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978-0-521-03673-3 - New Uncertainty Concepts in Hydrology and Water Resources

Edited by Zbigniew W. Kundzewicz

Frontmatter

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One of the greatest problems hydrology research faces today is how to quantify uncertainty, which is inherent in every hydrological process. This modern overview of uncertainty emphasises non-orthodox concepts, such as random fields, fractals and fuzziness. This book comprehensively reviews alternative and conventional methods of risk and uncertainty representation in hydrology and water resources. The water-related applications discussed in the book pertain to areas of strong recent interest, such as multifractals and climate change impacts.

The authors represent a variety of research backgrounds, achieving a broad subject coverage. The material covered provides an important insight into new theories of uncertainty related to the field of hydrology. The book is international in scope and will be welcomed by researchers and graduate students of hydrology and water resources.

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New Uncertainty Concepts in Hydrology and Water Resources

INTERNATIONAL HYDROLOGY SERIES



New Uncertainty Concepts in Hydrology and Water Resources

Edited by
Zbigniew W. Kundzewicz (*Polish Academy of Sciences, Poland*)



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Contents

List of Authors	<i>page xi</i>
Preface	xiii
 <i>I. INTRODUCTION</i>	
<i>1. Hydrological uncertainty in perspective</i> Z. W. Kundzewicz	3
 <i>II. FACETS OF UNCERTAINTY</i>	
<i>1. Bayesian relative information measure – a tool for analyzing the outputs of general circulation models</i> M. E. Moss	13
<i>2. A stochastic weather generator using atmospheric circulation patterns and its use to evaluate climate change effects</i> A. Bárdossy	25
<i>3. Hydrological uncertainty – floods of Lake Eyre</i> V. Kotwicki & Z. W. Kundzewicz	32
<i>4. Some aspects of hydrological design under non-stationarity</i> W. G. Strupczewski & H. T. Mitosek	39
<i>5. New plotting position rule for flood records considering historical data and palaeologic information</i> Guo Sheng Lian	45
 <i>III. NOVEL APPROACHES TO UNCERTAINTY: FRACTALS, FUZZY SETS AND PATTERN RECOGNITION, NON-PARAMETRIC METHODS</i>	
<i>1. Dispersion in stratified soils with fractal permeability distribution</i> M. W. Kemblowski & Jet-Chau Wen	55
<i>2. Multifractals and rain</i> S. Lovejoy & D. Schertzer	61
<i>3. Is rain fractal?</i> I. Zawadzki	104
<i>4. Multifractal structure of rainfall occurrence in West Africa</i> P. Hubert, F. Friggit & J. P. Carbonnel	109

viii	CONTENTS
<hr/>	
<i>5. Analysis of high-resolution rainfall data</i>	114
K. P. Georgakakos, M. B. Sharifi & P. L. Sturdevant	
<i>6. Application of fuzzy theory to snowmelt runoff</i>	121
K. Mizumura	
<i>7. On the value of fuzzy concepts in hydrology and water resources management</i>	126
J. Kindler & S. Tyszewski	
<i>8. Application of neural network in groundwater remediation under conditions of uncertainty</i>	133
R. S. Ranjithan, J. W. Eheart & J. H. Garrett, Jr.	
<i>9. Application of pattern recognition to rainfall–runoff analysis</i>	141
K. Mizumura	
<i>10. Nonparametric estimation of multivariate density and nonparametric regression</i>	145
W. Feluch	
<i>11. Nonparametric approach to design flood estimation with pre-gauging data and information</i>	151
Guo Sheng Lian	
 <i>IV. RANDOM FIELDS</i>	
<i>1. Analysis of regional drought characteristics with empirical orthogonal functions</i>	163
I. Krasovskaia & L. Gottschalk	
<i>2. Worth of radar data in real-time prediction of mean areal rainfall by nonadvective physically-based models</i>	168
K. P. Georgakakos & W. F. Krajewski	
<i>3. Uncertainty analysis in radar-rainfall estimation</i>	181
W. F. Krajewski & J. A. Smith	
<i>4. Design of groundwater monitoring networks for landfills</i>	190
P. D. Meyer, J. W. Eheart, R. S. Ranjithan & A. J. Valocchi	
<i>5. Spatial variability of evaporation from the land surface – random initial conditions</i>	197
R. J. Romanowicz, J. C. I. Dooge & J. P. O’Kane	
<i>6. Detecting outliers in flood data with geostatistical methods</i>	206
L. Gottschalk, I. Krasovskaia & Z. W. Kundzewicz	
 <i>V. TIME SERIES AND STOCHASTIC PROCESSES</i>	
<i>1. Prediction uncertainty in seasonal partial duration series</i>	217
P. F. Rasmussen & D. Rosbjerg	
<i>2. A daily streamflow model based on a jump-diffusion process</i>	225
F. Konecny & H. P. Nachtnebel	
<i>3. The influence of time discretization on inferred stochastic properties of point rainfall</i>	230
S. Weglarczyk	
<i>4. The distribution of the 1-day total precipitation amount</i>	238
W. Jakubowski	
<i>5. Analysis of outliers in Norwegian flood data</i>	245
L. Gottschalk & Z. W. Kundzewicz	

