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BOOK REVIEWS

The Basics of Technical Communicating, edited by EDWARD B. CAIN, published by American Chemical Society, 1155 Sixteenth St., N.W. Washington, D.C. 200 36, U.S.A., price: U.S. & Canada $ 29.95, export $ 35.95 (clothbound), ISBN 0-8412-1451-4; U.S. & Canada $ 19.95, export $ 23.95 (paperbound), ISBN 0-8412-1452-2, xiii + 198 p., LC 88-3325; illustrated, indexed.

Scientific professionals need well-developed written and oral communication skills in addition to technical abilities. They may be called upon to explain their research findings to the public, to present papers to their colleagues, or to apply for grants to fund research projects. These situations require logical thinking and good communication skills. *The Basics of Technical Communicating* explains how to use a clear, precise, unambiguous, and unemotional language. This 18 chapter book describes how to tailor speeches to different audiences and how to express opinions clearly. The contents cover everything which is required from letters and resumés to journal articles and user's manuals. Anyone who has ever used visual aids to accompany a document or presentation will appreciate the author's helpful suggestions. This book is a must for anyone who is interested in improving his or her communication skills.

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Handbook of Polycyclic Hydrocarbons, Part B. *Polycyclic Isomers and Heteroatom Analogs of Benzenoid Hydrocarbons*, edited by J. R. DIAS, Department of Chemistry, University of Missouri–Kansas City, Kansas City, MO, U.S.A., (Physical Sciences Data, 30B), 1988, 418 p., price: US $ 155.25/Dfl. 295.00, ISBN 0-444-43007-5.

Hydrocarbons bring together all the known benzenoids and their polycyclic isomers and heteroatom analogs and organize them both into isomer and isoskeletal groups, according to a periodic system which is based on graph-theoretical principles. A comparison of the number of isomers synthesized or identified in the environment with the number of theoretical isomers provides an overview of the domain of polycyclic hydrocarbons. The unique feature of the approach used is that it allows an easy comparison of topologically and graph-theoretically related molecules, many of which are environmental pollutants.

Part B begins with a detailed discussion on the nomenclature and classification scheme, on graph-theoretical and isomer enumeration methods, as well as on the molecular orbital and spectroscopic principles. It ends up with a compilation of experimental and theoretical properties of 150 polycyclic ring isomers and 250 heteroatom analogs of benzenoid hydrocarbons. The updated additional data for Part A are included in the appendix.

Analytical, organic, synthetic, and theoretical chemists working in the environmental and petroleum fields will find this book an indispensable source of information.

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Towards a SECPMD Green Revolution. From Chemical to New Biological Technologies in Agriculture in the Tropics, Proceedings of the International Meeting organized by the Academia Nazionale delle Scienze detta dei XL, Palazzo Civilta del Lavoro, Roma, Italy, in collaboration with the European Communities Commission and ENEA, edited by G. B. MARINI BETTOLO, Rome, Italy, (Developments in Agricultural and Managed-Forest Ecology, 19), 1988, xiv + 532 p., price: US $ 171.00/Dfl. 325.00, ISBN 0-444-98927-7.

Genetic research of some fundamental crops, together with the use of chemicals as pesticides and fertilizers, opened the way in the 1950s and 1960s to a great change in agriculture giving especially astonishing results in the tropics. This change known as the Green Revolution, is a truly great revolution in methods and materials since, when reasonably applied, made it possible to achieve in a few years a completely sufficient production of cereals in South and South-East Asia, Mexico, and South America. After 20 years of a continuous success, the aspects of the Green Revolution should be rediscussed having in mind new findings and possibilities offered by scientific and tehnological progress as well as negative side effects on the environment and human health.

In these papers the present state of agriculture is examined and the way forward for its development is indicated, especially in the tropics, and in Africa and South America, in particular. The need for further research is emphasized: the following priorities in its application are discussed: the economic aspects of any new system to be adopted, the necessary presevation of ecological equilibria of different environments, and the balance of energy input/output in a given agrosystem.

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2nd International Conference *New Frontiers in Hazardous Waste Management*, Pittsburgh 1987

It seems that in the Second International Conference on *New Frontiers in Hazardous Waste Management* the loudest note of warning was not sounded because of waste itself, but of an alarming waste to manpower ratio. Says Paul Busch, president-elect for the American Academy of Environmental Engineers: *We're only getting 5–10% of demand each year for engineering graduate and undergraduate students in hazardous and solid waste management. Between 1990 and 1995, we will need a production rate of 2,300 professionals per year.*

The engineers will be required for, what EPA's director of solid waste Marcia Williams calls, *the huge challenge of hazardous waste management — it is operating on the edge of state-of-the-art.*

The conference hosted 62 paper presentations detailing thermal, biological, and chemical treatment, land disposal, stabilization, and waste minimization. Sponsored by EPA, NUS Corp., AAEE, and the National Science Foundation, the optimistic and potential-oriented conference took place in Pittsburgh from 27th to 30th September.

