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"Gheorghe Asachi" Technical University of Iasi, Romania

EDITORIAL

A SPECIAL ISSUE ON

PROGRESS IN ENVIRONMENTAL ENGINEERING, BIOTECHNOLOGY AND MANAGEMENT IN THE FRAME OF KNOWLEDGE-BASED SUSTAINABLE ECONOMY

Exploratory Workshop, 19-21 September 2012

"The Exploratory Workshop ***„Progress in Environmental Engineering, Biotechnology and Management in The Frame of Knowledge-Based Sustainable Economy*"** took place in the context when worldwide research shows that the current industrial system supports a population that use resources and generates waste, consuming the Earth's supply, but who's biocapacity is far outweighed by the increased demand of products for a development system that often works on unsustainable bases.

Today's challenge is the integration of environmental sustainability with economic growth and prosperity, by decoupling environmental degradation from economic growth, to do "more with less".

Economic growth in the last 3-4 decades generated a double environmental impact on the planet. In 2000, the end of the twentieth century, humanity's ecological footprint was 1.3 times greater than its biocapacity, and the prognoses showed that by keeping the current model of production and consumption, in 2050, the ecological footprint will be equivalent to needing 2.4 planets.

Estimates show that each year, the Member States produce approximately 2 billion tons of waste, which annually increases by 10%, while CO_2 emissions from domestic and mobile (transport) sources also increase as a result of "non-green energy" consumption. Experts showed that more than 30% of greenhouse gas emissions derived from industrialized countries. Business community, governments and consumers respond in a different way to this issue, but the complexity and variety of approach angles increase the difficulty to identify and implement coherent action programs to diminish the impact of industrial systems on environmental quality.

In this context, the main goal of the workshop was to address major concerns for the future of ecological systems and economic policy in a very populated world, characterized by major social and economic disparities. In this context it is intended to generate a framework for understanding and formulation of actions meant to develop feasible solutions, taking into account a variety of institutional, social and international perspectives.

The workshop covers the following thematic directions:

- *sustainable industrial production and consumption, process integration*
- *integrated management of waste throughout the whole lifecycle, in order to reduce the environmental impact*
- *clean technologies in correlation with the best available techniques*
- *integration of pollution prevention alternatives with economic and social issues in industrial systems*
- *integrated management of water resources, treatment and management of industrial and municipal effluents*
- *biotechnology in environmental protection and sustainable industrial systems*

- *climate change, reducing greenhouse gas emissions and alternative energy*

- *education and knowledge, environmental policy, environmental awareness and attitudes in the context of sustainable development of a knowledge society.*

To cover these issues, invited plenary key-lectures, as well as invited conferences (key-lectures) within three roundtables were presented. Each roundtable began by a PhD thesis defense, with a presentation held by a PhD student, who prepared and defends her thesis in accordance with the roundtable topic, and then, the keynote speakers and the other participants discussed on the roundtable and workshop topics (even asking question to the PhD student).

Eight plenary lectures were presented, held by Professor **Akos Redey**, from University of Pannonia, Hungary; Professor **Carmen Teodosiu** from "Gheorghe Asachi" Technical University of Iasi, Romania; Professor **Hans Bressers**, from University of Twente, The Netherlands; Professor **Antonio Marzocchella**, form University of Studies of Naples, Frederico II, Italy; Dr. **Cheryl de Boer**, from University of Twente, The Netherlands; Associate Professor **Igor Cretescu** from "Gheorghe Asachi" Technical University of Iasi, Romania, Associate Professor **Carmen Catalina Ioan** from "Gheorghe Asachi" Technical University of Iasi, Romania.

Also, it was revealed and analyzed the contribution of the *Environmental Engineering and Management Journal* (http://omicron.ch.tuiasi.ro/EEMJ/) edited by the *Department of Environmental Engineering and Management* of the "Gheorghe Asachi" Technical University of Iasi and that of the series of the *International Conferences on Environmental Engineering and Management* [(www.iceem.eu), (both celebrating 10 years after their launch in 2002), to the advances in environmental engineering, biotechnology and environmental management in the context of a knowledge based sustainable economy.

Therefore, the lectures presented by invited keynote speakers, together with discussions, analyzes and proposed roundtables held in the workshop with the active participation of doctoral students, postdoctoral researchers and students revealed the worldwide latest research and achievements, as well as on European, regional and national levels, considering some changes in the current model of development and consumption. Also, all these involvements highlighted the existing link between development and knowledge and made public the actual and potential contribution of Romanian researchers to develop knowledge-based society.

This scientific framework motivated and demonstrated that science and technology can provide the necessary support to make decisions more efficiently in the use of resources, minimize material and energy flows to and from the environment and closing of substance cycles and energy.

