Sander and R.D. Braddock
One-dimensional Transient Water and Solute Transport in Soils 505

V.J. Bidwell
An Operational Model for Managing the Effect of Land Treatment of Wastewater on Groundwater Quality 511

C.J. Matthews, R.D. Braddock and G.C. Sander
Modelling Water Flow through a Multi-layered Cover Liner for a Waste Dump 517

Table of Contents

Volume 2: Natural Systems (Part Two)

Groundwater Flow and Solute Transport Modelling

(Conveners: F. Ghassemi and V. Bidwell)

H. Middlemis, N.P. Merrick, J.B. Ross and K.L. Rozlapa
Groundwater Modelling Guidelines for Australia: An Overview 523

N.P. Merrick, H. Middlemis and J.B. Ross
Groundwater Modelling Guidelines for Australia: The Review Process 529

W.R. Dawes, M. Gilfedder, G.R. Walker and W.R. Evans
Biophysical Modelling of Catchment-Scale Surface Water and Groundwater Response to Land-use Change 535

R.M. Lampayan, F. Ghassemi and I. White
Groundwater Modelling of an Irrigated Area of the Lachlan Catchment for Salinity Management 541

R. Ferdowsian and D.J. Pannell
Explaining Trends in Groundwater Depths: Distinguishing Between Atypical Rainfall Event, Time Trends, and the Impacts of Treatments 549

B.F.W. Croke, W.R. Evans, S. Yu. Schreider and C. Buller
Recharge Estimation for Jerrabomberra Creek Catchment, the Australian Capital Territory 555

J.L. Ticehurst, H.P. Cresswell, N.J. McKenzie and A.J. Jakeman
Using Simulation to Understand the Occurrence of Subsurface Lateral Flow in South-East Australia 561

I. White, B.C.T. Macdonald and M.D. Melville
Modelling Shallow Groundwater in Soft, Sulfidic, Coastal Sediments 567

J.F. Punthakey and R.M. Williams
Optimising Landuse for Management of Shallow Watertables: A Test Case for the Box Hill Catchment 573

J.F. Punthakey and S. Joseph
Optimising the Location of Pump Sites for Improved Management of Groundwater Pumping Schemes 579

C.E. Hayler and R. Willis
A Conceptual 3-D Finite-Element Model of Groundwater Flow and Saltwater Intrusion in the Elk Aquifer System, California 585

N. Su, Z.G. Yu, V. Anh and K. Bajracharya
Anthropogenically-Induced Fractal Tidal Waves in Coastal Aquifers at Bundaberg, Queensland, Australia 591

D. Frydrych, J. Maryska and J. Novak
Modelling of the Contaminants Transfer Between two Aquifers 597

Simulation of Salinity Processes and Land Degradation

(Convener: M. Littleboy)

W.A. Flügel, M. Märker and G. Rodolfi
Erosion Response Units (ERU): A Regional Erosion Concept for Sustainable Integrated Catchment Management and its Application in a Semi-arid Catchment in Swaziland, Southern Africa 603

R. Beecham and P. Arranz
Data Driven Model Development for Estimating Salt Export from Irrigation Areas 609

R. Gilmore, G. Beale, M. Simons and A. Davidson
Implementation of an Integrated Quantity and Quality Model for In-Stream Salinity in the Hunter Valley, NSW, Australia 615

R.M. Argent, R.J. George and W. Dawes
Flowtube: A Groundwater Calculator for Salinity Estimation 621

G.K. Summerell
Exploring Mechanisms of Salt Delivery to Stream Within the Kyeamba Valley Catchment New South Wales Australia 627

A.J. Ringrose-Voase, R.R. Young, N.I. Huth, Z. Paydar, A.L. Bernardi, R.G. Banks, R.M. Johnston, H.P. Cresswell, B.A. Keating, J.F. Scott, J.F. Holland and I. Daniells
A Tool to Aid Development of Land Use Strategies at a Catchment Scale to Reduce Dryland Salinity Risk 633

M. Littleboy, G. Piscopo, R. Beecham, P. Barnett and L. Newham
Determining Depth to Watertable for the Eastern Murray-Darling Basin, Australia 639

Climate Change Impacts
(Convener: P. Whetton)

P. H. Whetton and K.J. Hennessy
Climate Change Projections for the Australian Region 647

S.M. Howden and S. Crimp
Effect of Climate and Climate Change on Electricity Demand in Australia 655

S.M. Howden and P.J. Reyenga
Global Change Impacts on Wheat Production Along an Environmental Gradient in New South Wales 661

C.M. Page and R.N. Jones
OzClim: The Development of a Climate Scenario Generator for Australia 667

R.N. Jones and C.M. Page
Assessing the Risk of Climate Change on the Water Resources of the Macquarie River Catchment 673

P.J. Lawrence
Developing a Climate Modelling Framework to Investigate the Climate Impacts of Historical Australian Land Cover Changes 679

G.Y. Abawi, S.C. Dutta, D. McClymont, N.C. Treloar, J. Ritchie and T.R. Harris
A Decision Support Tool for Managing the Impact of Climate Variability on Water Resources 685

J.P. Evans and R.B. Smith
Modelling the Climate of South West Asia 691

J.P. Evans
Prediction of Streamflow by Regional Climate Models 697

C.P. Tung, H.H. Pan and T.Y. Lee
Modelling Climate Change Impacts on Stream Temperature for Taiwan Salmon's Habitat 703

