Laboratory of Operations Research
Department of Economics
School of Economics and Business
University of Thessaly

Department of Ichthyology and Aquatic Environment
School of Agricultural Sciences
University of Thessaly

7th Conference

"Economics of Natural Resources & the Environment"

Friday 26 - Saturday 27 November 2021

http://envecon.econ.uth.gr/main/

University of Thessaly – Department of Economics

University of Thessaly - Department of Ichthyology and Aquatic Environment

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Introduction

Dear,

Invited guests, Colleagues and Students,

On behalf of the Scientific and Organizing Committee, I welcome you to the 7th Conference on "Economics of Natural Resources and the Environment". The Laboratory of Operations Research in the Department of Economics of the School of Humanities and Social Sciences at the University of Thessaly organized successfully under the research project COOPERATION 2011 and the project entitled "Greenhouse Gas Emission Scenarios and Policies to Combat them by the year 2030, of Energy, Transport and Industry in Greece" the first two Pan-Hellenic Conferences on the Economics of Natural Resources and the Environment: Climate change on 26-27th March 2014 and October 31st and November 1st , 2014. Then the successful organization of the 3rd & 4th Pan-Hellenic Conference on Economics of Natural Resources and the Environment followed, on October 30-31st, 2015 and on November 4-5th, 2016. Continuing this effort, the 5th ENVECON Conference was organized on November 1st-3rd, 2018 in the Department of Economics of the University of Thessaly at Volos. The 6th ENVECON Conference was held online, due to the COVID-19 pandemic, on June 11-12th, 2021 and it was jointly organized by the Laboratory of Operations Research of the Department of Economics University of Thessaly and the Department of Economy and Sustainable Development of the Harokopio University.

The 7th ENVECON Conference is held online, due to the COVID-19 pandemic, on November 26th-27th, 2021 and it is jointly organized by the Laboratory of Operations Research of the Department of Economics University of Thessaly and the Interdepartmental Postgraduate Studies Program Education for Sustainability and the Environment of the University of Thessaly with emphasis to "Environmental Awareness and Education".

The conference aims to present the main issues that concern the Economics of Natural Resources and the Environment and the recent scientific research on the field. The main focus will be given on sustainability and effective environmental management, while research on the environmental and social impacts of the recent COVID-19 pandemic will also be presented. The conference aims to promote the exchange of views and experiences of researchers from different scientific fields and the finding of common components of research approaches, since the environment is governed from interdisciplinarity.

The conference schedule consists of 8 Sessions that include the following fields of research: *Environment and the Economy, Environmental Management and Valuation, Environmental behaviour and practices, Sustainable Transport, Environmental Education, Energy Issues & Policies, Environmental Policies and Assessment and Quantitative Methods in Environmental & Resource Economics.*

These 8 sessions will provide us the opportunity to learn about the scientific research and the scientific outcomes of the academic and research institutes that are participating in the conference. Due to the multidimensional nature of the environment and the interdisciplinarity that is governing the field, the conference will cover a lot of the areas associated with the environment, showing once more the importance of the cooperation of different scientific fields when studying about environmental protection and management.

I would like to welcome and thank the keynote speakers of the conference, Professor Nikos Georgantzis, Associate Professor Nikoleta Jones, Professor Stefanos Paraskevopoulos and Professor Konstantina Skanavis who accepted the invitation to present their long-term remarkable research experience on topics relevant to the conference.

I would also like to thank the participants, not only of the current conference but of the previous ones as well. Their support to this scientific effort is significantly important and fosters even more our efforts to contribute to the development of Economics of Natural Resources and the Environment. Personally, I promise to continue the conference at the highest possible level at a time, continuing to promote important research findings regarding sustainable development, environmental protection and natural resources management, at both theoretical and applied levels.

I hope that all academics, researchers and students, who participate in the Conference and who either present their research results or learn and value the work of other researchers, have a pleasant and constructive experience of the attendance of the Conference.

Conference Scientific Coordinator

Professor George E. Halkos (PhD)

Director of Laboratory of Operations Research
Department of Economics
School of Economics and Business
University of Thessaly, Volos, Greece

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Concise Conference Schedule		
Day	**Time** (Greek Time)	**Sessions-Topics**
Friday 26/11/2021	**09:15-09:45**	**OPENING – WELCOME**
	09:45-11:15	**Session 1:** **Energy Issues & Policies**
	11:15-12:00	**Keynote Speaker** *Professor* Nikos Georgantzis
	12:00-13:45	**Session 2:** **Environment and the Economy**
	13:45-14:15	Break
	14:15-15:00	**Keynote Speaker** *Dr Nikoleta Jones*
	15:00-16:30	**Session 3:** **Environmental behaviour and practices**
	16:30-18:00	**Session 4:** **Sustainable Transport**
Saturday 27/11/2021	**09:15-11:15**	**Session 5:** **Environmental Education**
	11:15-12:00	**Keynote Speaker** *Professor Stefanos Paraskevopoulos*
	12:00-13:30	**Session 6:** **Environmental Management and Valuation**
	13:30-14:15	Break
	14:15-15:45	**Session 7:** **Environmental Policies and Assessment**
	15:45-16:30	**Keynote Speaker** *Professor Konstantina Skanavis*
	16:30-18:20	**Session 8:** **Quantitative Methods in Environmental & Resource Economics**
	18:20-18:30	**CLOSING & FINAL GIVEAWAYS**

CONFERENCE SCHEDULE

Friday 26 November 2021

Opening - Welcome 09:15-09:45

Greeting from the Rector of University of Thessaly Prof. Zissis Mamouris
Greeting from the Dean of the School of Agricultural Sciences, Prof. Nikolaos Danalatos
Greeting from the Dean of the School of Economics and Business, Prof. Christos Kollias
Greeting from the Head of the Department of Ichthyology & Aquatic Environment, Prof. Dimitrios Vafidis
Greeting from the Head of the Department of Economics, Prof. Hlias Kevork

Welcome from the Director of Interdepartmental Postgraduate Studies Program Education for Sustainability and the Environment Associate Professor Steriani Matsiori

1st Session 09:45-11:15

Topic: **Energy Issues and Policies**

Chairperson: **Professor George Halkos**

09:45-10:05	*Energy poverty in rural areas in Greece* Giorgos Giannopoulos, Sofia-Natalia Boemi & Argyro Dimoudi
10:05-10:25	*Household energy poverty: Evidence from Greek households during COVID-19 pandemic* Ioannis Kostakis & Eleni Sardianou
10:25-10:45	*Coping with Energy Poverty* George E. Halkos & Eleni-Christina Gkampoura
10:45-11:05	*How has COVID-19 Impacted Electricity Production Tendencies? An Environmental Investigation of Germany, France, and Italy* Farhang Raymand & Dimitrios Papadopoulos
11:05-11:15	Discussion