Many speakers pointed at EPA's Superfund Innovative Technology Program (SITE), designed to assist the research.

The technology under SITE considerations is Westinghouse's Pyroplasma system, a thermal process based on the concept of pyrolysis of waste molecules. The portable system arrives to its destination in a 48 ft tractor trailer and was appeared to be efficient at Love Canal. A scrubber collects caustic acids from the exhaust gas.

A different portable incinerator used in Illinois produced scrubber water which was treated with activated carbon, according to James Cobb of the state's EPA.

Hazardous ashes resulting from municipal waste incineration were also discussed. Tracy Clapp of Rutgers University claims that leaching tests for heavy metals are not always accurate, stating that EP and TCLP tests typically extract less than 1% of the total lead present in ashes.

Sharing center stage with thermal technologies was a biological treatment. General Electric's Ronald Untermann is working on bacterial treatment, isolating PCP metabolizing genes for recombinant DNA technology. Finally, John Glaser of EPA is working with a fungus whose diet contains DDT and dioxins.

Every year there are a lot of conferences around the world, therefore it is very difficult to report all of them. The reason for which I would like to attract your attention to this particular one is its great practical aspect as well as the excellent organization both from technical and social standpoints.

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Economic-ecological modeling, book series *Study in Regional Science and Urban Economics*, edited by L. C. Braat and F. I. van Lierop, North Holland, Elsevier Science Publishers B.V., Amsterdam 1987, 329 p., ISBN 0-444-70298-9.

This book results from a study on economic-ecological models. Over 100 models from 21 countries were examined and evaluated during the project conducted by the Free University of Amsterdam and International Institute for Applied System Analysis (IIASA), Laxenburg, Austria. After closing the project

a workshop was held in IIASA for the modelers, policy analysts, and policy advisers. All essential conclusions and invited papers are brought together in this book.

The book consists of three parts. The first one provides the theory relevant to the analysis of problems of the interface of society and its natural environment and the general guidelines for environmental and resource analysis. It can serve as an introduction to these disciplines for economists and ecologists.

The first three chapters create a basis for understanding the various types of models, problems, and policies. J. N .R. JEFFERS emphasizes the very wide range of available mathematical techniques which can offer exciting possibilities for modeling of processes at all levels without losing the richness and complexity of ecological relationship and interactions. The following models are reviewed by the author: dynamic, matrix, Marcov, stochastic, multivariate, optimization, topological as well as others. In the conclusions, Jeffers states that ecologists have not yet achieved a success in the introduction of mathematical models to ecology. There has often been a failure to observe the mathematical assumptions inherent in the use of any mathematical technique. This failure has been particularly often experienced in the statistical techniques developing important assumptions, which determine the validity of the procedures being used. This is often derived from an unfortunate characteristic of ecological research, i.e., at first the data are collected empirically and then an attempt is made to model them instead of defining the problem carefully. Before collecting any data it should be always remembered that ecological system is an inherent part of the problem.

Looking at a particular problem it is possible to focus attention either on the economic or on the ecological aspects when the problem and its side effects are restricted to a local scale and a short period of time. If, however, a long-term problem is considered, a multidisciplinary approach would seem to be more appropriate.

In the next chapter the technical problems of integrating of economic and ecological theories and methods are examined and discussed. Integration of monodisciplinary approaches into multidisciplinary models is sometimes referred to as the "compartment modeling". Another way to develop an economic-ecological model is "holistic modeling", which allows model building as one consistent model instead of putting it together from separate monodisciplinary submodels. A third way is to start either from an ecological or from an economic model and expand it to a multidisciplinary model. It was found that in the survey sample the dynamic models were predominant. Optimization (prescriptive) models are as numerous as simultation (predictive) models and combinations of these two types. The ecological submodels are mostly built for simulation experiments; in a majority of the economic models optimization techniques are utilized. As to spatial aspects, the local and regional scale of modeling is most common.

The authors, L. C. BRAAT and W. F. J. van LIEROP, give information on model design. They distinguish two levels of designing. The first one is aimed at determining the general content of model due to the analysis of the policy issue and the operational technique, which fits the intended use of the model in the policy making process. The second level deals with the technical aspects of multidisciplinary modeling. It can be "interpretative" integration when a user interprets the output of one model and translates it mentally and manually into input data for the other model. When "mechanical", "formal" or "mathematical" integrations are applied, the relationships in quantitative models take the form of a regression equation, a time-indifferent coefficient, a time-dependent mathematical function of treshhold value.

The most successful attempts to integrate existing economic and ecological models of environmental and resource problems appear to be a connection between the so-called physical-economic models (e.g., material-balance models) and ecological "flow" models, designed to assess resource extraction and impacts of pollutant input. The integration of economics and ecology in mathematical models proves to be feasible, but it is still an operation which generally requires a series of technical adaptations of the models or additional data manipulations. Temporal scales have to be synchronized, spatial scales must be matched and sometimes whole set of equations need to be reformulated. In exercises concerning long-term projections and impact analysis uncertainty becomes a major obstacle.