Another objective of the workshop was to highlight the important role of stakeholders in maintaining and improvement of the quality of the anthropogenic global system in bi-univocal relationships with the natural environment in a harmonious concert, in which academia, research poles and actors in the technical-economic system must cooperate to develop and apply the best available techniques in production systems and services. In this generous context, young researchers: students, PhD students, postdocs found a fertile training ground for the implementation of sustainable development principles, to monitor the progress of an economic system based on knowledge.

Some key findings were highlighted:

- Science, technology and industrial policies should be integrated to maximize performances and well-being in ***knowledge-based economies*** – directly based on the **production, distribution and use of knowledge and information**.
- In addition to knowledge investments, **knowledge distribution through formal and informal networks is essential to economic performance.**
- The lectures presented by invited keynote speakers, together with discussions, analyses and proposed roundtables held in the workshop with the active participation of doctoral students, postdoctoral researchers and students **revealed the worldwide latest research and achievements, as well as on European, regional and national levels**, **considering some changes in the current model of development and consumption.** Also, all these involvements **highlighted the existing link between development and knowledge and made public the actual and potential contribution of Romanian researchers to develop knowledge-based society.**
- The scientific framework generated during the whole workshop **motivated and demonstrated that science and technology can provide the necessary support to make decisions more efficient in the use of resources, minimize material and energy flows to and from the environment and closing of substance cycles and energy.**
- One of the most important outcome of the workshop is that in the knowledge-based economy, **the science system contributes to the key functions** of: i) ***knowledge production*** – developing and providing new knowledge; ii) ***knowledge transmission*** – educating and developing human resources; and iii) ***knowledge transfer*** – disseminating knowledge and providing inputs to problem solving.
- It was agreed that the sustainability of a process or product should be assessed not only based on environmental requirements for eco-innovations, because any research should look at all innovations offering benefits compared to relevant alternatives, not just environmentally motivated, but also from

technico-economic perspectives (frequently there are multiple aims). Therefore, a multicriterial analysis could be recommended for the evaluation of any scenario or alternative which address a new process or products.

- The discussions have shown that university/industry collaborations bring with them **opportunities to amplify the weight of the educational mission of the University and to stimulate new research directions**.
- The upcoming idea and possible future development in different countries, sectors and industries, given empirical evidences of the case studies applied in several European countries, are able to motivate the importance of insight workout to design policies, prevent uncontrolled risks and anticipate alternatives.
- The relevant role played by the ***Environmental Engineering and Management Journal*** and the series of International ***Conferences on Environmental Engineering and Management*** (ICEEM) Conferences must be enhanced, since both bring new and added values to the teaching and research activities within the field of Environmental Engineering and management, contributing to the enlargement of cooperation in Romania and in Europe.
- A network was established among three Romanian Universities ("Gheorghe Asachi" Technical University of Iasi, Romania, University Politechnica of Bucharest, University Transilvania of Brasov) and The European Universities represented by Vienna University of Technology, Austria, University of Twente, The Netherlands, University of Studies of Naples Frederico II, University Pannonia, Hungary.
- This network will be active in the following areas of activities:

- extension of the *Joint Doctoral Supervision Agreements*;
- extension of *Erasmus* agreements in terms of staff and students mobilities, as well as within *Erasmus Mundus* framework
- a COST network and development of an application according to the workshop thematic issues for a call in 2013
- participation in regional and European programmes
- cooperation within the frame of *Environmental Engineering and Management Journal* on short, medium and long terms
- collaboration for organizing and support in scientific terms the 7th edition of the *International Conference on Environmental Engineering and Management*

It is therefore increasingly important to think about knowledge-based sustainable economy, based on the progress in environmental engineering, biotechnology and management in a long term, to build policies and strategies that address the nature of rapid and continuous changes in science and technology, as well as in the daily life. In this sense, forethought training become crucial as tools to visualize possible futures, emphasizing and highlighting the benefits and constraints that present policies can have in a near or a more distant future.