Keynote Speaker **11:15-12:00**

Topic: "Environmental innovation and firm profitability"
Professor Nikos Georgantzis
Burgundy School of Business, Dijon France

2nd Session **12:00-13:45**

Topic: **Environment and the Economy**

Chairperson: **Assistant Professor Kyriaki Tsilika**

12:00-12:20	*Climate reporting in EU: from NFRD to CSRD and beyond. Implications for Greece* Benjamin Karatzoglou
12:20-12:40	*Sustainable banking practices and customer satisfaction: Empirical evidence from Generation Y* Athanasia Stauropoulou, Eleni Sardianou, Georgios Malindretos, Konstantinos Evangelinos & Ioannis Nikolaou
12:40-13:00	*The socioeconomic and environmental impact of exploration and exploitation of hydrocarbons in maritime areas and the case of Greece* Andreas Stergiou
13:00-13:20	*Uncertainty effects and environmental determinants of Bitcoin's price crash risk during the COVID-19 pandemic* Nikolaos A. Kyriazis
13:20-13:40	*Strategic spatial planning for optimal deployment of fire resources for the protection of natural and built environment from wildfires in the light of climate change* Stavros Sakellariou, Olga Christopoulou & Sophoclis Dritsas
13:40-13:45	Discussion

Keynote Speaker **14:15-15:00**

Topic: "The new EU Biodiversity strategy: Opportunities and socio-economic challenges"

Dr Nikoleta Jones
Associate Professor Institute for Global Sustainable Development
University of Warwick, UK
Deputy Director at Institute for Global Sustainable Development
Director of Research for the School for Cross-Faculty Studies

3rd Session **15:00-16:30**

Topic: **Environmental Behavior and Practices**

Chairperson: **Associate Professor Konstantinos Evangelinos**

15:00-15:20	*Consumer perceptions for bioplastics: Notes from the field* Antonios Skouloudis & Altani Panagiotopoulou
15:20-15:40	*Consumer preferences for bio-based products: Preliminary findings from an ongoing investigation* Antonios Skouloudis, Altani Panagiotopoulou & Chrisovalantis Malesios
15:40-16:00	*Workplace human rights assessment in sustainability reports: An overview of the United Kingdom market* Stefanos Fotiadis & Konstantinos Evangelinos
16:00-16:20	*Honeybee Pollination Services: Challenges and Opportunities for Beekeepers and Farmers in Greece* Simeon Marnasidis, Garyfallos Arabatzis, Fani Hatjina, Chrisovalantis Malesios & Efstathia Verikouki
16:20-16:30	Discussion

4th Session 16:30-18:00

Topic:	**Sustainable Transport**
Chairperson:	**Professor Vasilios Profillidis**
16:30-16:50	*Investigation of changes in the transport habits in Greece due to COVID-19 pandemic* Athanasios Galanis, Dimitra Tsiantoula, Nikiforos Botzoris, Vassilios Profillidis & Panagiotis Lemonakis
16:50-17:10	*Mega Infrastructure Projects and their contribution to Sustainable Development. The case study of the Athens Airport, Eleftherios Venizelos* Roido Mitoula & Angelos Papavasileiou
17:10-17:30	*Driver distraction of cyclists in urban environment: A methodological approach* Dimitrios Kontos, Panagiotis Lemonakis, George Botzoris, Athanasios Galanis & Nikolaos Eliou
17:30-17:50	*New Trans-Arctic shipping routes: Opportunities and challenges for shipping and maritime transport* Joniada Tahiraj & Antonios Skouloudis
17:50-18:00	*Discussion*

Saturday 27 November 2021

5th Session **09:15-11:15**

Topic: **Environmental Education**

Chairperson: **Associate Professor Steriani Matsiori**

09:15-09:35	*Environmental Literacy and Climate Change Perceptions of Primary School Teachers* Chrysovalantis Kalessopoulos, Anastasia Gkargkavouzi & Steriani Matsiori
09:35-09:55	*Energy literacy assessment of Greek secondary students* Konstantinos Kougias, Eleni Sardianou, Anna Saiti & Konstantinos Tsagarakis
9:55-10:15	*Environmental education and sustainability* Ioanna Grigoriadou, Ourania Gkouna & Georgios Tsekouropoulos
10:15-10:35	*Effective educational units: Perceptions & Attitudes of the teachers of public primary schools of the Prefecture of Thessaloniki* Eleni Vlachoudi, Georgios Tsekouropoulos & Nikolaos Katsonis
10:35-10:55	*Educate environmentally conscious teenagers through music and movement* Vasiliki Tsekouropoulou, Vasileios Kasmeris & Eleni Tsompanaki
10:55-11:15	Discussion

Keynote Speaker **11:15-12:00**

Topic: "From environmental education to Education for Sustainable Development"
Professor Stefanos Paraskevopoulos
Department of Special Education, School of Humanities, University of Thessaly
Vice Rector of Administrative Affairs

6th Session 12:00-13:30

Topic:	**Environmental Management and Valuation**
Chairperson:	**Assistant Professor Antonis Skouloudis**
12:00-12:20	*Economic valuation of «Prepaid Bag - Pay As You Throw (PAYT) System» and «Rewarding Recycling Program»: Case Study of the Municipality of Kozani* Theodoros Adamidis & Dionysis Latinopoulos
12:20-12:40	*Ground management and environmental impact* Ourania Eftychiadou
12:40-13:00	*Precision Forestry Prospects in Greece* Christiana Koliouska
13:00-13:20	*Corporate Social Responsibility, Sustainability Reporting and Forest Fires: Evidence from the 2018 Megafires* Eleni Stathi & Konstantinos G. Papaspyropoulos
13:20-13:30	Discussion

7th Session **14:15-15:45**

Topic:	**Environmental Policies and Assessment**
Chairperson:	**Professor Roido Mitoula**
14:15-14:35	*National budget and environmental subsidies: Optimal management and a dynamic game* George E. Halkos, George J. Papageorgiou, Emmanuil G. Halkos & John G. Papageorgiou
14:35-14:55	*The alignment of Greece with the Environmental Law of the EU: Historical development, current trends and critical implications* Georgios A. Moutsinas, Georgios Meletiadis, Dimitrios S. Prampromis, Zoi Patetsou, Konstantinos D. Patitsas & Sophoklis E. Dritsas
14:55-15:15	*Environmental taxes and their use in European Union* Stavros Tsiantikoudis, Spyros Galatsidas, Anastasia Paschalidou, Eleni Zafeiriou, Garyfallos Arabatzis
15:15-15:35	*Aspects of environmental policies in Athens during the Classical period under an economics perspective* George Halkos, Emmanuil Marios Economou & Nickolaos Kyriazis
15:35-15:45	Discussion

Keynote Speaker **15:45-16:30**

Topic: “"Ecotherapy" with a University prescription”
Professor Constantina Skanavis
Head, Research Unit of Environmental Education and Communication
Laboratory of Hygiene and Epidemiology
Vice Chair, Department of Public and Community Health, University of West Attica

