
Editorial

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Biographical note: Peter Nijkamp is a Professor in Regional and Urban Economics and in Economic Geography at the Free University, Amsterdam. His main research interests cover plan evaluation, multicriteria analysis, regional and urban planning, transport systems analysis, mathematical modelling, technological innovation and resource management. In the past years, he has focused his research in particular on quantitative methods for policy analysis, as well as on behavioural analysis of economic agents. He has a broad expertise in the area of public policy, services planning, infrastructure management and environmental protection. In all these fields, he has published many books and numerous articles. He is a Member of editorial boards of more than 30 journals. He has been a Visiting Professor in many universities all over the world. He is the Past President of the European Regional Science Association and of the Regional Science Association International. He is also a Fellow of the Royal Netherlands Academy of Sciences and is an Immediate past Vice-President of this organisation. Since June 2002, he serves as President of the governing board of the Netherlands Research Council (NWO). In addition, he is the Past President of the European Heads of Research Councils (EUROHORCs). In 1996, he was awarded the most prestigious scientific prize in the Netherlands, the Spinoza award.

Daniela-Luminita Constantin is a Professor of Regional Economics at the Academy of Economic Studies of Bucharest and Director of the Research Centre for Macroeconomic and Regional Forecasting of this university. She is also the President of the Romanian Regional Science Association and a member of the Council of European Regional Science Association. She carried out numerous research stages abroad as Fulbright, JSPS, DAAD and Phare-Tempus scholar. She has authored or co-authored a large number of books and articles published in Romania and abroad and has participated in many national and international research project teams. She is the Director of the Romanian Journal of Regional Science. Her main scientific interest concentrates on

strategic assessment methods, regional policy analysis, EU structural assistance, regional competitiveness, regional labour markets, SMEs and entrepreneurship, sustainability, environmental issues and human security.

Sustainability has in the past years become a fashionable concept. Sustainable development, aiming to improve and maintain the well-being of both people and ecosystems, is one of the greatest challenges at the beginning of the 21st century. With its three inter-related key elements – equity, environment and development – sustainable development has recorded an unprecedented interest not only among the public and policy-makers, but also among the worldwide scientific community. The current foci on sustainable development bring about an important concern with the design of sound environmental-economic principles and applicable evaluation methodologies. Accordingly, the scientific research puts a special emphasis on environmental-economic modelling and assessment so as to respond to increasing policy challenges. With this aim in view, a great deal of research concentrates on environmental resource valuation, resource use, material balance, environmental impact, spatial-environmental externalities, multi-criteria decision tools, risk assessment and management, the use of policy scenarios for sustainable development, the integration of institutional and behavioural approaches in environmental analysis, etc. Environmental analysis has indeed become a multi-faceted and mature field of research.

This special issue brings together a series of articles dedicated to the assessment and modelling of environmental resources and risks, launching new channels of investigation in the methodological field and proposing new, useful solutions for environmental policy and management. The various contributions aim to map out new developments in environmental analysis and management. Earlier versions of several articles included in this collection were presented at the 46th Congress of European Regional Science Association which was hosted by the University of Thessaly, Greece, in August 2006. Articles written by other renowned researchers have been subsequently added to the initial nucleus. The volume consists of three main parts, each of them containing four articles.

Part 1 concentrates on *Modelling and assessment of environmental indicators*. The articles in this cluster propose valuable methods and techniques for the construction of composite indicators for sustainability measurement, the valuation of environmental risks, the calculation of numerical estimates of the factors behind changes in CO₂-emissions and the investigation of public awareness with regard to contaminated sites.

In Article 1, Giuseppe Munda, Michela Nardo, Michaela Saisana and Tanja Srebotnjak address the key uncertainties encountered by the mathematical modelling when composite indicators for sustainability measurement are constructed. An empirical case study focused on the Environmental Sustainability Index (ESI), pointing out various possibilities to model and to estimate these uncertainties, is provided. The authors analyse the linear aggregation rules as well as the non-linear/non-compensatory mathematical aggregation convention which can be employed in order to construct composite indicators for a systematic countries' ranking. They emphasise the great importance of both the aggregation system and the selection of the weights for the indicators involved in the development of the ESI. Finally, the differences between the original ESI and its

Monte-Carlo version, which resulted in different groups of leader and laggard countries are discussed.

