THE ATHENS INSTITUTE FOR EDUCATION AND RESEARCH

Abstract Book

14th Annual International Symposium on Environment

27-30 May 2019, Athens, Greece

Edited by

Gregory T. Papanikos

2019

Abstracts
14th Annual International Symposium on Environment
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(In Alphabetical Order by Author's Family name)

Preface

This book includes the abstracts of all the papers presented at the *14th Annual International Symposium on Environment (27-30 May 2019)*, organized by the Athens Institute for Education and Research (ATINER).

In total 24 papers were submitted by 24 presenters, coming from 14 different countries (Canada, Chile, China, Cyprus, Czech Republic, France, Israel, Mexico, Philippines, Romania, Taiwan, Thailand, Turkey and USA). The conference was organized into 8 sessions that included a variety of topic areas such as Air and Water Pollution, Environmentally Friendly Value-Added Products, Waters: Monitoring, Abatement and Analysis, Biodiversity and Plants, Sustainable Development: Education, Climate Change and Energy Considerations, Air Pollution Measurement Techniques and Legal Compliance. A full conference program can be found before the relevant abstracts. In accordance with ATINER's Publication Policy, the papers presented during this conference will be considered for inclusion in one of ATINER's many publications.

The purpose of this abstract book is to provide members of ATINER and other academics around the world with a resource through which to discover colleagues and additional research relevant to their own work. This purpose is in congruence with the overall mission of the association. ATINER was established in 1995 as an independent academic organization with the mission to become a forum where academics and researchers from all over the world could meet to exchange ideas on their research and consider the future developments of their fields of study.

It is our hope that through ATINER's conferences and publications, Athens will become a place where academics and researchers from all over the world regularly meet to discuss the developments of their discipline and present their work. Since 1995, ATINER has organized more than 400 international conferences and has published nearly 200 books. Academically, the institute is organized into 6 divisions and 37 units. Each unit organizes at least one annual conference and undertakes various small and large research projects.

For each of these events, the involvement of multiple parties is crucial. I would like to thank all the participants, the members of the organizing and academic committees, and most importantly the administration staff of ATINER for putting this conference and its subsequent publications together. Specific individuals are listed on the following page.

Gregory T. Papanikos
President

14th Annual International Symposium on Environment
27-30 May 2019, Athens, Greece

Scientific Committee

All ATINER's conferences are organized by the Academic Council. This conference has been organized with the assistance of the following academics, who contributed by chairing the conference sessions and/or by reviewing the submitted abstracts and papers:

1. Gregory T. Papanikos, President, ATINER & Honorary Professor, University of Stirling, UK.
2. Nicolas Abatzoglou, Head, Environment Unit, ATINER & Professor, Department of Chemical & Biotechnological Engineering, Université de Sherbrooke, Canada, Chair Pfizer, PAT in Pharmaceutical Engineering, Director GREEN-TPV and GRTP-C & P.
3. Saif Uddin, Director, Center for Environmental Pollution, Climate & Ecology (CEPCE) & Senior Research Scientist, Kuwait Institute for Scientific Research, Kuwait.
4. Salim Hiziroglu, Academic Member, ATINER & Professor, Natural Resource Ecology and Management, Oklahoma State University, Stillwater, Oklahoma, USA.
5. Krassi Rumchev, Academic Member, ATINER & Associate Professor, School of Public Health, Curtin University, Australia.
6. Alan Hedge, Professor, Cornell University, USA.
7. Sam Andriani, Academic Member, ATINER & Professor / Research Scientist, Columbus State Community College / The Andriani Institute Research Center, USA.
8. Monica Siroux, Professor, Director of the Environmental and Electrical Engineering Department, ICube | INSA Strasbourg, France.
9. Valerie Laforest, Research Director / Professor, École des Mines de Saint-Étienne, France.
10. Yunsoo Choi, Associate Professor, University of Houston, USA.
11. Onur Ulker, Assistant Professor, Kirikkale University, Turkey.
12. Lampros Pyrgiotis, Research Fellow, ATINER.
13. Olga Gkounta, Researcher, ATINER.