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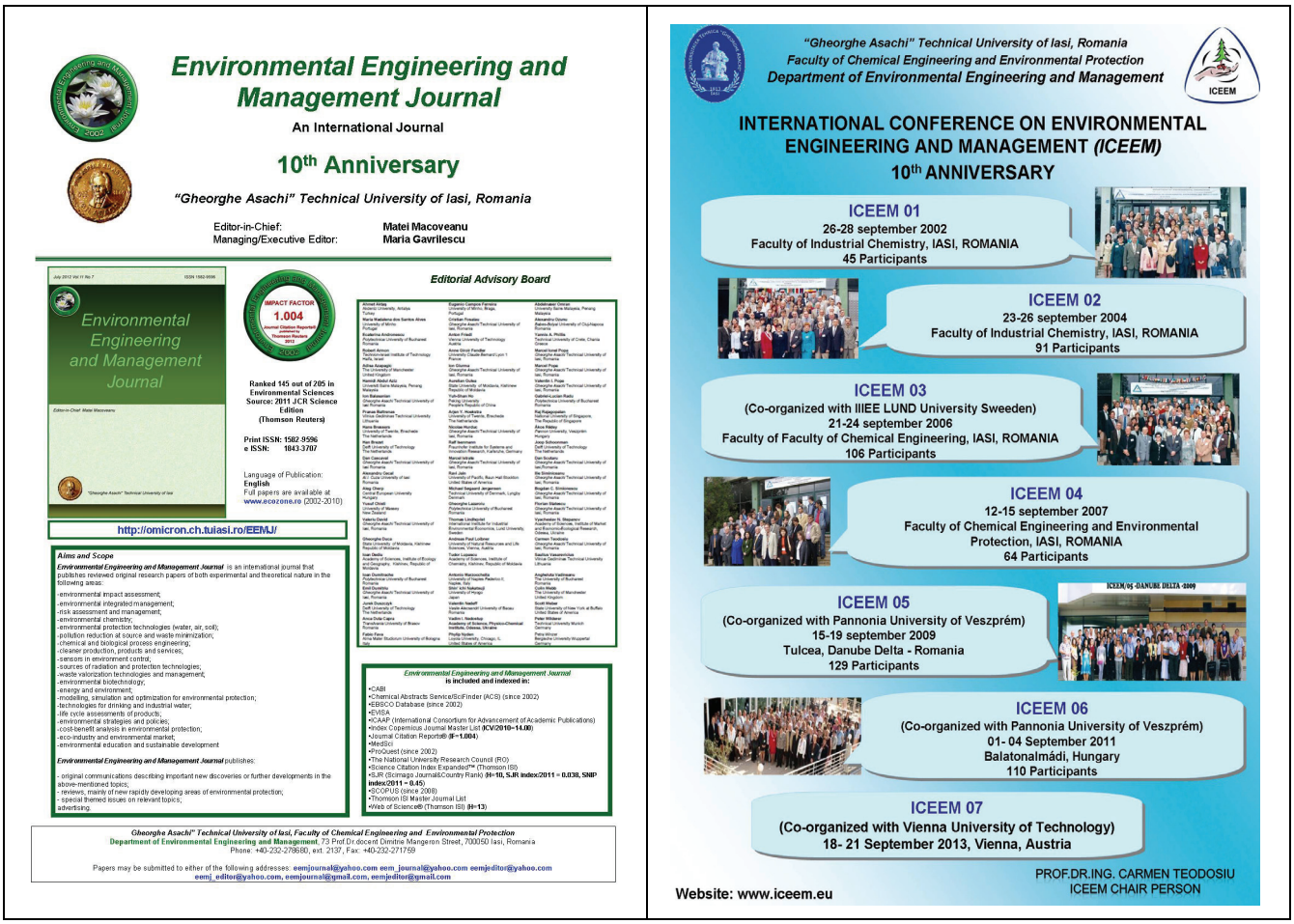
Guest editors:
Professor Maria Gavrilescu
Gheorghe Asachi Technical University of Iasi, Romania
Professor Anton Friedl
Vienna University of Technology, Vienna, Austria



Maria Gavrilescu (1956) is a *Professor* at the Department of Environmental Engineering and Management, within the Faculty of Chemical Engineering and Environmental Protection of the *Gheorghe Asachi* Technical University of Iasi, Romania, *Project Director* of the over 40 grants and research themes, and *Managing Editor* of *Environmental Engineering and Management Journal*. Her research interest includes: chemical and biological process engineering, biotechnology/ environmental biotechnology, environmental risk assessment and management, industrial safety, integrated pollution prevention and control, sustainable industrial production, eco-design, ecotechnologies, cleaner production, environmental evaluations. She is author or coauthor of 18 books and six chapters, and published more than 300 paper (116 in ISI ranked journals). She is a member of the Group of Experts of *Environmental Biotechnology* section – European Federation of Biotechnology – and Corresponding Member of the Academy of Romanian Scientists.

Anton Friedl (1958) is a *Professor* at the Institute of Chemical Engineering within the Vienna University of Technology, Vienna, Austria. His teaching and research activities include areas such as chemical engineering, environmental engineering and biotechnology, and simulation of complex processes. He developed and continues to perform numerous activities with scientific character and within International Federations and Scientific Committees. Since 2008, professor Friedl is a member of the Scientific Advisory Board of *Environmental Engineering and Management Journal.*
He received the Following awards and titles: Prize for the best PhD Thesis (1991); award for research in engineering, Awarded by the *Viennese Chamber of Economics*, VA-TECH special prize for invention "CO_2-Reduction Processes Involving Energy Consumption by Avoiding Greenhouse Gas Formation". In 2008, Professor Friedl awarded the title of *Doctor Honoris Causa* of the "Gheorghe Asachi" Technical University of Iasi, Romania. He is author or co-author of numerous publications (over 250) in specialized scientific journals and proceedings of conferences. He is currently head of research groups: *Thermal Process Engineering and Simulation and Process Engineering Sustainable and Chemometrics* within the Institute of Chemical Engineering, Vienna University of Technology.