Article 2, written by Chiara Traversi and Peter Nijkamp, provides a systematic perspective on methods and techniques for quantitative policy-oriented risk valuation in the management of environmental risk in agriculture. In this context valuation can act as a tool for risk qualifying and quantifying, for designing and comparing various policy options so as to select the policy option expected to provide the best result in reducing risk. The article approaches both the primary monetary valuation and the non-monetary valuation and discusses the factors that can be used for the selection of the preferred valuation method. As far as the non-monetary valuation is concerned, a classification which distinguishes four groups of indicators is proposed, namely descriptive indicators/indexes, performance indicators linked to qualitative objectives (aims, goals), performance indicators linked to quantitative objectives (targets, commitments) and risk indicators. The authors reveal the need for an optimal context-specific framework of environmental valuation supported with substantive and causal scientific investigation. In their view, more empirical primary studies on the valuation of environmental risk are necessary in order to allow methodological innovation based on experimentation and to produce a sound body of knowledge to be used for research synthesis.

In Article 3, Jarmo Vehmas proposes a method based on decomposition analysis for calculating numerical estimates of the factors or 'driving forces' behind the change in CO₂ emissions from fuel combustion. These factors refer to changes in carbon intensity of energy supply, efficiency of the energy transformation system, energy intensity of the national economy, economic growth in terms of labour productivity, share of economically active population, and size of population. They are incorporated in a master equation which represents an extended variant of the so-called IPAT identity ($I = PAT$, with I – environmental impact, P – size of population, A – affluence (level of economic activity), T – process of transforming the resources into useful goods). An empirical analysis for 1990–2003 was carried out for the USA, Japan, China, India, Brazil and the European Union (EU-25) as a whole and for each member state.

In Article 4, starting from the importance of cleaning up of contaminated sites, Margherita Turvani, Anna Alberini, Stefania Tonin and Aline Chiabai discuss the results of a survey they conducted among the residents of four Italian cities (Venice, Milan, Naples and Bari). This study is of a big relevance owing to the serious contaminated site problems they are confronted with. The main purpose was to investigate the residents' awareness of the contaminated site problem and to elicit their preferences for corresponding public programmes, probing them extensively on specific priority issues of such programmes. In survey-related technical terms, the authors consider that their results are consistent with a Bayesian updating mechanism, whereby the final attitudes towards the goals of cleanup programmes incorporate the respondents' pre-existing attitudes as well as the information about contaminated sites, current legislation, cleanup technologies and feasibility that was provided in their survey questionnaire.

Part 2 deals with *Spatial policy challenges to environmental resources*. The key foci are on policy challenges to sustainable water use, regional environmental policies for utilising the biomass resources, the use of scenarios for the integrated coastal zone and water resources management, and people's perceptions and attitudes towards economic aspects of urban green spaces.

Article 5, authored by Jasper M. Dalhuisen, Peter Nijkamp and Henri L.F. de Groot brings into discussion the policy challenges to sustainable water use from the perspective

of economic market instruments. From the very beginning, water is approached in terms of scarcity features and policy uncertainty, while highlighting the relevant characteristics of demand and supply, with particular emphasis on the market failures that warrant government intervention to regulate the market. Two controversial issues of the current policy debate – privatisation and liberalisation of water sector – are addressed in relation to the viability of price instruments. The experience of different EU countries and the conclusions of a project comparing several European cities are used in order to suggest interesting lessons that can be learnt with regard to the economics of water use. The article also refers to the possibilities to influence the water supply and demand in accordance with basic sustainability criteria.

In Article 6, Yoshiro Higano, Takeshi Mizunoya, Shintaro Kobayashi, Kiyonori Taguchi and Katsuhiko Sakurai focus on regional environmental policies for utilising biomass resources, considering the negative effects of biomass waste on water pollution and global warming. They explain that there is a trade-off among these effects; usually local governments in charge with water pollution control try to reduce water pollution loads without thinking about the influences on global warming. This situation results in a partial optimisation of environmental management, and therefore a comprehensive framework for evaluation of environmental policies is necessary. The study elaborated by Higano and collaborators brings about a convincing response to this challenge, formulating a simulation/evaluation model that reflects the material balance (for water and air pollutants) and also evaluates the relevant regional environmental policies. The model has been applied in the concrete case of Kasumigaura basin, where a prototype of a biomass utilisation plant has been developed by a joint team of researchers conducted by Higano and his associates in cooperation with the local government. The results indicate that effective use of biomass resources allows simultaneous pursuit of environmental preservation and economic development and underline the importance of cross-sectoral cooperation.