FINAL CONFERENCE PROGRAM
14th Annual International Symposium on Environment, 27-30 May 2019, Athens, Greece
Conference Venue: Titania Hotel, 52 Panepistimiou Street, 10678 Athens, Greece

Monday 27 May 2019

07:50-08:40 Registration and Refreshments

08:50-09:20 (Room C - 10th Floor): Welcome and Opening Address by Gregory T. Papanikos, President, ATINER.

09:30-11:00 Session I (Room E - Mezzanine): Air Pollution I

Chair: Olga Gkounta, Researcher, ATINER.

1. Alan Hedge, Professor, Cornell University, USA. Effects of Buildings on Air Pollution and Climate Change.
2. Yunsoo Choi, Associate Professor, University of Houston, USA. Using AI Deep Learning to Predict Ozone Concentrations 24 Hours in Advance and Climate Change Impact on Ozone in Texas.
3. Hongyong Qiao, Postgraduate Student, Beijing Forestry University, China. A New Synonym for Beijing's Environmental Quality – "Beijing Blue".

11:00-12:30 Session II (Room E - Mezzanine): Waters: Monitoring, Analysis, Pollution and Abatement

Chair: Monica Siroux, Professor, Director of the Environmental and Electrical Engineering Department, ICube | INSA Strasbourg, France.

1. Valerie Laforest, Research Director / Professor, École des Mines de Saint-Étienne, France & Jonathan Villot, Assistant Professor, École des Mines de Saint-Étienne, France. Assessing Urban Wastewater Treatment Process through Best Available Technique Criteria.
2. Cassandra Carter, Research Student, University of St. Thomas, USA, Erin Curran, Associate Professor, University of St. Thomas, USA, Dalma Martinovic – Weigelt, Associate Professor, University of St. Thomas, USA, Alvine Mehinto, Senior Scientist, Southern California Coastal Water Research Project, USA, Natalia Garcia Reyero Vinas, Research Biologist, US Army Engineer Research and Development Center, USA & Mark Ferrey, Research Scientist 2, Minnesota Pollution Control Agency, USA. Prioritization of Environmental Contaminants in Aquatic Ecosystems: A Partial Least Squares Approach.
3. Michelle Angelica Roa, Graduate Student, University of the Philippines Diliman, Philippines. Pretreatment of Brackish Water through Chitosan Coagulation and Slow Sand Filtration for Desalination Applications.
4. Manna Farrel Pinto, Graduate Research Student, University of the Philippines Diliman, Philippines. Graphene Zeolite-based Granular Media Filtration System for the Pretreatment of Brackish Water.

12:30-14:00 Session III (Room E - Mezzanine): Sustainable Development: Education, Climate Change and Energy Considerations

Chair: Valerie Laforest, Research Director / Professor, École des Mines de Saint-Étienne, France.

1. Monica Siroux, Professor, Director of the Environmental and Electrical Engineering Department, ICube | INSA Strasbourg, France. Towards Sustainable Energy Technologies: The Case of the Micro Combined Heat and Power Systems.
2. Camelia Maier, Professor, Texas Woman's University, USA. Texas Woman's University Pollinator Gardens – Working toward Conservation and Sustainability Education.
3. Erofili Pontikaki, Lecturer, Webster University Thailand, Thailand. The Katowice Climate Change Conference 2018 and its Implications for the EU.
4. Ana Maria Leon Ramos, MSc Student, Universidad Juárez Autónoma de Tabasco, Mexico, Candelario Ramon de los Santos, PhD Student, Universidad Juárez Autónoma de Tabasco, Mexico, Laura Lorena Diaz Flores Diaz Flores, Researcher, Universidad Juárez Autónoma de Tabasco, Mexico, Angelica Silvestre Lopez Rodríguez, Researcher, Universidad Juárez Autónoma de Tabasco, Mexico, Edgar Vicente Macias Melo, Researcher, Universidad Juárez Autónoma de Tabasco, Mexico, Pio Sifuentes Gallardo, Researcher, Universidad Juárez Autónoma de Tabasco, Mexico & Ma Guadalupe Rivera Ruedas, Researcher, Universidad Juárez Autónoma de Tabasco, Mexico. Formulation for Producing High Strength Hydraulic Concrete Added with Biogenic Nano CaCO3 Structures.