P. Kuneepong, S. Kongton, V. Wangwacharakul and S. Sumdin
Modelling Economic Crop Yield and Climate Change in Thailand 709

J. Md. Abdul Hye and Md. Mahboob-ul-Kabir
Modelling Approach in Climate Impact Assessment for the Bangladesh Coastal Area 715

Carbon Cycle Modelling
(Convener: M. Howden)

A. Parshotam
Modelling Recalcitrant Soil Organic Carbon, the 'Holy Grail' in Soil Science 721

A. Parshotam
Inert Organic Matter (IOM) in the Rothamsted Soil-Carbon Turnover Model: Analytical Solutions 727

K. Ranatunga, M.J. Hill, M.E. Probert and R.C. Dalal
Comparative Application of APSIM, RothC and Century to Predict Soil Carbon Dynamics 733

M.J. Hill, R. Braaten and G. McKeon
A Spatial Tool for Analysis of the Effects of Grazing Land Management Scenarios on Carbon Sequestration in Australian Rangelands 739

M.J. Hill, R. Braaten, and H. Ainslie
Management Effects on Carbon Sequestration in Pasture and Cropping Systems in Northern NSW 745

M.M. Barson, L.A. Randall and S.C. Barry
Modelling Greenhouse Gas Emissions from Land Cover Change: Linking Continental Data With Point/Patch Models 751

Ecological Modelling of Fisheries and Marine Resources
(Convener: R. Little)

J. Scandol
What is the Role of Computer Simulation in the Ecologically Sustainable Development of Australian Fisheries? 757

D.B. Lowe, F. Poldy, B.D. Foran and R.E. Kearney
Exploring Options for the Long Term Future of Australia's Fisheries Using a Scenario Modelling Approach 763

I.R. Ball and H.P. Possingham
The Design of Marine Protected Areas: Adapting Terrestrial Techniques 769

I.R. Ball and A. Constable
Virtual Fish, Virtual Fisheries and Virtual Fishery Management: An Introduction to Fish Heaven 775

K. Okuguchi and F. Szidarovszky
A Dynamic Model of International Fishing 781

L.R. Little, S. Kuikka, A.E. Punt, F. Pantus, C.R. Davies and B.D. Mapstone
Information Flow among Fishing Vessels Modelled Using a Bayesian Network 787

J.R. Day, T. Farrell, J. Diggle, P. Donkers and N. J. Bax
Carp Fishdown - Can we Catch the Last Female? 795

M. Craine, Y.W. Cheng, N. Caputi and C. Chubb
Improving Catch Predictions for Management of the Western Rock Lobster (*Panulirus cygnus*) Fishery Using Time Series Analysis 801

M. Sekine, J. Yang, M. Ukita and T. Imai
A Fish Habitat Evaluation Model Based on the Behavioral Mode 807

H. Clyne and J. Kennedy
A Simulation of Interactions Between the Critically Endangered North Atlantic Right Whale *Eubalaena glacialis* and Shipping using Dynamically Variable Temporal Granularity to Minimise Run Time 813

Methods for Evaluating Probabilistic Ecological Models
(Convener: M. McCarthy)

M.R. Lethbridge, H.P. Possingham and A.J. Tyre
A Spatially Explicit Population Viability Model using GIS 819

A.J. Tyre, B. Tenhumberg, D. Niejalke and H.P. Possingham
Predicting Risk to Biodiversity as a Function of Aquifer Pressure in GAB Mound Springs 825

S.A. Field, A.J. Tyre, S.C. Ball and H.P. Possingham
Observer Error and Statistical Power: Evaluating Survey Reliability for Conservation Management 831

L.T. Cetin, F. Recknagel and R. Boumans
WETMOD: A Generic Wetland Ecosystem Model for the Simulation of Floodplain Wetlands at the Lower River Murray (South Australia) 837

P.K. Pollett
Diffusion Approximations for Ecological Models 843

B. Wintle, M.A. McCarthy and R.P. Kavanagh
Using Bayesian Model Averaging to Better Represent Uncertainty in Predictions of Ecological Models 849

Riverine Biota and Habitat: Modelling the Responses to Flow and Sediment Regime Changes
(Convener: W. Young)

W.J. Young, R.W. Ogden, I.P. Prosser and A.O. Hughes
Predicting River Channel Type from Flow and Sediment Regimes Attributes 855

I.P. Prosser, W.J. Young, P. Rustomji, A.O. Hughes and C.J. Moran
A Model of River Sediment Budgets as an Element of River Health Assessment 861

A.J. Wade, H.P. Jarvie, C. Neal, H. Prior, P.G. Whitehead and P.J. Johnes
Nutrient Monitoring, Simulation and Management within a Major Lowland UK River System: The Kennet 867

Statistics and Models for Environmental Flow Assessment
(Convener: C. Gippel)

C. Gippel
Hydrological Analyses for Environmental Flow Assessment 873

M.J. Stewardson, J.D. Fenton and P. Cottingham
Applying the Flow Events Method in an Environmental Flow Study of the Broken River 881

E.J. McLean and J.B. Hinwood
Criteria for Selecting Environmental Flows in Estuaries with Application to the Snowy River Estuary 887

