# Introduction

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**Biographical notes:** Jason Papathanasiou is a Full Time Lecturer at the Department of Marketing and Operations Management, University of Macedonia, Greece. He holds a PhD in Operational Research and Informatics and a Degree in Physics, both from the Aristotle University of Thessaloniki, Greece. He has worked for a number of years in the Technical Institute of Technology in Thessaloniki and on the Universities of Macedonia and Western Macedonia teaching courses such as 'Decision Support Systems', 'Web Programming' and 'Operational Research'. He has participated in a number of national and EU funded projects and has published his work in international scientific peer referred journals.

John Wang is a Professor in the Department of Management and Information Systems at Montclair State University, USA. Having received a scholarship award, he came to the USA and completed his PhD in Operations Research from Temple University. He has published over 100 refereed papers and six books. He has also developed several computer software programs based on his research findings. He has served as a Guest Editor and Referee for many highly prestigious journals. *He has served as track chair and/or session chairman numerous times on the most prestigious international and national conferences.* His long-term research goal is on the synergy of operations research, data mining and cybernetics.

Environmental decision making and governance is nowadays exercised by numerous actors, both state and non-state, such as NGOs, international organisations, government agencies, private sector enterprises and local communities. Facilitating interaction between them, while at the same time focusing on sustainable use of Earth's resources, has been a key challenge for developed and developing countries alike. The complexity of the problem has been amplified by factors like climate change and biodiversity loss. This has focused current research trends on the tools and methods used by decision makers to produce successful long-term environmental policies and achieve sound

environmental management procedures and sustainable development. The need to have a working knowledge of environmental issues is not confined to environmental scientists, engineers and policy makers; researchers from all scientific areas are challenged to participate in the development of such tools and methods, which may then be used by the decision makers to improve their environmental performance and effectiveness. This issue disseminates research on newly emerged methodologies aimed at improving environmental governance and decision making, in the hope of contributing positively to the debate.

Many scholars sought to contribute to the development of principles for effective sustainability assessment (Pope and Grace, 2006). For instance, Salo (2008) found that both the corporate governance and corporate environmental performance share a common predictor – disclosure. Gill (2008) emphasised that corporate social responsibility (CSR) has increasingly focused on corporate governance as a vehicle for incorporating social and environmental concerns into the business decision-making process. Having conducted a meta-analysis of 47 case studies, Newig and Fritsch (2009) explored whether and to what extent the existence of multiple levels of governance affects the ability of participatory decision making to deliver high-quality environmental policy output and to improve implementation and compliance. This special issue provides the newest developments in this area.

In the first paper of this issue, Konstantinos Ioannou, Panagiotis Lefakis and Garyfallos Arabatzis (Greece) report that there is a great diffusion of modern information systems in all areas of science. In the specific case of forestry, new information tools have emerged during the last 15 years which have helped to improve the work of foresters. Decision support systems (DSS) are applications which are designed to help managers by accelerating relevant decision-making processes, while simultaneously focusing on the conservation of natural, financial and human resources. In their paper, the authors describe the development of a DSS which has been designed to help managers in decision making in relation to areas that have been burnt by forest fires. In addition, this DSS system provides the user with the capacity to create hypothetical (what-if) scenarios in order to identify the best form of intervention. The relevant software was created using Visual C# and the weights of the various parameters were calculated using multi-criteria decision analysis (MCDA).

Sathaporn Monprapussorn, Danai Thaitakoo and Ruth Banomyong (Thailand) examine hazardous materials (HAZMAT) transport, as this is a vital logistic activity from the supply of raw materials to production units. There are accident risks associated with trucks being involved in HAZMAT shipment. The severity of impact on the surroundings will depend on factors such as distance and/or time, accident rate, population density, the number of sensitive locations, an ability to mount rescue operations, etc. It is essential that all criteria and factors be considered prior to HAZMAT decision making. The availability of data and a lack of a comprehensive analytical framework to select the best possible route is a major concern in many countries, especially in less-developed economies where lowest cost is the main driver. The main purpose of this paper is to present a HAZMAT transport framework based on the sustainability paradigm by the application of a MCDA and geographic information systems (GIS) for optimum route planning. A number of sustainability criteria and factors are proposed and categorised into three main groups: economic, environmental and social issues. The framework development processes, goals, methods and tools, are described. The proposed framework can be useful in the planning process of governmental policy makers and

carriers and/or shippers when they need to evaluate possible sustainable routes and minimise the potential damage from HAZMAT transport.

Kristjan Piirimäe (Estonia) explains that successful design of environmental decision support systems (EDSS) depends on an accurate understanding of relevant behavioural and decision-making processes in the human mind. EDSS could provide variable types of assistance in various decision steps. Issue definition and criteria-setting require articulation of the problem universal decision frameworks and the Socratic Method. Option generation needs support through the provision of various creative environments. In the option assessment step, computers provide support for arithmetic computations, deductive reasoning and stimulating intuition. Due to conceptual and technical inconsistencies, pipelining of all simulation tools to a universal environmental supermodel remains impossible. However, a toolbox approach might organise various independent tools in the issue definition phase. Efficient design of artificial intelligence depends on the input of experts from various knowledge domains. In addition to reasoning and creativity experts, an environmental management knowledge base might be improved by the involvement of representatives of social control. Instead of leading to sustainable decisions, a functioning EDSS may facilitate ecological degradation. Environmentally harmful behaviour may result from the computational outputs of an overly simple economic module of EDSS which ignores the importance of reputation. However, even a perfectly designed EDSS could enhance sustainable behaviour only in local and short-term cases.

In the fourth paper, Dimitra B. Manou (Greece) proposes a theoretical framework for improving environmental decision making and assessing the environmental performance of Multilateral Development Banks (MDBs) – a hitherto unnoticed parameter of global environmental governance. A methodology is developed by setting the criteria for exploring the integration of environmental concerns in the financing activities of the best-known MDBs: World Bank, African Development Bank, Asian Development Bank, Inter-American Development Bank and European Bank for Reconstruction and Development. It is argued that the proposed criteria may serve as the basis for further research that will permit researchers to

1  examine the level of integration of the concept of sustainable development in project financing

2  acknowledge the similarities and differences among the environmental policies of the MDBs

3  improve environmental decision making and rule making in these organisations.

In the last paper of this issue, Professor S.M. Fakhrul Islam (Bangladesh) argues that intrusion of saline water and soil salinity is a major threat of climate change to coastal agriculture. In the coastal area of Bangladesh, rice is the most important crop affected by salinity during the summer season. The objective of his paper is to develop tools for *ex ante* cost-benefit assessment with an integration of the knowledge of farmers, industry experts and scientists to develop new salinity- and drought-resistant transgenic rice varieties in response to climate change in Bangladesh.

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