14:00-15:00 Lunch

15:00-16:30 Session IV (Room E - Mezzanine): Biodiversity and Plants

Chair: Yunsoo Choi, Associate Professor, University of Houston, USA.

1. Lenka Skalova, Professor, Charles University, Czech Republic, Lucie Stuchlikova Raisova, Postdoctoral, Charles University, Czech Republic, Lenka Langhansova, Researcher, Czech Academy of Sciences, Czech Republic, Pavel Jakubec, Postdoctoral, Charles University, Czech Republic & Martina Navratilova, PhD Student, Charles University, Czech Republic. Uptake and Biotransformation of Monepantel in Plants used as Livestock Feed.
2. Rina Kamenetsky Goldstein, Senior Researcher, ARO The Volcani Center, Israel. Biodiversity and Survival Strategies of Geophytes in Mediterranean Climate.
3. Radka Podlipna, Scientist, Institute of Experimental Botany, Czech Academy of Sciences, Czech Republic, Eliska Syslova, PhD Student, Czech Academy of Sciences, Czech Republic, Barbora Szotakova, Professor, Charles University, Czech Republic & Lenka Skalova, Professor, Charles University, Czech Republic. The Fate of Anthelmintics in Soy Plant.

21:30-23:30 Greek Night and Dinner

Tuesday 28 May 2019

07:30-10:15 Session VI: An Educational Urban Walk in Modern and Ancient Athens

Group Discussion on Ancient and Modern Athens
Visit to the Most Important Historical and Cultural Monuments of the City (be prepared to walk and talk as in the ancient peripatetic school of Aristotle)

11:00-13:00 Session VII (Room D - 10th Floor): Environmentally Friendly Value-Added Products

Chair: Salim Hiziroglu, Professor, Oklahoma State University, USA.

1. Sam Andriani, Professor / Research Scientist, Columbus State Community College / The Andriani Institute Research Center, USA. Photodegradation of a few Polycyclic Aromatic Hydrocarbons (PAH) in Aqueous Solution.
2. Emilia-Adela Salca, Associate Professor, Transilvania University of Brasov, Romania. Evaluation of the Surface Quality of Wood as a Function of Machining Parameters.
3. Fidan Aslanova, Associate Professor, Near East University, Cyprus. Influence of Industrial Enterprises on the Environment.
4. Onur Ulker, Assistant Professor, Kirikkale University, Turkey. Evaluation of Corner Joint Strength of Particleboard and Sandwich Panels bonded with Starch.
5. Way Long, Assistant Professor, National Pingtung University of Science and Technology, Taiwan & Chun-Chun Chien, Associate Professor, Fooyin University, Taiwan. Modified Acoustic Property of Bamboo Violin Soundboard using the Microphone Array Method.

13:00-14:30 Session VIII (Room D - 10th Floor): Air Pollution II

Chair: Alan Hedge, Professor, Cornell University, USA.

1. Ian McKendry, Professor, The University of British Columbia, Canada. Suppression of Mountain Convective Boundary Layer "Handover" Processes by Persistent Wildfire Smoke Plumes in Southwestern British Columbia.
2. Eli Zaady, Researcher, Agricultural Research Organization, Volcani Center, Israel. The Expected Environmental Impact of Increased Pesticide use on the Mortality of Pollinators and Hive Productivity.
3. Adriana Dumitru, PhD Student, University of Bucharest, Romania, Alina Olaru, Teaching Assistant, University of Bucharest, Romania, Marius Dumitru, Researcher, National Institute for Laser, Plasma and Radiation Physics, Romania & Gabriela Iorga, Assistant Professor, University of Bucharest, Romania. Influence of Coal Open-Pit Mining on Ambient Air: A Case Study in South-western Romania.

14:30-15:30 Lunch

15:30-17:00 Session IX (Room D - 10th Floor): Air Pollution Measurement Techniques and Legal Compliance

Chair: Onur Ulker, Assistant Professor, Kirikkale University, Turkey.