8th Session **16:30-18:20**

Topic: **Quantitative Methods in Environmental & Resource Economics**

Chairperson: **Professor George Halkos**

16:30-16:50	*Spillovers, Technological Hierarchies, and the environmental effects through clean technologies adoption* Nikos Chatzistamoulou, Kostas Kounetas
16:50-17:10	*Two stage DEA and environmental elasticities of polluting DMUs* George Halkos & Christina Bampatsou
17:10-17:30	*A multi-criteria methodology for off-grid small settlements* Evangelos Tsiaras & Frank A. Coutelieris
17:30-17:50	*Testing causalities within the Eurozone economic space at the interface of energy and tourism* George Ekonomou
17:50-18:10	*Use of indexes in evaluating environmental and health efficiency* George Halkos & Georgia Argyropoulou
18:10-18:20	Discussion

Closing **18:20-18:30**

Topic: Closing & Giveaways
Professor George Halkos
Department of Economics, School of Humanities and Social Sciences, University of Thessaly

ABSTRACTS

Energy poverty in rural areas in Greece

Giorgos Giannopoulos, Sofia-Natalia Boemi & Argyro Dimoudi
Laboratory of Environmental and Energy Design of Buildings and Settlements, Department of Environmental Engineering, Democritus University of Thrace, Xanthi
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Abstract
More than a quarter of a century since Boardman's (1991) seminal book on fuel poverty, the concept of energy or fuel poverty has attracted as much attention as ever. It now has a prominent representation in academic literature and the policy seeking to mitigate poverty.
Energy poverty is usually expressed as a condition where households cannot afford to adequately heat or cool homes due to low-income levels or, more broadly, as the inability to attain a socially and materially necessitated level of domestic energy services. In the context of developed countries, energy poverty research has focused on the problem of inadequate leaving conditions and energy accessibility and affordability.
The paper presents research about energy use issues, including energy access and quality, expenditure concerning income, built environment-related aspects and thermal comfort levels in the region of Pieria in Greece. The sampling data are from in-situ audit interviews with a structured questionnaire.
The results showed an inability to adequate heating during winter that is not associated with income but mainly with the heating system and the occupation. Finally, research showed that economic instability affected mainly the middle class. Therefore, measures in favor of energy efficiency aiming to increase households' purchasing power must be at the national level.

Keywords: Energy poverty, Greece, qualitative data analysis

JEL Codes: P18; P4; Q4.

Household energy poverty: Evidence from Greek households during COVID-19 pandemic

Ioannis Kostakis & Eleni Sardianou

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Abstract

The COVID-19 health crisis has led states to redefine their goals and prioritize citizens' health over economic policies. The curfew imposed to control the pandemic has created multiple financial problems. People adapted their daily life and way of life to the new conditions. These included, among other things, a reduction in the income of many workers combined with a reduction in travel and an increase in teleworking from home. Thus the needs of consumers for energy consumption inside the home increased significantly due to their stay at home. This study studies the inability of households to meet their needs and obligations regarding energy consumption within their home. The research was conducted electronically with the participation of a sample of Attica residents during the first phase of the pandemic (April-June 2020). The sample consisted of a total of 850 households that were asked to answer for the cost they paid for energy before and after the pandemic as well as if they were unable to meet their energy needs. Econometric models were evaluated for the purposes of the research. According to the results, household energy costs increased during the pandemic and the percentage of households classified as energy poor is increased. The econometric results suggest that the factors that affect his energy ability are, among other things, telework time, the number of family members and household income. Households have expressed a willingness to develop energy-saving actions, or to change energy lanes due to the increased needs of family members for energy consumption.

Keywords: Energy poverty, Households, COVID-19 pandemic, Regression models

JEL Codes: Q40; Q59; D19; Q56

Coping with Energy Poverty

George E. Halkos & Eleni-Christina Gkampoura
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Abstract
Energy is an important factor of socioeconomic development and is essential for the satisfaction of basic human needs. Access to energy should be ensured for everyone in the world in order to promote people's welfare. Energy poverty usually refers to a situation where people cannot keep their homes adequately warm, but it is a complex issue with a multi-dimensional nature and many more aspects. This paper presents a review of the energy poverty problem, presenting various definitions given in the literature, identifying the impacts of the problem as well as the drivers that can worsen energy poverty conditions in general. In addition, the Sustainable Development Goals that are linked directly and indirectly with the problem of energy poverty are analyzed. The situation occurring in Europe is also examined: energy poverty is measured for 28 European countries and for the time-period 2004-2019, using a composite measurement and highlighting the countries with the highest and lowest levels of energy poverty, while various drivers of the problem are identified through an econometric analysis. The paper also discusses the different solutions that can help address and tackle the energy poverty problem.

Keywords: Energy poverty, Impacts, Affordability, Sustainable Development Goals, Europe.

JEL Codes: O13; Q01; Q4; Q56.

How has COVID-19 Impacted Electricity Production Tendencies? An Environmental Investigation of Germany, France, and Italy

Farhang Raymand & Dimitrios Papadopoulos
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Abstract
Undoubtedly, the COVID-19 pandemic has caused major issues in education, health systems and economy. This has led to considerable change in trends of consumer behavior everywhere. In this article, we review the implications of the current situation on the energy market. Additionally, many industries went through shutdowns, which in turn has impacted environmental quality. This work considers the electricity profiles of EU's top three energy producers, Germany, France, and Italy. We investigate how the timeline of COVID-19 has impacted the consumption and emission numbers. Supervised machine learning has been used to learn from previous data and predict the daily electricity production in these countries amidst COVID-19. For this process, the most important features are the total cases, the daily cases, the logarithmic of the total cases on 7-day average and the vaccinations. The predictions shows that the model was accurate with R^2 index ≥80%. Furthermore, it is analyzed how different features impact the consumption and to what extent they are correlated amongst themselves. As the vaccination programs are carried out in each country and nations go through a "reopening phase", the electricity market as well as pollution levels have re-stabilized, nevertheless at a lower level compared to the same time in past years.

Keywords: Energy consumption, energy forecast, machine learning, COVID-19.

JEL Codes: O13; P18; P48; Q41; Q47.

Climate reporting in EU: from NFRD to CSRD and beyond. Implications for Greece

Benjamin Karatzoglou, PhD
Researcher
venos@um.edu.gr

Abstract

The last decade EU has been enforcing laws requiring that certain large companies disclose information on environmental, social and governance (ESG) impact of their operations to help multiple stakeholders evaluate aspects of corporate non-financial performance and potentially promote corporate sustainability. Pertinent efforts culminated with the Non-Financial Reporting Directive (NFRD, 2014/95/EU), applicable to approximately 11,700 large-size, public-interest companies.