W.L. Peirson, R. Nittim, M.J. Chadwick and K.A. Bishop
Impact of Flow Reductions on Australian Estuarine Habitats 893

Atmospheric Flow and Dispersion
(Convener: N. Mole)

M. Du, S. Kawashima, K. Matsuo, S. Yonemura and S. Inoue
Simulation of the Effect of a Cornfield on Wind and on Pollen Deposition 899

R.J. Munro, P.C. Chatwin and N. Mole
Models for Concentration Fluctuations in Relative and Absolute Dispersion 905

C.W. Anderson, N. Mole, S. Nadarajah and T. Rydén
Modelling the Occurrence of Large Concentration Values in Pollutant Plumes 911

Terrain Analysis and Spatial Processes
(Convener: J. Gallant)

H. Lu, J.C. Gallant, I.P. Prosser, C. Moran and G. Priestley
Continental Scale Sheet and Rill Erosion Modelling: Incorporating Monthly Soil Loss Distribution 917

J.C. Gallant
Terrain Scaling for Continental Scale Soil Erosion Modelling 925

G.B. Chirico, R.B. Grayson, A. Longobardi, P. Villani and A.W. Western
Shallow Landslide Hazard Mapping Based on a Quasi-Dynamic Wetness Index 931

I.P. Prosser, J. Gallant and P. Rustomji
Characterising Sediment Transport Capacity on Hillslopes Using Hypsometric Functions 937

P.A. Hancock, M.F. Hutchinson, S.M. Turton and A.L. Lewis
Thin Plate Smoothing Spline Interpolation of Long Term Monthly Mean Rainfall for the Wet Tropics Region of North-Eastern Australia 943

D. Pullar and B. Fentie
Extending Map Algebra for Dynamic Spatial Models: A Hydrological Modelling Example 949

J.C. Gallant, N. Allwood and R. Beecham
Automated Slope Classification Using Digital Elevation Models 955

Bushfire Modelling
(Convener: R. Weber)

G.D. Cook and A.C. Liedloff
Simulating Fire Ecology and Fire Management in North Australia 961

M.P. Plucinski and W.R. Catchpole
Predicting Ignition Thresholds in Litter Layers 967

R.O. Weber, G.N. Mercer and H.S. Sidhu
Instability of Travelling Waves in a Complex System Modelling Fire Spread 973

V.A. Perminov
Mathematical Modeling of Forest Fire Spread Initiation 977

Earth System Modelling
(Convener: J. Finnigan)

R.A. Cropp, A.J. Gabric and R.D. Braddock
Fitting a Deterministic PZN Model to Remote-sensed Chlorophyll Data using a Genetic Algorithm and Self-Organizing Map 983

C.E. Williams and E.P. Theus
It's About TIMED 989

R.N. Thwaites and M.J. Grundy
Conceptual and Digital Terrain Modelling of Regolith-Catenary Units for Resource Assessment 995

Emission Control Modelling
(Convener: R.D. Braddock)

B.J. Mullins, R.D. Braddock and I.E. Agranovski
Prediction and Minimisation of NO_x Emissions from Industrial Furnaces Using PCA 1001

J.M. Whitcombe, R.D. Braddock and I.E. Agranovski
Identification of Operating Parameters Critical to the Reduction of Particulate Emissions from Oil Refineries 1007

P. Kathirgamanathan, R. McKibbin and R.I. McLachlan
Source Term Estimation of Pollution from an Instantaneous Point Source 1013

V. Surapipith, T.D. Davies and T.D. Jickells
Dispersion Modelling of Cross-Border Air Pollution Transportation in the European Black Triangle 1019

N.P. Kristensen and R.D. Braddock
A Model for the Inertial Capture of Particulates in a Bubbling Filter 1025

Table of Contents

Volume 3: Socioeconomic Systems

Incorporating Ecological Economics into the Management of Natural Resources
(Convener: J. Robinson)

M. Chaloupka, J. Robinson and J. Asafu-Adjaye
Addressing Water Quality Problems Through the Integration of Ecological and Economic Modelling 1031

J.B. Hinwood and E.J. McLean
A Conceptual Framework for a Physical – Economic Model of Tidal Inlet Flooding 1037

J. Robinson, G. Thomas and J. Asafu-Adjaye
Improving the Reliability of Environmental Value Transfer 1043

J.L. de Kok and H.G. Wind
Integrating Natural and Social Science Knowledge in a Decision Support System for Coastal Zone Management 1049

D. Oglethorpe and J. Smith
An Ecological-Economic Model for Agri-Environmental Policy Decision Support 1055

R. McAllister, R. Beard and J. Asafu-Adjaya
Deforestation and Illegal Logging in Developing South-East Asian Countries 1061

Energy Economics and Greenhouse Gas Mitigation
(Conveners: M.G. Saupin and C. Watkins)

C.A. Baloi, J.A. Belward and M. Bulmer
Short Term Forecast of the Load Demand in Victoria 1065

C. Watkins
Carbon Emissions Markets: A Simulation Approach 1071

A. Korobeinikov, P. Read, J. Lermit, A. Parshotam and P. Kathirgamanathan
Market Dynamics of Allocating Land to Biofuel and Forest Sinks 1079

