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Special issue on "Optimization Models in Environment and Sustainable Development"

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This article constitutes an introduction to the special issue on "Optimization Models in Environment and Sustainable Development". It specifies the aim of the special issue and presents an overview of 14 papers in the issue.

1 Introduction

Today, sustainable management of the environment and its resources is an issue of vital importance in our contemporary societies and especially in developed societies. The scarcity of resources may well account for this fact. The importance of this problem underlies the necessity for adapting measures aiming at its solution. Many research papers and scientific conferences have been devoted to this direction. The challenge is to combine the high quality of life with a continuing economic growth in a sustainable way over the long term. However, this goal requires multidisciplinary and integrated research effort. Identification and evaluation of the likely environmental, economic and

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social impacts of alternative policies can only be done through scientific models. A vast number of different optimization models and approaches have been developed to assess the impact of a strategy or a policy in terms of sustainable development. Furthermore, the European Union through the Seventh Framework Programme tries to stimulate the scientific community to bring innovative solutions for these problems.

2 Aim of the special issue

This special issue entitled "Optimization Models in Environment and Sustainable Development" is focused on recent advances on the ways in which patterns of development can be measured and modeled in the search for sustainability, and also to provide a framework to help decision-makers choose the most appropriate model. This special issue of ORIJ bring together original research, techniques, state-of-the-art surveys, and advanced applications of optimization models in environment and sustainable development. More specifically, this special issue covers topics like decision support systems in environment and sustainable development, analysis of the relation between economic growth and environmental quality, optimization models for environmental systems, waste management planning and optimization, optimization models in forest and agricultural sector and also operational research (OR) case studies in the field of environmental management.

3 Special issue's articles

Each submission to this special issue was peer reviewed by at least two referees. After a reviewing process, 14 papers were finally accepted for publication in the special issue. The papers are organized in two issues.

The current issue begins with the paper by K. Nishide, and A. Ohyama and investigates the relationship between the economic size and growth of a country and the environmental pollution, in a real options framework. The next four papers are related to OR applications on rural sector. The paper by B. Manos, J. Papathanasiou, T. Bournaris, A. Paparrizou, and G. Arabatzis involves the use of multi-criteria mathematical programming models to simulate the impacts on the production plan, income, employment and the environment due to a policy, which increases the price of irrigation water. A. Ragkos, and A. Psychoudakis employ a multi-objective programming approach in order to examine the possibilities of simultaneously achieving environmental goals such as the reduction of agrochemical and irrigation water use. K. Melfou, A. Theocharopoulos, and E. Papanagiotou measure total factor productivity growth in a panel of sheep farms in Greece and assess the relative contribution of technical change, technical efficiency change and scale efficiency change in observed productivity growth using stochastic frontier analysis (SFA). The paper by Z. Andreopoulou, A. Kokkinakis, and T. Koutroumanidis involves the use of the multi-criteria method PROMETHEE II to assess e-commerce websites of fish culture sector. E. Stiakakis, and P. Fouliras propose the use of Data Envelopment Analysis (DEA) to investigate the impact of environmental practices on firms' efficiency, in the ICT-producing sectors. The current issue closes with the paper by P. Mitropoulos, I. Giannikos, and I. Mitropoulos proposing a Mixed Integer Programming (MIP) model to determine the number, sizes and locations of solid waste management facilities.

The second issue begins with the paper by A. Billionnet on optimal selection of forest patches using integer and fractional programming. The second paper by C. Pappis, and N. Rachaniotis considers the problem of scheduling a single fire fighting resource with deteriorating fire suppression times and set-up times. M. Chalikias, G. Kyriakopoulos, and K. Kolovos present two case studies on environmental sustainability and financial feasibility evaluation of woodfuel biomass used for a potential replacement of conventional space heating sources; the first case study is in the northern Greece context and the second case study concerns the nearby Balkan countries. G. Tzolakis, P. Papanikolaou, D. Kolokotronis, N. Samaras, A. Tourlidakis, and A. Tompoulidis study the problem of emissions' reduction of a coal-fired power plant via reduction of consumption through simulation and optimization of its mathematical model. The sixth paper by K. Anagnostopoulos, A. Vavatsikos, N. Spiropoulos, and I. Kraias, involves the use of a new GIS add-in for supporting criterion weight elicitation methods regarding land suitability analysis for natural wastewater treatment systems. The second issue closes with the paper by M. Kourempele, G. Mavrotas, L. Geronikolou, and S. Rozakis presenting an application of multi-objective linear programming for power generation expansion planning on Milos island.

4 Acknowledgements

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