As the adverse impact of climate change becomes aggressively apparent, multiple initiatives have emerged pressurizing companies to act and report on the impact of their activities and suggesting appropriate guidelines and frameworks. The voluntary nature of such requirements has limited their effective implementation since the provided information varies in terms of timing, transparency, quality, and assurance.

In 2019, the European Commission (EC) published guidelines focusing on reporting climate-related information as a supplement to NFRD. In April 2021, the EC adopted a proposal for a Corporate Sustainability Reporting Directive (CSRD) that extends the reporting scope to over 55,000 companies, making the process mandatory, audited, and digitally available to all.

This paper presents the advancements in the field of climate reporting in the EU in anticipation of the CSRD issuance and critically analyses the suggested practices, probable shortcomings, consultation comments, and assumptions under which CSRD will contribute to transparency, clarity, and quality of the climatic reports produced.

Keywords: Non-financial reporting, Climate reporting, NFRD, CSRD proposal

JEL Codes: G11; G32; Q51; M4.

Sustainable banking practises and customer satisfaction: Empirical evidence from Generation Y

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Abstract

The purpose of this research is to examine the determinants of the satisfaction that customers feel about the contribution of their bank to sustainability. Specifically, this paper focuses on Generation Y, since they have been more affected by the economic crisis during the development of its professional skills. This research contributes to developing knowledge regarding the impact of the integration of sustainability practices in the banking sector on customer satisfaction. The importance of customer awareness about the holistic involvement of banks in sustainability is recognized as a critical factor beyond their strict relationship to the financial dimension. The effective communication of sustainability practices of banks also has a direct impact on the level of satisfaction of Generation Y customers.

Keywords: Banking practices, sustainability, Generation Y, satisfaction, awareness.

JEL Codes: Q56; Q50; O44; M14.

The socioeconomic and environmental impact of exploration and exploitation of hydrocarbons in maritime areas and the case of Greece

Andreas Stergiou
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Abstract
Notably, the exploration and exploitation of hydrocarbons in a maritime area have considerable social, economic and environmental impact. Both activities are of extremely complex nature and hence their success is subject to many and diverse factors. Although there are some common socioeconomic and environmental denominators, the impact of these projects strongly vary. International experience can easily lead to the conclusion that it is possible to indicate a number of key principles that recur in different countries such as guaranteeing long-term energy security for the country's citizens, maximizing the economic benefit to the economy etc. However, unlike in other policy areas, it is not possible to identify a generally accepted international government policy concerning the development and management of the natural gas industry. The paper takes stock of some characteristic examples of extraction and monetisation of hydrocarbons discovered in the sea, identifies major trends and tries to project them to the specific circumstances that prevail in Greece.

Keywords: Hydrocarbons, environment, offshore drilling, socioeconomic impact of the exploitation of fossil fuels, Greece and hydrocarbons reserves

JEL Codes: Q35; Q38; Q47; Q48; Q53**.**

Uncertainty effects and environmental determinants of Bitcoin's price crash risk during the COVID-19 pandemic

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Abstract
This paper investigates the determinants of Bitcoin price crash risk during the first two waves of the COVID-19 pandemic. High-frequency (1-minute) data are employed in order to set under scrutiny Bitcoin return volatility. Focus is made on the impacts of economic policy uncertainty, geopolitical risk, investor sentiment, fluctuations in stock markets and MSCI and FTSE environmental indices on abrupt downwards movements regarding Bitcoin's market values. Univariate and multivariate regressions result into a spectrum of fruitful results about the impacts of uncertainty and environmental indices on cryptocurrency instability. This study provides a roadmap for investors interested in modern financial assets during turbulent eras in an economic and environmental context.

Keywords: Bitcoin price crash. Economic policy uncertainty, Geopolical Risk, Investor sentiment, Environmental impacts

JEL Codes: F64; F65; G12; G15; Q51.

Strategic spatial planning for optimal deployment of fire resources for the protection of natural and built environment from wildfires in the light of climate change

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Abstract
Wildfires are a natural phenomenon but may potentially be transformed to environmental hazard that can have serious consequences for natural and anthropogenic ecosystems. Future projections predict that, under a climate change environment, the fire season (especially in Southern Europe) will be lengthier, with higher levels of droughts leading to higher fire severity. Therefore, critical time of response for initial attack constitutes the basis for effective and timely fire management. The aim of the paper focuses on the establishment of optimal location options for initial attack based on burn probability as well as on population capacity (Wildland Urban Interface). Several spatial schemes of optimal locations were developed considering the ideal and realistic critical time of response (2 scenarios), as well as the current and desired capacity of the fire service. Hence, the proposed Spatial Decision Support System would significantly enhance the fire agency's capabilities taking into account the maximization of environmental protection and the rationalization of financial resources.

Keywords: Wildfires, burn probability, population capacity, initial attack, spatial optimization.

JEL Codes: Q23; R41; R58.

Consumer perceptions for bioplastics: Notes from the field

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Abstract
This study explores consumer attitudes and viewpoints for bioplastics. Utilizing qualitative data drawn from personal interviews with potential consumers of bioplastic products, we attempt to shed light on consumer thoughts and emotions that shape perceptions and attitudes towards the emerging bioplastics industry. Findings reveal that interviewees generally have a positive attitude towards bioplastics with certain issues around the intrinsic characteristics of these products that warrant further attention and investigation. Such findings have the potential to provide theoretical and managerial implications. From a theoretical perspective, qualitative results such as those reported here contribute to the green products literature through the elucidation of how individuals interpret, feel, and/or react to bio-based plastics. From a managerial standpoint, the study offers fruitful insights to new product development and marketing under the scope of consumers' viewpoints and beliefs, stimulating managers to focus on actions towards more effective product marketing/communication strategies, environmentally friendly commodities and/or environmentally responsible practices that may enhance business efficiency, productivity and market share.

Keywords: Plastics, bio-based plastics/bioplastics, consumer attitudes/ perceptions, purchase intentions, Greece.

JEL Codes: D19; L65; Q01; Q56; Q57.

Consumer preferences for bio-based products: Preliminary findings from an ongoing investigation

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Abstract
The purpose of this study is to highlight how the emergence of bio-based products influences consumer behavior. One survey was conducted using self-reported scales to investigate the main effects of individuals' characteristics such as innovativeness, trust in science, environmental concerns, and previous experience with bio-products on consumers' preferences, i.e. willingness to pay more (WTPm) for: a) bio-nylon jacket, b) bio-based breadsticks, and c) bioplastic bottled water. The statistical results indicate that certain individuals' attributes may influence consumers' WTP for a premium price for such the three different bio-based products. In this respect, the findings encapsulate managerial/practical and policy implications by bringing together these key features and indicating the need further explore consumers' preferences for bio-based products in the Greek context.

Keywords: Consumer preferences, willingness to pay, bio-based products, Greece.

JEL Codes: D19; L65; Q01; Q56; Q57.