K. Fatai, L. Oxley and F. Scrimgeour
Modelling and Forecasting Demand for Electricity in New Zealand: A Comparison of Two Approaches 1085

K. Fatai, L. Oxley and F. Scrimgeour
Modelling the Causal Relationship Between Energy Consumption and GDP in New Zealand, Australia, India, Indonesia, the Philippines and Thailand 1091

Multi-Criteria Modelling in Natural Resource Management
(Convener: X. Zhu)

T.J. Venn and S.R. Harrison
Appropriate Multi-Criteria Decision Support Tools for Aiding Indigenous Decision-Makers in Aurukun Shire, Cape York Peninsula 1097

X. Zhu, D. Walker and C. Mayocchi
Integrating Multi-Criteria Modelling and GIS for Sugarcane Land Allocation 1103

NIWA LIBRARY
P.O. Box 8602
Riccarton
Christchurch

T. Tumaneng-Diete, B. Waring and C. Glen
Community Values for Public Land Use: The Case of Glen Rock Area, Queensland 1109

Agent-Based Modelling in Environmental Management
(Conveners: M. Hare and P. Perez)

M. Hare, P. Deadman and K. Lim
Towards a Taxonomy of Agent-Based Simulation Models in Environmental Management 1115

O. Barreteau and F. Bousquet
From a Conceptual Model to its Artifacts: Building on Experiments using the SHADOC Model..... 1123

C. Le Page, M. Etienne and F. Bousquet
Using Dynamics Spatial Entities in Agent-Based Simulations 1129

W.J. Chivers, R.D. Herbert and S. Keen
A Comparison of Individual-Based and Dynamic Modelling using Bullant 1135

N. Becu, P. Perez, A. Walker and O. Barreteau
CatchScape: An Integrated Multi-Agent Model for Simulating Water Management at the Catchment Scale, A Northern Thailand Case Study 1141

H.S. Otter and A. van der Veen
ABLOoM: Agent-Based Modelling of Location Behaviour..... 1147

M. Le Bars and J.M. Attonaty
The Sharing of Water Between Different Users: A Multi-Agent System to Improve the Negotiation..... 1153

M. Kuper, C. Mullon, F. Bousquet and Y. Poncet
Natural Resource Management using Integrated Modelling: The Case of the Niger River Inland Delta..... 1159

Modelling to Support Decisions on Integrated Catchment Management: A Transition to Sustainable Landscapes
(Convener: M. Scoccimarro)

S. Khan, C. Stubbs and D. McLaughlin
A Regional Hydrologic Economic Framework for Investigating Sustainable Irrigated Landscape Futures 1165

R.A. Letcher
A Tool for the Analysis of Policy Options for Off-Allocation Water in the Namoi River Catchment..... 1171

M. Dunlop, B.D. Foran and F. Poldy
Exploring Solutions to Australia's Long-term Land and Water Problems Using Scenario Modelling..... 1177

C. Giupponi, J. Mysiak, A. Fassio and V. Cogan
MULINO: Multi-sectoral, Integrated and Operational Decision Support System for Sustainable Use of Water Resources at the Catchment Scale..... 1183

S. Gameda, T. Huffman, J. Yang, B. Junkins and R. Gill
Integration of Economic and Biophysical Models for Assessing Agricultural Policy Impacts on Water Quality at a Regional Scale 1189

N. Hall and W. Watson
A Conceptual Modelling Framework for Integrated Catchment Management of Salinity 1195

N. Hall, R. Greiner and S. Yongvanit
Modelling Salinity Management at Farm and Catchment Scales in NSW and Thailand..... 1201

S.Yu. Schreider, P.E. Weinmann, G.P. Codner and H.M. Malano
Integrated Modelling System for Sustainable Water Allocation Planning 1207

A. Changsirivathanathamrong, S. Moore and K. Linard
Integrating System Dynamics with Life Cycle Assessment: A Framework for Improved Policy Formulation and Analysis 1213

I. Moffatt
The Role of Orientors in Modelling Sustainable Development 1219

R. Greiner and X. Zhu
Systems Framework for Integrated Regional-Scale R&D Projects 1225

Econometric Modelling
(Convener: M. McAleer)

Y. Murasawa and K. Morimune
Distribution-Free Statistical Inference for Generalized Lorenz Dominance Based on Grouped Data 1231

M.D. Smith
Specification of Non-Normal Double-Hurdle Models 1237

T. Yamamoto and E. Kurozumi
Finite Sample Properties of the Test for Long-Run Granger Non-Causality in Cointegrated Systems 1243

S. Hoti
An Empirical Evaluation of International Capital Flows 1249

K. Oya
Test of Random Effects with Incomplete Panel Data 1255

C. Lim and M. McAleer
Modelling Inbound Tourism from Japan to Australia 1261

Y. Nishiyama
Bandwidth Selection for Semiparametric Averaged Derivatives 1267

K. Nawata
Estimation of the Female Labor Supply Models by Heckman's Two-Step Estimator and the Maximum Likelihood Estimator 1273

H. Yang, K.C. Abbaspour and A. Zehnder
An Analysis of Water Scarcity-induced Cereal Grain Import 1279

Y. Takeuchi
On a Statistical Method to Detect Discontinuity in the Distribution Function of Reported Earnings 1285

Financial Econometrics
(Convener: M. McAleer)