In the second part *Practice of Environmental and Resource Modeling* models related to specific fields of application are presented and discussed.

The series opens with a review of fisheries' models. It presents a bioeconomic model of the antarctic whaling industry, the general model of fishery regulation, and the stochastic model establishing the optimality of constant-escapement harvest policies for a stochastic single-species, as well as a non-age structured fishery model with known parameters. Then the models for forestry are described. They are oriented either towards the forest as an economic resource for society with very little concern in the ecology of forests or towards the forest which is viewed as an ecological system that eventually will produce some economic benefits. The spruce budworm model developed by HOLLIG, JONES, and CLARK is the only model which integrates economy and ecology in a mathematical structure.

The numerous agricultural models examined in the next chapter are related to plant production, animal husbandry, soil sciences, water management, and so forth. Most of the models describe the interaction between production and ecological conditions. Depending on how far the possibilities of utilization of ecological conditions were connected to the investigation of economic problems, there is a shift in stress from the ecological to the economic aspect. Three models are described, i.e., 1) a physical crop production model which examines the possibilities of plant production, setting out from an ecological basis, 2) the system model for investigating long-term consequences of Technological Development in Hungarian Agriculture, and 3) the model related tu multiseasonal management of an agricultural pest developed by M. MANGEL and R. E. PLANT for the cotton–spider system in California.

Water resource modeling is the next focus of attention, concentrating on the group of models. They aim at crucial common problems such as aquifier management, regional conflict resolution, and others.

The models presented by D. P. LOUCKS in the succeeding chapter deal with the water quality. The author states that there now exists a wide range of mathematical modeling approaches for water quality impact prediction. Nevertheless the attempts of modelers to be more realistic and precise by building more complex models have not necessarily led to closer accuracy. Because of the difficulties and costs in producing, calibrating, and veryfying such comprehensive models, there has been supported a prevailing view that, at least for management, relatively simple models are preferred. Most models are based on conservation of mass and energy, and a few, on statistical regression methods. The chapter reviews and compares several models that have been used for planning the management of water quality in rivers (St John, Trent, and Rhine Rivers), lakes (Lake Balaton and Neusiedler Sea), and estuaries (Delavare Estuary). The chapter is concluded with the statement that the uncertainties and difficulties in accurately predicting both water quality and economic impacts of control measures stem largely from our lack of knowledge about the systems being modeled.

The next field in designing models relates to outdoor recreation and tourism, which are important economically because they take up a large amount of private and public budgets. The recreation policy issues are described and possible application of models to them is indicated. The chapter ends with a review of some integrated models. Most of them handle recreation as one of the various land-use possibilities only, because the ecological impacts of recreation are rather uncomparable with other land-use forms (ICEDA (1983), BOYNTON (1977), YORK et al., (1977), van der PLOEG et al. (1984)). World wide recreation is an important "phenomenon" for economists and ecologists, as well as for geographers and social scientists. They are obviously living in a different "real world" and therefore they do not seem to be able to cooperate.

The next author, F. L. TOTH, reviews the models of regional development in which it is necessary to consider interactions between a mixed set of resources. The general goal of the three models presented is to show that productivity of one resource is not connected with the cost of significant deterioration in several others.

The first model was developed to reveal the role of coastial resources in the ecological balance and economic vitality of a coastial region where the local economy is predominantly dependent on activities basing on water resources. In this study energy flow modeling was applied.

The second model was designed as a management tool to help policy makers plan land and water

resource use in river catchments. The study raises problems of multiple land use, water supply, recreation, agriculture, and forestry in Western Australia.

The third model was developed for agricultural purposes in Hungary. Its basic goals were to determine the maximal crop which could be obtained by the turn of the century provided that the natural environment, meteorological effects, soil properties, water supply, the genetic properties of plants, and the partial modification of environmental factors (land reclamation, irrigation) are maintained. The biomass program aimed to clarify internal relationships of the biomass production–transformation–utilization cycle and to elaborate alternative methods of utilizing the biomass in the short and long terms.

In the next chapter, the various kinds of economic-ecological models in the regional total system framework are examined. These models are selected on the basis of the Japanese experience in this field. The scope of the regional framework includes: land use management, ecological resource utilization, pollution control scheme, conservation of open space, landscape historical heritages, wildlife, vegetation, and so on. The authors surveyed three integrated models: for evaluation of industrial policy, environmental management model in the Special Research Program, and model for eutrophication on the Lake Kasumigaura basin. It is stressed that there is still a large gap between economic and ecological models.

Finally, models for national, international, and global systems' policy are discussed. Comparison between systems is indicated in diagrams, differential equations, and graphs. It is demonstrated that modeling the ties between economic and ecological systems often produces several behavioral phenomena, such as pulsing-state and steady-state.

In the last part of the book, the practical and institutional constraints in applying the models and implementing their results are presented. They include bureaucratic and political circumstances and differences in objectives and views between model builders and users.

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