CONTENTS	ix
<i>6. Stochastic modelling of the operation of hydrants in an irrigation network</i> G. Tsakiris & O. Manoliadis	252
<i>7. Order and disorder in hydroclimatological processes</i> K. Kowalski	257
<i>8. Towards the physical structure of river flow stochastic process</i> J. J. Napiórkowski & W. G. Strupczewski	261
 <i>VI. RISK, RELIABILITY AND RELATED CRITERIA</i>	
<i>1. Stochastic approach to non-point pollution of surface waters</i> E. J. Plate	273
<i>2. Statistically safe sets methodology for optimal management of reservoirs in risk situations</i> A. Karbowski	284
<i>3. Risk assessment in control of reservoir systems</i> A. Kozłowski & A. Łodziński	293
<i>4. Reliability-related criteria in water supply system studies</i> Z. W. Kundzewicz & A. Laski	299
<i>5. Reliability analysis of reservoir operation</i> J. J. Bogardi & A. Verhoef	306
<i>6. Composite risk model of Ogee type spillway</i> M. Sowiński & M. I. Yusuf	316

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Preface

The present volume contains the edited proceedings of the International Workshop on New Uncertainty Concepts in Hydrology and Water Resources, held in Madralin near Warsaw, Poland from 24 to 26 September 1990. It was organized under the auspices of the Institute of Geophysics, Polish Academy of Sciences, Warsaw, Poland, and the International Commission on Water Resources Systems (ICWRS) – a body within the International Association of Hydrological Sciences (IAHS). The Organization and Programme Committee for the Workshop consisted of the following individuals: Professor Lars Gottschalk (Norway/ICWRS/IAHS), Professor Zdzisław Kaczmarek (Poland/IIASA), Professor Janusz Kindler (Poland), Professor Zbigniew W. Kundzewicz (Poland), who acted as the Secretary, Professor Uri Shamir (Israel/ICWRS/IAHS) and Professor Witold Strupczewski (Poland).

The Workshop was a continuation of series of meetings organized under the aegis of the International Commission of Water Resources Systems (ICWRS) within the IAHS. This series of meetings was initiated by the former ICWRS President, Professor Mike Hamlin in Birmingham, 1984. Last Workshop of similar character was organized by the ICWRS Secretary, Professor Lars Gottschalk in Oslo (1989).

The Workshop was primarily devoted to recent methods of representation of uncertainty in hydrology and water resources. This embraces newly introduced methods and approaches that, albeit not new, have raised considerable recent interest. In the menu of topics tackled at the Workshop were, among others, such diverse items, as fractals, risk and reliability-related criteria, fuzzy sets, pattern recognition, random fields, time series, outliers detection, non-parametric methods, etc. The apparent side effect of the Workshop was also putting different methods into perspective. It possibly helped assessing methodologies and answering the question, whether the apparent attractivity of particular methods is based on permanent values or it is just a band-wagon effect and the methods are likely to pass as a short-lasting fashion. The Workshop attracted 44 registered participants from 16 countries, who presented 44 oral contributions during nine technical sessions. The set of participants was highly heterogeneous, as regards their backgrounds,

institutions represented, theoretical and practical experiences and research philosophies. The participants were, by background, hydrologists, civil, environmental and agricultural engineers, foresters, geographers, geologists, geophysicists, system scientists, mathematicians, computer scientists and physicists. The institutions, where participants worked ranged from universities, through non-university research institutes (e.g. academies of sciences), administration (government agencies) to consulting engineers. The variety of backgrounds, research orientations and preferences is clearly visible in this volume, where more descriptive contributions are neighbours to papers stuffed with heavy mathematical developments. The heterogeneity and multidisciplinary nature is believed to have contributed to a broad subject coverage and to have caused a welcome cross-fertilization effect.

The idea of the Workshop was to report on recent research, to present and discuss work at different stages of progress. Some entries in the discussion were indeed thought-provoking and surely helped the presenters and the audience to shape their further research.

It is a pleasure of the editor of this volume (and also secretary of the Organization and Programme Committee) to thank the participants in the Workshop and the contributors to this volume for their fine work that made the Workshop an undoubted success. Thanks are extended to the organizing institutions mentioned. The financial support provided by the Institute of Geophysics, Polish Academy of Sciences and by the International Institute for Applied Systems Analysis (IIASA) in Laxenburg, Austria, is gratefully acknowledged. Last, but not least, thanks are due to the UNESCO and its Director of Division of Water Sciences, Dr Andras Szollosi-Nagy, for the invitation to publish this volume within the International Hydrology Series and for support of the editorial work.

It is believed that the present contribution contains a wealth of illuminating and stimulating material. It may be useful for researchers, lecturers and graduate students in hydrology and water resources.

Z. W. Kundzewicz