V. Pavlov
Missing Data and Interpolation in Dynamic Term Structure Models 1291

S. Hoti
A Comparison of Country Credit Risk Ratings 1297

F. Chan, D. Marinova and M. McAleer
Trends and Volatilities in Patents Registered in the USA 1303

F. Chan and M. McAleer
Recursive Statistical Analysis of the GARCH (1,1) Process for Stock Prices 1311

A.K. Tsui
Diagnostics for Conditional Heteroscedasticity Models: Some Simulation Results 1317

A.E. Clements and A.S. Hurn
Modelling Price Dynamics as the Outcome of Interaction between Heterogeneous Agents 1323

D. Marinova and M. McAleer
Trends and Volatility in Japanese Patenting in the USA: An Analysis of Two Industries 1329

H. Wago
Bayesian Estimation of Smooth Transition GARCH Model 1337

R. Becker and A.S. Hurn
Using Discrete-time Techniques to Test Continuous-time Models for Nonlinearity in Drift 1343

F. Chan and M. McAleer
Evaluating the Forecast Performance of Smooth Transition Volatility Models 1349

Economic Modelling
(Convener: L. Oxley)

L.M. Smith
The Third Wave: Mathematisation and Samuelson's Economics 1355

C. Iremonger and F. Scrimgeour
Population and Scenario Modelling for Education and Te Reo Maori Investment 1361

F. Scrimgeour and C. Iremonger
A Computer Based Decision Support System for Ethical Investments for Indigenous People 1367

L. Ben Said, A. Drogoul and T. Bouron
Multi-Agent Based Simulation of Consumer Behaviour: Towards a New Marketing Approach 1373

D. Marinova and M. McAleer
Trends and Volatility in Ecological Patenting in the USA 1379

D. Choi and L. Oxley
Modelling the Demand for Money in New Zealand 1385

P. Berg, R. Bewley and D. Rees
The Impact of Stock Market Volatility on Corporate Bond Credit Spreads 1391

B. Hu and M. McAleer
Industry Structure and Inter-industry Relationships in China 1397

C. Lim
Strengthening the Australia-Korea Relationship through International Tourism 1403

R.D. Herbert and R.D. Bell
Macroeconomic Policy Development with a Separate Predictive Model 1409

G.D. Leeves and R.D. Herbert
Unemployment Dynamics in a Flow Model of the Australian Labor Market 1415

R. Bartels, D.G. Fiebig and A. McCabe
The Value of Using Stated Preference Methods: A Case Study in Modelling Water Heather Choices 1421

M. Tsuji and J.I. Choe
An Ordered Probit Analysis of Factors Promoting a Regional Information Policy 1427

T. Fukiharu
A Simulation of the Heckscher-Ohlin Theorem 1433

Y.H. Cheung
A Monte Carlo Study of the Probability Weighting Function 1439

Time Series Analysis
(Convener: C. McKenzie)

R. Breunig and A.R. Pagan
Do Markov-Switching Models Capture Nonlinearities in the Data? Tests using Nonparametric Methods 1445

K. Maekawa, Z. He and K. Tee
Unit Root Tests in a Time Series Regression with Structural Changes 1451

M. Fukushige
Using the Durbin-Watson Ratio to Detect a Spurious Regressions: Can We Make a Rule of Thumb? 1457

C.R. McKenzie
Small Sample Evidence on the Impact of Generated Variable in Event Studies 1463

K. Sakata and C.R. McKenzie
The Impact of Sectoral Shifts on the Unemployment Rate of Different Age Groups 1469

K. Sato, Z.Y. Zhang and M. McAleer
Is a Monetary Union Feasible for East Asia? An Optimum Currency Area Approach 1475

L.K. Lim
Is ASEAN-5 Suitable for a Regional Currency Agreement? 1481

E.K.M. Lai, Y.W. Cheng and M. McAleer
Predicting Monthly Catch for Some Western Australian Coastal Finfish Species with Seasonal ARIMA – GARCH Models 1487

U. Goto and C.R. McKenzie
Theories of Dynamic Pricing and the Tokyo Retail Gasoline Market 1493

C.-T. Lin and L.K. Lim
A Re-examination of Day of the Week Effect in Australia 1501

W.S. Chan, S.H. Cheung and K.H. Wu
Multiple Forecasts with Autoregressive Time Series Models: Case Studies 1507

Modelling in Finance
(Convener: J. Sequeira)

J.M. Sequeira, P.C. Chiat and M. McAleer
Modelling Volatility in Currency Futures for Developed and Emerging Markets 1513

M. Chandra
Time-varying Conditional Correlations in Asia-Pacific Equity Markets 1519

C. Watkins and M. McAleer
Forecasting Commodity Market Volatility in the Presence of Extreme Observations 1525

Modelling and Financial Management
(Convener: D. Allen)

V. Fang and C.T. Lin
Hedging, Financial Distress and Managerial Risk Aversion: Evidence from Australia Gold Mining Industry 1531

D.E. Allen and J. Parwada
Mutual Fund Company Mergers and Their Impact on Investment Flows 1537

D.E. Allen and W. Yang
Do UK Stock Prices Deviate from Fundamentals? 1543

Empirical Finance and Risk Analysis/Modelling
(Convener: P. Verhoeven)