1. Raul G.E. Morales, Professor, University of Chile, Chile, Gregorio P. Jara, Research Associate, University of Chile, Chile & Nicolas Valdes, Professor, Universidad Los Andes, Chile. Atmospheric Pollution by Pm-2.5 and Co in Urban-Rural Zones of Chile.
2. Marie Dellise, PhD Student, École des Mines de Saint-Étienne, France, Jonathan Villot, Assistant Professor, École des Mines de Saint-Étienne, France, Rodolphe Gaucher, Head of Unit "Sustainable and Cleaner Technologies and Processes", INERIS, France, Anne Amardeil, Study Engineer, EDF, France & Valerie Laforest, Research Director / Professor, École des Mines de Saint-Étienne, France. Assessing the Implementation of Best Available Techniques at the Local Scale in the Absence of Industrial Sectoral Reference: An Issue for Compliance Demonstration.

21:00- 22:30 Dinner

Wednesday 29 May 2019
Mycenae and Island of Poros Visit
Educational Island Tour

Thursday 30 May 2019
Delphi Visit

Friday 31 May 2019
Ancient Corinth and Cape Sounion

Sam Andriani
Professor / Research Scientist, Columbus State Community College / The Andriani Institute Research Center, USA

Photodegradation of a few Polycyclic Aromatic Hydrocarbons (PAH) in Aqueous Solution

Many organic compounds containing multiple benzene rings as components, contribute to serious pollutants in waters and soils, and therefore harmful to the environment. They are classified as polycyclic aromatic hydrocarbons, PAH. These compounds are spread accidentally or worse voluntarily in the environment, either from industrial waste or household waste or transportation waste. One of the main ways of eliminating these organic compounds that are not very biodegradable, is the natural photodegradation in aqueous solutions. These should occur in different places where water is present and accessible to sunray such as rivers and lakes.

Our studies were focused on the photodegradation of three major PAHs: anthracene, $C_{14}H_{10}$ which has three fused benzene rings straight, phenanthrene C_4H_{10} also a three fused benzene rings but with a U shape, and finally diflufenican, $C_{19}H_{11}F_2N_2O_2$ a herbicide with three benzene ring but not fused together.

Carrying out the photodecaying process in aqueous solutions present two major advantages: -primarily water is a transparent medium easily penetrated by sunray especially the UV part with high energy, and secondary water can modify the reactivity of the compound whether water soluble or in suspension. PAHs which do not dissolved in water, react and undergo photochemical reactions in the presence of oxide photocatalysts, such as titanium dioxide, TiO_2, and zinc oxide, ZnO.

The following criteria are key to successful results:

a) Although non water soluble, PAHs have the affinity to remain adsorbed on the photocatalyst
b) The compound is a pollutant and also toxic (assessing the possible detoxicity after photodecay)
c) Absorption of the daylight, meaning wavelength greater than 300 nm
d) Having a simple chemical structure in order to be able to analyze the products and to propose a mechanism

The photodegradation using the adsorption method with TiO_2 were studied under aerobic and anaerobic processes. The influence of pH, influence of the area of adsorption, study of half-life, and toxicity. A few

number of support naturally found in waters were also carried out: ferric oxide, clay, and even cellulose.

Fidan Aslanova
Associate Professor, Near East University, Cyprus

Influence of Industrial Enterprises on the Environment

Industrial revolution significantly modified overall development of many countries. It is an accepted fact that the environment is getting insufficient to me et all of needs and demands by the consumers. Therefore it is vital that industrial enterprises should take into consideration the environmental issues very closely so that a certain balance can be achieved. The main objective of this study to evaluate perspectives of enterprises as function of the environment. A descriptive model consistory of a study group shaving fifty randomly selected employees in several industrial enterprises. A semi-structured interview form with ten opened items was also developed. Data were evaluated employing content analyses. The overall adverse influence of industrial activities on the environmental was also determined. It appears that excessive exploration of natural resource, depletion of ozone layer, rapid population growth, air and water pollution were found a major problems. Based on the findings in this work it appears that managers from different industrial sectors indicated that major decisions will be handled within the scope of environmental aspects and some of business activities will be substantially influenced by the environment.