Workplace human rights assessment in sustainability reports: An overview of the United Kingdom market

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Abstract
Organizations are responsible for their impacts on human rights directly through their own actions and operations and indirectly through their interactions and relationships with others, including governments, local communities and suppliers, and their investments. The aim of this study is to assess the level of accountability of organizations based in the United Kingdom (UK) on issues of human rights at work (HRW), expressed by nine fundamental disclosures of the Global Reporting Initiative (GRI) manual. Our sample consists of one hundred and seventy-three organizations, from thirty-four different business sectors whose Corporate Social Responsibility (CSR) reports for 2019 were accessed from the GRI database. The overall findings indicate that organizations in the UK exhibit a very low level of compliance with regards to workplace human rights issues. Most sample reports demonstrate poor statements on the assessed topic. In contrast to the majority, four reports performed moderately and one somewhat satisfactorily at incorporating these types of GRI principles into their annual disclosures.

Keywords: CSR, GRI Standards, rights and principles at work, accountability.

JEL Codes: G34; M14; O16; Q01; Q56.

Honeybee Pollination Services: Challenges and Opportunities for Beekeepers and Farmers in Greece

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Abstract

Pollination services provide substantial benefits to human populations and, more specifically, to agriculture. The aim of the current paper was to explore the possibility of providing organized honeybee pollination services in Greece, a country where such services are hardly developed, as is also the case in many other European countries. The vast majority of the beekeepers (87.8%) surveyed were of the opinion that the use of agrochemicals is the dominant problem in rural areas. Another important finding of the research is that 23.0% of the farmers who responded believe that insecticides are safe to moderately hazardous for bees, 59.2% of them hold the same view on fungicides and 46.7% on herbicides. A serious problem pinpointed by 63.4% of farmers is the fact that hives are very few and, therefore, crop pollination cannot be effectively carried out. However, only 2.4% of farmers hire pollination hives for their crops by paying rental fees. When asked if they would agree to participate in a subsidized crop pollination project, 84.8% of beekeepers and 74.7% of farmers gave positive answers, a finding indicating that there are good prospects for the development of honeybee pollination services markets in Greece. The authors suggest that farmers should be specially informed and trained so that they may be able to avoid posing risks to bees when they apply agrochemicals. Organized hive placement in agricultural and forest areas should be re-examined within the framework of national agricultural policy.

Keywords: Ecosystem, pollination services, apiculture, honeybees, rural development.

JEL Codes: O13; Q18; Q57; Q58.

Investigation of changes in the transport habits in Greece due to COVID-19 pandemic

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Abstract

This study examines the possible changes in the transport habits of citizens in Greece, due to the imposition of measures to prevent and limit the contagion of the Covid-19 pandemic, through a questionnaire survey with 755 participants. The questionnaire is divided into three subsections and was distributed electronically using Google Forms. The research focuses on the transport habits, the frequency and the reasons of trips with specific transport modes, in the period before the pandemic. In addition, it analyzes the views of the respondents regarding the changes in the way and the frequency of the trips, the choice of transport modes and their opinion regarding the difference of the traffic volume of the streets, the pedestrian flow and the traffic congestion period during the enforcement of measures in order to prevent the contagion of Covid-19.

The results of this research mainly indicate that the respondents used primarily and secondarily their cars, both before and during the pandemic. In addition, there was a significant reduction in their trips during the period of restrictive measures, the use of public transport was significantly reduced and at the end of the pandemic they will choose to walk for their recreational trips.

Keywords: Transportation, Transport habits, Covid-19, Greece.

JEL Codes: L91; O18; R41.

Mega Infrastructure Projects and their contribution to Sustainable Development The case study of the Athens Airport, Eleftherios Venizelos

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Abstract
Large airports are important mega infrastructure projects that promote the sustainable development of a country. They contribute to a reduction in travel and transport times, to global economic activity, to international trade, and to tourism. In addition, they contribute to social development by creating jobs and alleviating regional inequalities, as they make even the most remote and inaccessible places accessible. Especially for areas that are not globally recognised economic centers, the existence of a large airport facilitates access. It attracts investors, employees, and visitors, contributing to strengthening the local economy.
In this paper the positive contribution of airports to the economic development of a place is confirmed. Eleftherios Venizelos Airport is selected as a case study. It is located in Athens, the capital of the Greek state and is the main gateway into the country by air. Through primary research questionnaire material and secondary statistics data of our own processing, the impact of the airport on the sustainable development of the wider host region and its contribution to the national economy and development is investigated. The primary research was organized using the Microsoft Forms software and the processing and analysis of the secondary data with the statistical analysis software STATA.
The research findings given in the conclusion demonstrate the contribution of this specific mega infrastructure project to local and national sustainable development.

Keywords: Mega Infrastructure Projects, Sustainable Development, Sustainable Infrastructure, Airports and Development, Airport Eleftherios Venizelos, Athens, Greece.

JEL Codes: Q01; Q50; Q56; R11; R40; R42.

Driver distraction of cyclists in urban environment: A methodological approach

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Abstract

It is well known that driving is a complex process that requires the simultaneous existence of physical, mental, and sensory abilities. Despite the complexity of driving, it is observed that drivers deal with tasks which distract their attention from the driving one. With the growing number of portable devices as well as the electronic assistance and entertainment systems offered to the driver, the sources of distraction are constantly increasing. The purpose of this study is to understand the phenomenon of driver distraction and its impact to road safety. More specifically, a summary of the recent literature on driver distraction is made, focusing specifically on the distraction of drivers, both by technological means and by external factors. Finally, a methodological approach is applied to the phenomenon, and in particular to the distraction of the bicycle driver in the urban environment, which included the conduction of an experiment in real conditions in the city of Volos. The research involved 15 drivers, who were asked to perform a specific route by cycling and following specific instructions through a navigator. The data collected were analyzed and showed that the phenomenon of driver distraction is real and is a high-risk factor.

Keywords: Road safety, cyclists, driver distraction, distraction sources, navigation.

JEL Codes: R41; R42; O18.