P. Verhoeven and M. McAleer
Estimating Conditional Volatility using Asymmetric Probability Density Functions 1549

P. Verhoeven and M. McAleer
Non-Linear Modelling and Asymmetries in Conditional Volatility 1557

J. Yeo
Modelling Time-Varying Systematic Risk in Australia 1565

J. Yeo
Testing Beta Constancy over the Australian Business Cycle 1571

C.T. Lin
Another Look at the Size and Book-to-Market Effects on Stock Returns 1577

K. Omura, Y. Tanigawa and J. Uno
Execution Probabilities of Limit Orders on the Tokyo Stock Exchange 1583

Table of Contents

Volume 4: General Systems

Decision Support Frameworks
(Convener: R. Argent)

Part One: Frameworks
(Convener: R. Argents)

R.M. Argent, R.A. Vertessy, J. Rahman and S. Seaton
From Components to Decisions: The Role of Software Engineering and Frameworks in Catchment Decision Support 1589

J.B. Robinson and D.M. Freebairn
The Decision-Maker has an Important, but Often Neglected, Role in Model Use 1595

M. W. Blind, L. Wentholt, B. van Adrichem and P. Groenendijk
The Generic Framework - An Open Framework for Model Linkage and Rapid Decision Support System Development 1601

S. N. Collis and J.D. Corbett
An Object Oriented Framework for Integration of Agricultural and Natural Resource Management Tools 1607

P. Lawrence, J. Robinson and R. Eisner
A Decision Environment: Going Beyond a Decision Framework to Improve the Effectiveness of Decision Making in Natural Resource Management 1613

J.A. Lau, W. G. Vandenberg, D. Battad and R.U. Willig
Integrated Forest Planning System (IFPS) - A Practical Approach to Decision Support Framework Design 1619

J.M. Rahman, S.M. Cuddy and F.G.R. Watson
Tarsier and ICMS: Two Approaches to Framework Development 1625

Part Two: Tools and techniques
(Conveners: S. Cuddy and J. Rahman)

L.H.A. Rodrigues and A.C.B. Munari
Automatic Classification Technique in an Environmental Unit Recognition: A Case Study 1631

G. M. Turner and F. Poldy
Let's Get Physical: Creating a Stocks and Flows View of the Australian Economy 1637

T. Kokkonen, A. Jolma and H. Koivusalo
Interfacing Environmental Simulation Models with Databases using XML 1643

A.E. Rizzoli, R.M. Argent, M. Manglaviti and M. Mutti
Encapsulating Environmental Models and Data using Java and XML 1649

C.R. Maul
Data Presentation, Structures, Formats and Scalability of Applications – How do They Fit Together? 1655

M.A. Haynes and D.B. Prestwidge
A Decision Support System for Generating Improved Sugarcane Harvest Schedules 1659

A. Jolma, E. Turunen, M. Kummu and T. Dubrovin
Reservoir Operation by Fuzzy Reasoning 1665

C. R. Maul
Use of Software Components in Model Development 1671

D. M. Freebairn, J.B. Robinson and S.F. Glanville
Software Tools for Learning and Decision Support 1677

D. McClymont, D.M. Freebairn and Y. Abawi
BROWSER A Graphic Tool to Explore Data Relationships 1683

S. Wealands, A. Zerger, S. Szylkarski and R. Carr
Integrating Spatial Information Systems and Hydrodynamic Modelling for Cyclone Risk Management 1689

Systems Analysis: Large Scale Optimisation in Natural Resources Management
(Convener: O. Chikumbo)

S.J.R. Woodward, R.W. Webby and D.B. Binnie
A Farmer Decision Tool for Simulating and Optimising Lamb Production 1695

K. Öhman and T. Lämås
A Model for Clustering of Harvest Activities in Long Term Forest Planning 1701

F. Garcia and R. Sabbadin
Solving Large Weakly Coupled Markov Decision Processes: Application to Forest Management 1707

B. Tenhumberg, A.J. Tyre and H.P. Possingham
An Optimization Approach for Minimizing Extinction Risk of Endangered Species through Captive Breeding 1713

O. Chikumbo and S. Davey
Use of Models in Ecologically Sustainable Forest Management and Decision-Making 1719

O. Chikumbo
Multi-catchment Forest Harvest Scheduling for the Eden Management Area in Australia 1727

O. Chikumbo and R. Bradbury
A comparison between Regional and Multi-catchment Forest Harvest Scheduling 1733

A. Lee, O. Chikumbo, S. Davey and P.K. Tickle
Enhanced Visualisation Capability for Forest Management Optimisation Results 1739

Modelling and Simulation of Agricultural Systems
(Convener: D. White)

R.J. Gorddard and P.A. Walker (Invited)
INSIGHT: A Tool for Increasing Coordination in Natural Resource Policy Processes 1745

D.H. White, M.K. van Ittersum and R.J. Gorddard (Invited)
INSIGHT into Biophysical Models for Evaluating Alternative Land Use Policies in Eastern Australia 1751

R.J. Gorddard (Invited)
Explorative Modelling of the Links Between Social Change and Natural Resource Policy 1757

M.K. Van Ittersum and R.J. Gorddard (Invited)
Integrated Modelling for Natural Resource Management: Where to Next? 1763

