P R E F A C E

This special issue of "*MATCH Communications in Mathematical and in Computer Chemistry*" contains contributions to the 6th Workshop on "*Partial Orders in Environmental Sciences and Chemistry*" which took place in Bayreuth, Germany, from April 15 to April 16 2004. About 20 participants from four nations discussed new theoretical developments as well as many applications of partial orders in environmental sciences. The focus was on examples of partial orders that can be employed to support decisions in environmental management.

The series of workshops began in 1998 during a visit of E. Halfon at the Leibniz-Institute of Freshwater Ecology and Inland Fisheries in Berlin. Halfon was the first who detected the broad applicability of partial orders in Environmental Science and in risk assessment. Since that time the following workshops were organized:

Year	Location	Organizers	Topic
1998	Berlin	Brüggemann	Order Theoretical Tools in Environmental Sciences
1999	Roskilde	Sørensen	Partial Order Ranking Methods or Applications and Methods Development
2000	Berlin	Pudenz	Order Theoretical Tools in Environmental Sciences and Decision Systems
2001	Iffeldorf	Voigt, Welzl	Order Theory (Hasse Diagram Technique) Meets Multivariate Statistics
2002	Roskilde	Sørensen	Order Theory in Environmental Sciences - Integrative approaches
2004[)]	Bayreuth	Brüggemann, Frank	Partial Order in Environmental Sciences and Chemistry

From 2002 onwards a two years' period has been considered as most appropriate.

The use of partial orders in chemistry is not new: E. Ruch, M. Randić, D. Klein, S. El-Basil, A. T. Balaban should be mentioned as pioneers. Many papers devoted to the mathematics of partial orders can be found in "*MATCH Communications in Mathematical and in Computer Chemistry*". In 2000 a special issue, volume 42, was devoted to partial orders in chemistry,

with J. Brickmann and D. Klein as editors. This issue contains an excellent overview on the applications in chemistry; and the Prolegomenon of D. Klein offers a concise introduction to this fascinating field. Presently a book is in preparation, edited by R. Brüggemann and L. Carlsen that contains an educational approach to partial orders and their applications. Looking back to the last 20 years, a variety of environmental applications has been addressed:

- risk assessment of chemicals (QSAR, monitoring studies),
- waste disposal sites,
- diversity, richness, abundance-site-relations
- evaluation of sediment quality, of pollution patterns and of water quality,
- evaluation of information sources,
- options for highway constructions,
- ecotoxicological testing,
- comparison of criteria for sustainability,
- comparison of mining activities,
- decision support systems (especially: water management),
- archeometrics,
- analysis of concepts of aromaticity.

Many fields of applications could profit from employing the concept of partial order. For example, for pattern recognition in spectroscopy it could replace purely empirical approaches, because multiregression techniques sometimes fail. Here the powerful formal concept analysis, founded by Wille and advanced in his school offers an interesting alternative to conventional multivariate statistics.

Indeed, the aim of these workshops is to intensify the use of Discrete Mathematics that is helpful for applications, to develop new applications, and to discuss new and fascinating developments in software. In that sense, the 6th Workshop, held at the University of Bayreuth, is a step in this direction.

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