New Trans-Arctic shipping routes: Opportunities and challenges for shipping and maritime transport

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Abstract

The impact of climate change in the Arctic Ocean has opened new possibilities for shipping companies. The two main routes in the Arctic Ocean that are used by ships, the Northeast Passage (NEP) and the Northwest Passage (NWP) present both opportunities and challenges and it is estimated that by mid-century new trans-Arctic shipping routes will be navigable. Reduction in travel time and fuel demand, less emissions, safer transit are key advantages these routes provide. However, commercial viability for the utilization of these seaways requires an interdisciplinary approach taking into consideration market needs, costs, revenue, cash flow parameters along with the intrinsic characteristics of the Arctic Region, i.e., the extreme weather conditions and the progressively stricter environmental regulations applied in maritime industry. In this study we examine how shipping companies can be affected by Polar Code Environmental Requirements and the imposition of UN IMO ban approval on the use of heavy fuel oil and its carriage for use by ships in their perspectives to utilize the polar seaways. To achieve this, a questionnaire was developed with categorized criteria of the Polar Code, potential incentives, and practices for which companies were asked to provide their viewpoints and perceptions. Our findings indicate that companies ranks environmental requirements as one of the most costly demands, recognizing the stricter environmental regulations applied onward and adapt to these policies to maintain their competitiveness and improve environmental performance of their vessels. However, their decision to involve in transit shipping in Arctic Waters depends on numerous factors and is associated more with business strategy, which does not include this market, rather than the cost that environmental regulations generate. As the study's respondents primarily pertain to shipping companies with 1-10 bulk carriers fleet size based in Greece, further research could draw from a larger and more diverse sample of shipping companies that already operate through the Arctic Waters routes.

Keywords: Arctic waters, shipping/maritime sector, climate change.

JEL Codes: Q54; Q01; Q56; M14.

Environmental Literacy and Climate Change Perceptions of Primary School Teachers

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Abstract

Environmental Education Programs aim to promote ecological citizenship based on environmentally literate students. In this sense, teachers must be sufficiently qualified to support their students towards a sustainable lifestyle. The main goal of this study is to explore the environmental literacy levels of primary school teachers and their perceptions of climate change: A total of 200 teachers completed an online questionnaire. Environmental Literacy was measured via scales of ecological knowledge, attitudes, values, ecological behavior, and skills. Based on bivariate and multivariate data analysis, the results showed a moderate level of environmental knowledge, positive attitudes, and enhanced values. On the contrary, levels of ecological behavior and skills were relatively low. These findings enable the refinement of the curricula of the Pedagogical Departments of Universities that seek to promote sustainability and develop environmentally literate citizens.

Keywords: Environmental Literacy, climate change, ecological citizenship, sustainability, primary school teachers.

JEL Codes: I20; C31; Q54.

Energy literacy assessment of Greek secondary students

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Abstract
Environmental awareness and energy literacy is an issue that has been emerged in the last decade, attracting increasing attention mainly from the international education systems. Knowledge of energy, its use and students' attitudes towards its consumption are key points for the sustainability of the environment and the economy in the future. The purpose of this paper is to investigate, through empirical analysis, the level of energy literacy of junior high school students in Greece. The analysis is based on 1200 questionnaires completed by junior high school students. The preliminary results indicated that Greek students, to a great extent, have poor basic knowledge about energy, which leads them to its unsustainable use. The outcomes of the study can be a power tool for educational planners to create a curricula oriented towards sustainable energy use.

Keywords: Sustainability, energy literacy, secondary students, environment, energy education.

JEL Codes: I2; Q01; Q20; O30; O40.

Environmental education and sustainability

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Abstract
Environmental education, with a view to promoting sustainable development and the useful technology that accompanies it, contributes to a more constructive approach to knowledge and the development of systemic thinking. In this conceptual framework, it is important to cultivate individual skills which enable us to re-shape the future in terms of environmental and social sustainability in order to approach, process and arrange day-to-day environmental challenges. The ultimate goal is the understanding of this complex and multi-leveled issue, but also the utilization and application of this knowledge through educational action. In particular, the implementation of these training processes is of major importance as a means of achieving sustainable development. In this context, the current study investigates the effectiveness of environmental education as unessential tool in educating the new generation on preventing and solving environmental problems. The research concludes that environmental education can not only be applied to schools and higher and technical education, but also serve as vocational training to ensure better understanding of the relationship between man and the natural environment, through the tools of natural and digital learning that are in line with the reduction of our environmental footprint and the promotion of sustainability.

Key words: Environmental Education, Sustainability, Education, environmental issues

JEL Codes: O21; Q28; Q42; Q48.

Effective educational units: Perceptions & Attitudes of the teachers of public primary schools of the Prefecture of Thessaloniki

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Abstract

In a society that is constantly changing and evolving, the school is called to play a very important role, which should be both quality and effective. The purpose of this study is to highlight the factors that can affect the effectiveness of a school unit and to investigate the relationship between these factors. According to the results of the study, teachers believe that factors related to both pedagogical and learning function as well as the administrative function of education, contribute to the increase of the efficiency of the school units, while it is worth noting that there were differences in the answers of the participants in terms of position of responsibility, of years of service and of their educational level. In addition, the professional development of the teaching staff, which is achieved through their participation in training seminars, seems to have a positive effect on the effectiveness of a school structure. In conclusion, it is worth noting that there was a strong positive linear relationship between the factors that can increase school effectiveness.

Keywords: Effectiveness, attitudes and perceptions of teachers, primary education, organizational culture, behavior.

JEL Codes: I20.

Educate environmentally conscious teenagers through music and movement

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Abstract

Nowadays environment has come under serious threat. It is urgent to embrace it more than ever. Education has always been the key to development, thus we educate teenagers on how to consider environmental issues. This paper focuses on the educational values of performing arts in order to familiarize high school students with the environment. Based on Fluxus movement and the Happenings, a contemporary music named *Romance* was composed for such a purpose by Tsekouropoulou and danced in open air by Tsompanaki. The videorecorded project was presented to students from music and dance conservatoires, so as to familiarize them with natural sounds and movement qualities and assist them to make their own music and dancing projects through team work.

Particularly, we believe that incorporating music and movement in nature into Schools' curriculum can be of great assistance for students to develop both environmental conscience and acquire artistic identity. The project can be applied to Greek Conservatoires-Dance Schools and High schools. Music and dance teachers encourage students to produce sounds by using natural elements - trees, rocks, pines- and to move freely outdoors by using movement qualities and gestures, to be inspired by nature and to express themselves and be artistically creative.

Keywords: Music, movement expression, artistry, teamwork.

JEL Codes: I20.

Economic valuation of «Prepaid Bag - Pay As You Throw (PAYT) System» and «Rewarding Recycling Program»: Case Study of the Municipality of Kozani

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Abstract

The aim of this study is to provide estimates, through a questionnaire survey, of: (a) the Willingness to Pay (WTP) for a «Prepaid Bag - Pay As You Throw (PAYT) System», as well as (b) the Willingness to Accept (WTA) for a «Rewarding Recycling Program» respectively. The main objective of this analysis was to measure the value that the citizens of the municipality of Kozani attribute to improving the solid waste management system. We also tried to identify the socio - economic determinants influencing their WTP values.

A structured web-based questionnaire survey method was used as a research tool for data collection from respondents in order to estimate respondents' intention to participate in waste separation and recycling processes. The Contingent Valuation Method (CVM) was applied as the research method to elicit people's WTP and WTA for the two aforementioned solid waste management programs. The econometric analysis with regard to citizens' WTP values revealed the important role that education and environmental information can play in order to stimulate pre-environmental behavior with regard to individual waste reduction.