J.B. Robinson and D.M. Freebairn
How Sensitive are Agricultural Production Systems Models to Crop Management Parameters? Why is it Difficult to Quantify Farm Management? 1769

E. Wang, H. Meinke, G.L. Hammer, D.P. Holzworth, M.J. Robertson and S.C. Chapman
Agricultural Systems Models Require High Modularity, Flexibility and Sound Component Science 1775

Y.L. Everingham, R.C. Muchow and R.C. Stone
Forecasting Australian Sugar Yields Using Phases of the Southern Oscillation Index 1781

A. Higgins and M. Haynes
An Integrated Modelling Approach To Enhancing Sugarcane Profitability 1787

B.A.M. Bouman, T.P. Tuong, M.J. Kropff and H.H. van Laar
The Model ORYZA2000 to Simulate Growth and Development of Lowland Rice 1793

D.G. Mayer, R.A. Stephenson, K.H. Jones, J.S. Yee-Yet, A.W. Dunstan, D.J.D. Bell, K.E. Delaney, K.J. Wilson and J. Wilkie
Mechanistic and Statistical Models to Forecast the Australian Macadamia Crop 1799

D.L. Liu and B.J. Scott
Modelling Maintenance Respiration in Wheat 1805

B.A. Keating, K. Verburg, C.J. Smith, M.E. Probert and D. Gaydon
Assessing Leakiness in Australia's Dryland Farming Systems 1811

D.C. Flanagan, C.S. Renschler, J.R. Frankenberger, T.A. Cochrane and B.A. Engel
Enhanced WEPP Model Applicability for Improved Erosion Prediction 1817

C.J.N. Smith, D. Oglethorpe and J. Wright
The Development of an Integrated Modelling System to Support Decisions on Organic Farms 1823

E.J. Tiller
Exploring the Ecosystem Service of Natural Pest Control in Australian Cotton Farming Systems 1829

A. Clift and A. Meats
Why Model Tephritid Fruit Fly Incursions in Agricultural Production Areas? 1835

S.M. Howden
Analysis of National Livestock Statistics: Assessment for Systematic Reporting Bias 1841

P.M. Pepper, L.B. Dunlop, E.J. Weston and D. Cloonan
Simulation of the Supply Capability of Sheep on the Mitchell Grass Downs of North West Queensland 1847

C.C. Palliser, M.E. Wastney, K.P. Bright, K.A. Macdonald and J.W. Penno
Modelling the Lactation Curves of New Zealand Cows 1853

M.J. McPhee, G.P. Meaker, P. Graham, P.M. Carberry, B.L. Davies, M.B. Whelan, A.K. Bell and B. Clements
StockPlan: Decision Tools for Exploring Management Options for Drought 1859

M.D. Rollo, G.W. Sheath and C.J. Boom
Could a Cattle Liveweight Gain Model and a Kalman Filter Help Farmers Short-term Decision Making? 1865

M. Atzeni, K. Casey and A. Skerman
A Model to Predict Cattle Feedlot Runoff for Effluent Reuse Applications 1871

J.A. Ludwig, A.C. Liedloff, R.M. Dyer, L.M. Cafe and M.B. Coughenour
Modelling the Rate and Pattern of Woody Thickening in Australian Savanna Pastures 1877

R.P. Silberstein, R.A. Vertessy and T.J. Hatton
A Simple Method for Hillslope Agroforestry Design 1883

R.P. Silberstein, R.A. Vertessy and D. McJannet
A Parameter Space and Simulation Response Surface for Agroforestry Design 1889

N.I. Huth, V.O. Snow and B.A. Keating
Integrating a Forest Modelling Capability into an Agricultural Production Systems Modelling Environment - Current Applications and Future Possibilities 1895

Modelling the Growth of Cities and Urban Water Systems
(Convener: C. Zoppou)

T. Soroczynski
Integrated Systems Analysis for Cities 1901

J.A. van Leeuwen, R. Fabris, L. Sledz and J.K. van Leeuwen
Modelling Enhanced Alum Treatment of Southern Australian Raw Water for Drinking Purposes 1907

Application of Biologically Inspired Modelling Methods in Water Engineering
(Convener: H. Maier)

B. Cannas, A. Fanni, M. Pintus and G.M. Sechi
River Flow Forecast for Reservoir Management Using Neural Networks 1913

G. J. Bowden, H.R. Maier and G.C. Dandy
Understanding the Range of Applicability of Artificial Neural Network Forecasting Models 1919

N. Lauzon and B.J. Lence
Identification of Long Term Patterns in Hydrologic Data Using Fuzzy and Neural Network Techniques 1925

A.R. Simpson, H.R. Maier, W.K. Foong, K.Y. Phang, H.Y. Seah and C.L. Tan
Selection of Parameters for Ant Colony Optimisation Applied to the Optimal Design of Water Distribution Systems 1931

D.J. Walker
A Genetic Algorithm Model of Coastal Evoluation 1937

A.W.M. Ng and B.J. C. Perera
Importance of Genetic Algorithm Operators in River Water Quality Model Parameter Optimisation 1943

D. De Rigo, A.E. Rizzoli, R. Soncini-Sessa, E. Weber and P. Zenesi
Neuro-Dynamic Programming for the Efficient Management of Reservoir Networks 1949

Geostatistical and Geophysical Modelling
(Convener: P.I. Brooker)