In Article 7, Alexandra Mexa, Giorgos Kallis, Harry Coccossis and Dionyssia Hatzilacou examine the relevance of scenarios as a tool for environmental planning. The theoretical–conceptual approach is accompanied by two case studies reflecting different perspectives and uses of scenarios in two different planning problems. They investigated the integrated coastal zone and water resources management in two Greek islands, namely Rhodes and Naxos. In Rhodes, the scenarios were prepared by a team of experts and high level policy-makers in a top–down manner and the main concern was with their scientific robustness and policy usefulness as an input in the formal spatial planning process. In Naxos, instead, scenarios were prepared by a broad range of stakeholders and citizens following a bottom-up procedure, which facilitated discussions and mutual learning, but also induced a relative weakness in terms of scientific content and integration with policy processes. Hence, one of the most interesting conclusions of this article refers to expected changes in the application of the scenario method, leading to scenarios characterised by scientific robustness and elaborated by a cooperative scheme of various stakeholders, the public at large and experts. The authors also emphasise the need of assessing the use of scenarios in environmental planning, so as to solve both the problems rooted in false expectations and those determined by poor performance.

Article 8, developed by Paschalis Arvanitidis, Konstantinos Lalenis, George Petrakos and Yannis Psycharis, explores people’s perceptions and attitudes towards economic aspects of urban green spaces by means of a questionnaire survey conducted in 11 European cities endowed with very different amounts of urban green space. The research

questions concentrate on aspects such as the demand of urban green, who should pay for the provision and improvement of urban green, to what extent urban green affects the values of land and properties which are in close vicinity, which is the contribution of urban green to urban economic development, or the influence of socio-economic characteristics on the perceptions and attitudes towards green space. The research results have important policy implications and can contribute to providing a solid base for a 'green' development strategy in European cities.

Finally, Part 3 includes articles performing *economic analyses of agriculture and land use*, an issue that is very useful to the decision-making process. Models regarding the optimum allocation of agricultural crops, the control of an invasive plant by a stochastic biological control agent, the impacts of different technology regimes on technical performance in horticulture and the level of social consensus and support for the development of an energy plant based on the use of vegetal biomass are constructed and applied to concrete case studies.

In Article 9, Nava Haruvy and Sarit Shalhevet propose a model for optimising the allocation of agricultural crops considering the environmental impacts, housing value and leisure preferences. The main research goal is to plan the agricultural crops in accordance with the region's major interests. The results of the model demonstrate that a profit maximisation-oriented policy determines a significantly different crop allocation than a social welfare-oriented policy. The trade-offs between the two objectives are analysed as well. The model is applied for a case study in Central Israel, but the authors also discuss the results that would be obtained if the optimisation were applied for the whole country.

Article 10 provides an original approach to the economics of controlling an invasive plant by a stochastic biological control agent. Based on the fact that biological agents may assist in controlling invasions but the biological agent may not be effective, due to stochastic effects of biological control, Morteza Chalak, Arjan Ruijs and Ekko van Ierland analyse to what extent the stochastic effects of a biological control agent affect the optimal choice of control strategies to deal with the invasion of the Californian thistle in New Zealand. With this aim in mind, they developed an optimisation model which derives the path and combination of control options that maximise the expected net present value of returns from a pasture. In terms of policy choices the model demonstrates that environmentally friendly control options at relatively low costs can replace chemicals as a control option usually employed.

In Article 11, Arno J. van der Vlist and Henk Folmer analyse the impacts of different technology regimes on the technical performance of Dutch horticulture applying an input-oriented stochastic production frontier framework consistent with cost-minimising behaviour, which allows for the inclusion of various environmental technology regimes. The data are obtained from a stratified sample of Dutch greenhouse firms. The most important research result shows that after controlling for differences in size and inputs, technical inefficiency is significantly lower for modern environmental technology than for conventional environmental technology. In addition, differences among various modern environmental technology regimes have been found, supporting the hypothesis that the adoption of more advanced technology leads to higher technical efficiency. Finally, the authors launch further research questions seeking to shed light on the controversy regarding the impacts of environmental policies.

Finally, in Article 12, Andrea De Montis and Corrado Zoppi apply the contingent valuation method in order to investigate the level of social consensus and support for the development of an energy plant based on the use of vegetal biomass in Central Sardinia,

Italy. Estimates of ex-ante household willingness to pay are employed, considering that they are important indicators of the social endorsement for the project development. The authors highlight the effectiveness of consensus evaluation techniques in order to increase the level and quality of information of the local communities as well as of the different levels of the public administration and to favour corresponding feedbacks. Clearly, they argue that such techniques can be used only as a suggestion and not to draw final decisions in deterministic terms.

The entire collection of articles in this special issue is characterised by a high degree of originality. It brings about an important contribution to the development of both a novel methodological framework and sound empirical analysis for environmental management from the perspective of modelling and assessing environmental resources and risks. The economic, technological, institutional and behavioural aspects envisaged by the research studies presented in this special issue provide new insights into the complex world of environmentally sustainable development, stimulating the scientific debate and the exploration of further research questions and approaches. We do hope that they will also contribute to the increase in the decision-making process effectiveness as well as to informed risk and uncertainty reduction in environmental resources management.