Cassandra Carter
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Associate Professor, University of St. Thomas, USA
Dalma Martinovic – Weigelt
Associate Professor, University of St. Thomas, USA
Alvine Mehinto
Senior Scientist, Southern California Coastal Water Research Project, USA
Natalia Garcia Reyero Vinas
Research Biologist, US Army Engineer Research and Development Center, USA
&
Mark Ferrey
Research Scientist 2, Minnesota Pollution Control Agency, USA

Prioritization of Environmental Contaminants in Aquatic Ecosystems: A Partial Least Squares Approach

The diversity of contaminants, their presence in aquatic environments at concentrations near/below the analytical detection limit, and their potential to exert additive and/or complex cumulative effects call for an integrative assessment of their risk. Chemical monitoring has been widely used to assess exposure to environmental contaminants. Chemistry data alone is not sufficient for risk assessment because of paucity of bio-effects/toxicity data for many contaminants. Recent methodological advances in bio-effects screening (e.g., omic and high-throughput in vitro toxicity testing assays) now allow for concurrent monitoring of a wide array of biological activities. When collected concurrently, chemistry and bio-effects data can enhance chemical prioritization. Analytical chemistry data for 146 chemicals and liver transcriptomics data (60K feature microarray) from adult male fathead minnows exposed to stream water (48h, n = 7 fish per location, 10 randomly selected streams) were collected. Partial least-squares (PLS) regression using both backwards elimination and orthogonal variable reduction methods were employed to identify stream contaminants that are strongly associated with biological impacts observed in the fathead minnows. Preliminary analysis has identified nine contaminants of particular importance in the prediction of gene expression profiles. Although statistical analysis is ongoing, this study allows for the screening and prioritization of environmental contaminants based on associated biological effects. Contaminants not found to co-vary significantly with biological outcomes may be minimized in future research. Environmental contaminants identified as likely influencers of biological responses warrant additional investigation. While the influential contaminants identified in this study are most applicable to

their particular geographic location, the methods used for identifying high- and low- priority contaminants, which will be discussed in detail, are broadly generalizable to research conducted in other ecosystems.

Yunsoo Choi
Associate Professor, University of Houston, USA

Using AI Deep Learning to Predict Ozone Concentrations 24 Hours in Advance and Climate Change Impact on Ozone in Texas

In this study, we use a deep convolutional neural network (CNN) to develop a model that predicts ozone concentrations 24 hours in advance. We have evaluated the model for 21 continuous ambient air quality monitoring stations (CAMs) across Texas, including stations in the Houston-Galveston-Brazoria region, Dallas-Fort Worth, Austin, San Antonio, and El Paso. The model, which consists of meteorological inputs (e.g., wind field, temperature) and air pollution concentrations (NO_x and ozone) from the previous day, are trained for predicting next-day, 24-hour ozone concentrations. We acquired meteorological and air pollution data for 2014 to 2017 from the Texas Commission on Environmental Quality. For 19 of the 21 stations in the study, results show that the yearly index of agreement (IOA) is above 0.85, confirming acceptable accuracy of the CNN model. They also show that the model performs well, even for stations with varying monthly trends of ozone concentrations (specifically CAMS-012, located in El-Paso, and CAMS-013, located in Fort Worth, both with IOA=0.89), but it does not perform as well at stations in coastal regions and the Houston ship channel (CAMS-045, CAMS-620, CAMS1034, and CAMS-015) because of the frequent hourly variation in the observed variables, the lower planetary boundary layer near the coast, and emissions from petrochemical plants.

The performance metrics of these stations could be improved with the addition of more years of training data, as done for CAMS-045, where the IOA improved from 0.84 to 0.86 with the addition of seven more years of training data. To ensure that the model was robust, we tested it on stations where fewer meteorological variables are monitored (CAMS- 003, 059, 045, 053, 078, 617, 618, and 620). Although these stations have fewer input features, their performance is similar to that of the other stations. Despite its success at capturing daily trends, however, the model mostly under predicts the daily maximum, which provides a direction for future study and improvement. As this model predicts ozone concentrations 24 hours in advance with greater accuracy and computationally fewer resources, it can serve as an early warning system for individuals susceptible to ozone and those engaging in outdoor activities. Further, the sensitivities of AI deep learning simulated ozone due to changes in meteorological variables provide a general idea on how climate change affects on ozone in Texas.