Considering the policy implication of our results, policy makers could use them in order to further evaluate the potential use of economic (market-based) instruments in order to improve the urban solid waste management in the Municipality of Kozani.

Keywords: Willingness to Pay (WTP), Willingness to Accept (WTA), Contingent Valuation Method (CVM), Prepaid Bag - Pay As You Throw (PAYT) System, Rewarding Recycling Program

JEL Codes: Q51; Q53; Q56; Q57.

Ground management and environmental impact

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Abstract
Ground is a natural resource with a very important role, both for the natural environment and for human communities. The urban ground has undergone a radical change in its physiology, while the rest of the ground is generally characterized as rural. The countryside includes elements that are natural resources, such as water, habitats, timber, etc. and therefore can be considered a natural resource itself.
The perpetually changing economic and social environment is pushing for greater exploitation of natural resources in order to improve human living conditions. Thus, the post-rural countryside is transformed into an idyllic place for the establishment of residence and business.
The way land is managed determines the positive or negative effects on the environment. The assessment from the change of the most natural land uses to urban uses, shows direct changes in the geomorphology, the ecosystem, and the microclimate of an area, increasing the flood activity and the heat waves, which become even more intense due to climate change.
Local sustainable development with the proper use of available natural resources seems to be a tool to address their unnecessary waste and enhance the natural environment.

Keywords: Land use change, Urbanization, Environment, Natural resources, Sustainable development.

JEL Codes: O18; O44; O15; O13; K32.

Precision Forestry Prospects in Greece

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Abstract

The term "Precision Forestry" (PF) describes the adoption of innovative Information and Communication Technology (ICT)) in sustainable forest management. Smart technology supports and enhance the decision making process through remote sensing, navigation systems, Geographic Information Systems (GIS), traceability, bio-economy, multicriteria analysis, precision measurement tools, wireless network, modeling and simulation, forest products supply chain management and operational research. These new trends can ensure current goals of sustainable forest management. The paper aims to explore the present status and the prospects of PF in Greek Forest Services in Macedonia. The research with the method of questionnaires was conducted in 2020. The results revealed that Forest Services should expand the ICT adoption within daily tasks and workflow. The adoption of PF is one of the most important dimensions of sustainability as it is imperative to protect forest resources while producing and using forest products to their full potential.

Keywords: Precision Forestry, Information and Communication Technology, Sustainable Forest Management, Greece, Sustainability.

JEL Codes: O1; Q01; Q23; Q56.

Corporate Social Responsibility, Sustainability Reporting and Forest Fires: Evidence from the 2018 Megafires

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Abstract
The present research explores the way that the top Greek and Californian corporations responded to the 2018 megafires, of Mati, Attica and Camp Fire, California. As megafires are becoming more often and their impacts more destructive, through the years, coordinated efforts are directed towards elimination of these tragic events and building of resilient communities. The private sector can play a vital role to achieving these goals, through philanthropic activities that are part of their Corporate Social Responsibility (CSR) and usually expressed by the corporations' sustainability reporting (SR). Based on CSR and natural disaster literature, and with the empirical data that were collected, the current research shows A) an important movement from both the Greek and Californian corporations towards the disaster relief efforts, B) the existence of different CSR patterns between the two regions and C) an extensive use of SR of the CSR performers. This is an empirical study among the first that comparatively examine CSR during two megafires in two different parts of the world and aims to add to the existing literature, as well as give a new perspective for future researchers, for corporations and public authorities.

Keywords: California and Mati wildfires, resilience, natural disasters, corporate philanthropy, GRI

JEL Codes: M14; Q01; Q23; Q56.

National budget and environmental subsidies: Optimal management and a dynamic game

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Abstract
In this work, we discuss first the intertemporal optimal management of subsidies offered by the environmental regulator and second the dynamic conflict between two groups of economic agents involved in environmental quality. The traditional management model with subsidies is augmented as a two–state variables model in which any taken environmental subsidy is treated as a result of historical adjustments, i.e. as a stock variable. A major implication of that model's extension is the existence of a richer equilibrium dynamics with bifurcations and limit cycles. In the second part of the work, we discuss the conflicts of the two types of players involved in the game: the first player is the social planner who cares about the good environmental quality and the second is the representative heavy equipped exploiter of the environmental resources. Both players have something common to manage, that is the subsidy depending: a) on the decision of the social planner which acts according to environmental quality and the national budget and b) on the intensity of the extractors' effort.

Keywords: National budget, subsidies, environmental quality, optimal control, differential games.

JEL Codes: H61; H23; Q50; C60; C72.

The alignment of Greece with the Environmental Law of the EU: Historical development, current trends and critical implications

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Abstract

We are living in an age, where the connection between the concepts of "environment" and "justice" is disputed in terms of its very existence and practical application. At the same time, the force of environmental law is encountered in a variety of institutional organizations internationally, among which the European Union and its cohesive member states play a pivotal role, albeit with differences amid its Community partners. In the present paper, the compliance of Greek environmental law with the European one is studied in the light of intragenerational and intergenerational justice. Methodologically, a systematic review of 106 institutional documents and scientific bibliographic references was carried out. The findings of the research showed both the existence of appropriate institutional mechanisms at Community and domestic level, as well as the chronic shortcomings of Greece in relation to the unhindered implementation of the European environmental regulations. Consequently, the need to redefine national policies so as to be characterized by an explicit ecological orientation and to update the investigated issue in the context of the current coronavirus pandemic emerges.

Keywords: Environmental Law, European Union, Greece, intragenerational justice, intergenerational justice.

JEL Codes: K32; Z18; N44; Q56; Q58.

Environmental taxes and their use in European Union

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Abstract

The intensive use of natural resources, due to various economic activities, has increased the negative environmental footprint of human on earth and greatly threatens the natural environment and human societies. Gradually, sustainable management and environmental protection is emerging as one of the most important priorities for governments, both at European Union level and globally. Almost all EU Member States are now designing and implementing some of the most comprehensive and effective economic tools in which they try to meet the obligations arising from the increasingly strict European environmental legislation. Environmental taxes, which implemented in every EU country, are playing an increasingly important role to their economies. By using these taxes, state governments are trying to effectively manage the issue of protecting the natural environment and restore areas already affected by pollution. The purpose of this work is to analyze the revenues from environmental taxes for projects and actions dedicated to environmental protection and minimizing the degradation by human activities in European Union countries. The practical implementation of environmental taxation is evaluated and conclusions are drawn for the most efficient use of environmental taxes.

Keywords: Environmental taxes, European union, environmental protection activities, income

JEL Codes: H23; O13; Q56.