M.R.P. Tingay, P.I. Brooker and P. Basford
Electrical and Transient Electromagnetic Modelling of a Copper Prospect near Cobar, NSW 1955

L.M. Bloom and J.M. Cross
Salinity and Acidity in The Jimperding Brook in Western Australia 1961

Y.-P. Lin, T.-P. Teng and Y.-C. Tan
Estimating and Simulating Spatial Distribution of Transmissivity Using Geostatistics Methods 1967

V.D. Vladimirov
Petrophysical Model of Chelopech Gold-Copper Ore Deposit 1973

L.M. Bloom and U.A. Mueller
Investigation of pH as Secondary Information in the Estimation of Soil Salinity 1979

C. Rajanayaka and D. Kulasiri
Investigation of a Stochastic Inverse Method to Estimate Parameters in Groundwater Models 1985

T. Tran, U.A. Mueller and L.M. Bloom
Conditional Simulation of Two-Dimensional Random Processes using Daubechies Wavelets 1991

Statistical Modelling in Health and Medical Sciences
(Convener: K.P. Singh)

T.I. Valappil, K.P. Singh and A.A. Bartolucci
An Overview of Estimating Causal Effects from Interval-Censored Data: G-Estimation Approach 1997

D. Carey, A.A. Bartolucci and K.P. Singh
Assessment of Therapeutic Equivalence of Three Proportions Using a Bayesian Approach 2005

K.P. Singh, S. Bae and A.A. Bartolucci
100(1-P)Th Percentile Remaining Survival Time 2011

M. Tsuji, S. Miyahara, F. Taoka and M. Teshima
Hospital Cost-Savings of the Elderly by Tele-Home-Care 2017

A.A. Bartolucci, K.P. Singh and R. Shanmugam
Empirical Bayesian Analysis of the Poisson Intervention and Incidence Parameters 2023

K.P. Singh, J.T. Wulu and A.A. Bartolucci
A Note on Generalized Poisson Regression Models 2029

L.C. Wadhwa, I. Val, M. Henderson and P.K. Donnelly
Simulation of Alternative Models of Operating Theatres Utilisation 2035

H. Mühlthaler and B. Quatember
Three-Dimensional Reconstruction of Stenosed Coronary Arteries from Biplane Angiograms and its Importance to Computer Simulation Studies of Blood Flow 2041

B. Quatember and H. Mühlthaler
Computer Simulation of the Coronary Hemodynamics: Image-Based Generation of the Mesh and Simulation Methodology 2047

Simulation of Traffic Control Systems
(Convener: T. Nakanishi)

Y. Tsubota, K. Watanabe and H. Kawashima
Vehicle-Actuated Signal Control System to Mitigate Environmental Impacts Due to Road Traffic: Measurements and Simulations 2053

Y. Hibiya, M. Kudo, T. Fujikura and T. Nakanishi
Adaptive Offset Control in Traffic Signal System 2059

M. Takahashi and T. Nakanishi
A New Model of the Road Traffic System Simulator PIMTRACS on the PIM 2065

Yossyafra and U. Vandebona
Simulation Modelling of Paratransit Services 2069

R.-P. Schäfer, D. Strauch and R. Kühne
A Geographic Information System for the Integration of Heterogeneous Traffic Information 2075

M. Namekawa, A. Satoh, H. Mori, N. Honda and H. Suda
Parallel Simulation Algorithm for Traffic Systems 2081

S. Yaskawa
Bullet Train Operation Simulator including Electric Power Consumption 2087

M. Numano, H. Itoh and Y. Niwa
Sea Traffic Simulation and its Visualisation in Multi-PC System 2093

E. Kozan
A Simulation Model for Mixed-Model Multi-Stage Assembly Lines 2099

Y. Futatsuishi, I. Watanabe and T. Nakanishi
A Study of a Scheduling Simulator for the Analysis of Multi-stage Flowshop Scheduling Problem with eM-Plant 2105

Virtual Simulation Systems and Their Applications
(Convener: T. Nakanishi)

T. Nakanishi
Virtual Simulation Systems and their Applications 2111

N. Mukai, M. Harada, K. Muroi, T. Hikichi and A. Yoshida
New Model for Membrane Peeling in Ocular Surgery Simulator 2119

T. Takei, K. Muramatsu A. Yoshida and S. Doi
A Parallel Visualization System and its Application to the Earth Simulator 2125

P.ff. Howden
COMPUTEZE - Relaxed English Simulation Accelerates Computer Word-processing and Data Entry 2131

Computational Modelling and Techniques
(Convener: L. Caccetta)

R.G. Addie
Quantum Simulation: Rare Event Simulation by means of Cloning and Thinning 2137

R.D. Braddock
Sensitivity Analysis and Discrete Structures 2143

L. Caccetta and M. Dzator
Models for the Location of Emergency Facilities 2149

L. Caccetta and P.J. Kelsey
Models for Mine Site Rehabilitation 2155

L. Caccetta and Wamiliana
Heuristics Algorithms for The Degree Constrained Minimum Spanning Tree Problems 2161

F. Recknagel
Adaptive Agents Simulation of Freshwater Ecosystems 2167

P. Tillman, R. Cox and B. Cathers
A Mathematical Model of Wave Interaction with a Double Wall Barrier 2173