Marie Dellise
PhD Student, École des Mines de Saint-Étienne, France
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INERIS, France
Anne Amardeil
Study Engineer, EDF, France
&
Valerie Laforest
Research Director / Professor, École des Mines de Saint-Étienne, France

Assessing the Implementation of Best Available Techniques at the Local Scale in the Absence of Industrial Sectoral Reference: An Issue for Compliance Demonstration

The Industrial Emissions Directive (IED) aims to achieve a high level of protection of the environment as a whole and of human health. In this purpose, the IED requires the implementation of techniques with performance equivalent to the Best Available Techniques (BATs) described in the reference documents (BREF).

However, when drawing up or revising a BREF at European level, it is not possible to cover each industrial sector or subsector for all or some of the Key Environmental Issues. There are then different types of situations for which the BREF is incomplete or non-existent.

Industrial plants involved in these activities without reference are not exempt from implementing BATs. However, the lack of reference technologies "officially" considered as BATs may lead the site operator to skip the installations concerned in his reflection on the establishment of BATs and / or the competent authority not to check BAT compliance.

The results of surveys and the literature review showed that the degree of verification and the methods for evaluating the implementation of BATs at the local scale are heterogeneous. Moreover, the large discrepancies in the processing of regulatory files can potentially give rise to distortions of competition.

In this context, a methodology was developed in order to enable the operator of an IED or non-IED installation concerned by the problem to demonstrate to the competent authorities, in the absence of an official reference, that a technique is BAT for the considered installation.

Its elaboration was based on case studies, which allowed to propose practical tools capable of answering each of the necessary steps to the assessment of techniques with regard to BATs, and to test them directly in the field.

Further applications in various sectors need to be made to confirm the genericity and the robustness of this methodology.

Adriana Dumitru
PhD Student, University of Bucharest, Romania
Alina Olaru
Teaching Assistant, University of Bucharest, Romania
Marius Dumitru
Researcher, National Institute for Laser, Plasma and Radiation Physics, Romania
&
Gabriela Iorga
Assistant Professor, University of Bucharest, Romania

Influence of Coal Open-Pit Mining on Ambient Air: A Case Study in South-western Romania

Mining activity in open-pit coal sites exerts a high pressure over the surrounding environment and health of people living nearby, as higher levels of particulate matter could increase their risk to develop adverse health effects. The aim of this study was to capture the level of exploitation activities in the residential area close to the coal open-mine in terms of mass concentrations and total carbon fractions (TC) of ambient PM10 and PM2.5 samples. Two sampling campaigns during 10 successive days (5-14 April 2018) and during 5 successive days (12-16 January 2019) covered both working (full time, part-time) and non-working days at the coal exploitation. The sampling was performed in a residential area at 10 m over the ground for 12 hours per day using two low-volume samplers (substrate: quartz fiber filter) and an eight-stage low-pressure cascade impactor (size range 0.06-16 μm diameter; substrate: aluminum foil). Information on the morphology of particles and elemental composition of ambient sample was obtained by scanning electron microscopy (SEM) and energy dispersive x-ray (EDX/EDS) analysis. The total mass concentration of particulate matter samples showed significant variation from full time working days to non-working days. The field campaign in 2019 was performed during a 5 day-strike, showing therefore the background PM_{10}, $PM_{2.5}$ and TC levels. Elements of both crustal and anthropogenic origin C, O, Si, Ca, K, S, Cu, Ni, Fe, Mg, Ti were revealed by EDX analysis. Air mass back trajectories, dispersion and deposition of fine particles modeled using HYSPLIT trajectory and dispersion models for each sampling day were added in order to interpret the aerosol mass concentrations in the area.