Aspects of environmental policies in Athens during the Classical period under an economics perspective

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Abstract
In this paper we present a series of environmental policies that were implemented in the city-state of Athens during the Classical period (508-323 BCE) under an economics perspective. We link these environmental policies to the provision of public goods and we argue that such goods proved to have been beneficial for the Athenian society as a whole. They basically included an efficient water management policy, the implementation of hygiene practices through a system of public baths in both at a personal basis and as a collective opportunity for all the residents of the Athenian state, the implementation of a recycling process regarding animal manor and a waste management policy in general. Using a game theoretical analysis we provide an economic evaluation regarding the functioning of these institutions. Our results show that the success of these environmental institutions should be attributed to their effectiveness but also, and equally important, to the willingness of the people themselves to accept and adopt them through a spirit of a developing a consistent environmental awareness mentality.

Keywords: Environmental institutions, Environmental public goods, water management, hygiene, recycling, waste management policy, game theory, Classical Athens.

JEL Codes: H41; I18; K32; N13; N53; Q53; Q58.

Spillovers, Technological Hierarchies, and the environmental effects through clean technologies adoption

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Abstract

In this paper we explore the nature of spillover effects and their impact on learning through a multi-hierarchy framework of production frontiers on a global scale for a nine-year period, based on the development level of each country economy. Under a non-parametric metafrontier framework and through the Data Envelopment Analysis under variable returns to scale, we explore the effect of spillovers and the impact of clean technologies adoption on performance change. Econometric results indicate that performance differentials between countries of different development level may be attributed to absorptive capacity, foreign direct investments and knowledge flows circulating in each learning grid. A moderation effect of absorptive capacity is present, however not in a particularly systematic way. Moreover, the adoption of clean technologies seems to be a game-changer in improving performance growth.

Keywords: Data Envelopment Analysis, Technological Hierarchies, Knowledge flows, Clean Technologies.

JEL Codes: O44; D2; P18; C50; C60.

Two stage DEA and environmental elasticities of polluting DMUs

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Abstract

The present study looks into DEA bootstrap approach combined with long - run elasticities and marginal effects to both efficiency and economic growth index with respect to environmental variables. The methodology applied provides a useful and informative approach to tracking decarbonisation of energy -related GHG emissions systems. The purpose of this study was to analyze the rates of change taking place in the energy systems of polluting countries, in the light of the climate change mitigation objectives, from Paris agreement to Glasgow climate pact and therefore to enhance policy coherence for sustainable development by establishing best practices for resource management techniques.

Keywords: Two stage DEA, Efficiency, GHG, Environmental Variables, Elasticities, Marginal effects, Decarbonisation, Paris agreement, Glasgow climate pact

JEL Codes: O11; O57; Q01; Q40; Q43; Q48; Q50; Q58; R15.

A multi-criteria methodology for off-grid small settlements

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Abstract
Renewable Energy Systems has enormous potential to meet most of the world's energy demands. Precisely, RES-based hybrid power plants seem to be a promising option towards elimination of environmental impact of production and consumption of electricity. A multi-criteria methodology for identifying the most appropriate location(s) for installing low-scale RES-based hybrid electricity production systems to cover local energy demands without grid connection is presented here. The selection is initially based on geographical, spatial and demographical data, while also taken into account are optimally combined meteorological data (solar and wind potential), with available resources (in terms of free space, land use and investment costs). In order to assure high possibility of full load coverage by RES, we have chosen settlements presenting low electricity demands, located at areas of high and low solar and wind potential and maintain low population range (50 - 100 residents). The selected settlements are Repetista and Areti, villages at Kalpaki, Ioannina, Epirus, Hagia Sophia and Fisini, villages at Lemnos Island, North Aegean Sea, Kumasa and Kandyllas, villages at Vagonia, Heraklion, Crete and Kato Lefkos and Lefkos, Karpathos Island, Dodecanese, South Aegean Sea. The desired loads are crucial for the optimal operation of the off-grid power production systems. On top of that, optimization in not only the size and the operation of the hybrid system, but also in the composition of energy sources mixture, is also performed. Findings show that it is feasible to implement autonomous power generation and electricity coverage from renewable energy systems for small settlements, based on the presented multi-criteria methodology. Finally, the social acceptance for such an installation is presented after using and elaborating a relative questionnaire that was answered by the residents of two settlements.

Keywords: Methodology, Off-grid power production, Renewable, Social acceptance, Energy.

JEL Codes: Q20; Q42; Q43; Q47; Q55; Q56.

Testing causalities within the Eurozone economic space at the interface of energy and tourism

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Abstract

The purpose of the present study lies in investigating cointegrating and causality relationships between two important sectors in our modern world, namely energy and tourism. We define energy in terms of primary energy consumption. We use second generation unit root tests to examine if variables under consideration are stationary. We employ cointegrating and causality tests to search for potential long-run relationships and direction of causalities. We contribute in the relevant discussion in three ways. We use the concept of market segments in the relevant econometric models to define tourism in terms of leisure tourism spending. We also include internal consumption, by international and domestic visitors, instead of international receipts when searching for causalities. Additionally, we take into consideration total Gross Domestic Product (GDP) generated exclusively by tourism sector, an issue that is less visible in relevant studies. Research findings revealed that all proxies of tourism are mutually influenced with primary energy consumption. As a result, an increase (decrease) to each of them will cause an increase (decrease) on primary energy consumption in the same direction. Practical implications require collaborative management across tourism stakeholders to efficiently use energy within the context of sustainable development.

Keywords: Energy, environment, tourism.

JEL Codes: N7; F64; Z3.

Use of indexes in evaluating environmental and health efficiency

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Abstract
According the literature, there is a strong link between air pollutants to many types of health problems of many body systems. In this research two different Data Envelopment Analysis (DEA) models and two indexes are used in order to evaluate the efficiency of pollutant management at the expense of health. Firstly, two variations of the simple DEA model are used to estimate the efficiencies of 18 European countries for the years 2000, 2005, 2010, 2014, 2015 and 2016. The first variation uses labour and capital as inputs and GDP/c and mortality from exposure to $PM_{2.5}$ as desirable and undesirable outputs respectively, while the second variation the environmental related tax revenues is used as additional input. The results derived are bias corrected to obtain the accurate efficiency scores of every country considered. Secondly, a two-stage DEA model is used to estimate the efficiencies of 23 countries for the time period 1990-2017, using capital, labor, and energy consumption as inputs, GDP as a desirable intermediate which is going out of the system, and sulfur oxides as an undesirable intermediate and respiratory disease deaths as an undesirable output. Finally, the simple mean Bertelsmann Index (BI) and the OECD's Distance Measure Index (DMI) are applied by using the air pollution, poisoning, poor sanitation, and unsafe water indicators of the third SDG goal for the evaluation of the efficiency of 107 United Nations countries for the period between 1990 and 2017. Useful conclusions can be drawn both in terms of the policies that can be implemented and in terms of the comparison of the above indicators.

Keywords: Environmental efficiency, Air pollution, Health effects, Good Health and Well-being, Environmental factors

JEL Codes: Q0, Q53.

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