Alan Hedge
Professor, Cornell University, USA

Effects of Buildings on Air Pollution and Climate Change

We spend most of our lives inside buildings. Many cities in the world more have hazardous outdoor air quality and a well designed building can protect occupants against outdoor air pollutants. However, it is important that the air quality inside a building is good. To provide for comfortable indoor conditions many buildings use air conditioning, but this approach dumps heat and pollutants from inside a building to the outside, which exacerbates climate change. This paper will describe research on the effects of the indoor evolutionary on health and performance and it will present a new approach to improving air quality using passive air filtration with materials with electrospun nanofibers from sustainable materials. This approach can reduce air pollution without increasing energy use and contributing to climate change.

Rina Kamenetsky Goldstein
Senior Researcher, ARO The Volcani Center, Israel

Biodiversity and Survival Strategies of Geophytes in Mediterranean Climate

Many natural habitats worldwide are characterized by a short annual period of favorable growth conditions, e.g., short summer in arctic-alpine habitats, light availability in early spring in deciduous forests or water availability in Mediterranean and (semi-) desert habitats. Such environments necessitate plant life strategies to make optimal use of the narrow windows available for growth and reproduction, surviving the relatively long and unfavorable periods. The geophytes - species with underground storage organs (e.g., bulbs or rhizomes) - developed special mechanisms to survive periods of unfavorable weather conditions. Although the direct ancestors of the modern geophytes are not known, it was proposed that the primitive species inhabited wet and warm locations. Later, adaptation to different environments due to an extension of an original habitat or plant evolution in climatic areas with marked seasonal changes has led to plant adaptation to periods of high and low temperatures, drought or improper light levels and to significant changes in their morphological structure and annual developmental cycles. The survival mechanisms vary between species, and provide different modes of adaptation to harsh environments. Environmental signals, including temperature, moisture and photoperiod affect dormancy and flowering of the geophytes. The major role in the interrelationship between florogenesis and dormancy during the life cycle most probably belongs to meristems, which define the survival strategy of the plant, including vegetative growth, flowering, drought tolerance and the formation of storage organs. These mechanisms warrant further investigation as the most important traits for the potential cultivars to be able to meet their agronomic and environmental goals.

Valerie Laforest
Research Director / Professor, École des Mines de Saint-Étienne, France
&
Jonathan Villot
Assistant Professor, École des Mines de Saint-Étienne, France

Assessing Urban Wastewater Treatment Process through Best Available Technique Criteria

The Industrial Emissions Directive 2010/75/EU aims at achieving a high level of protection of the environment as a whole. To succeed, reference documents, which consider techniques frequently used in the whole Europe and their environmental performance level, have to be elaborated. These techniques and their performances constitute the concept of Best Available Techniques (BAT), which is inevitable for industrial sectors concerned to consider. The treatment of wastewater and resulting sludge in Wastewater Treatment Plants (WWTP) is accompanied by significant consumption of resources (chemical products, energy, etc.) as well as the concomitant emission of pollutants into the environment. The NEXT project (ANR-14-CE04-10) is aimed at understanding the working of WWTPs by focusing on the sludge line. One of the objectives is to identify sufficiently long-term optimization opportunities for processes to be selected as Best Available Techniques (BAT) within the meaning of the Industrial Emissions Directive (IED). The methodological framework structured into five steps is essentially based on multi-criteria statistical tools processing data from industrial plants, in particular the consumption and emission values. The objective is to classify the sites studied and identify the reference plants. Two public databases available on the internet were used and 1010 French plants served as samples. The application and results demonstrated the applicability of the methodology used. Five techniques (membrane bioreactor, bacterial bed, sand filter and high-load or medium-load activated sludge) were identified as best available techniques according to the range of regulatory classification requirements for WWTPs. In addition, the reference values that may constitute the basis of the regulatory thresholds have been proposed and validated by scientific, legislative and expert judgments literature.

Ana Maria Leon Ramos
MSc Student, Universidad Juárez Autónoma de Tabasco, Mexico
Candelario Ramon de los Santos
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Laura Lorena Diaz Flores Diaz Flores
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Edgar Vicente Macias Melo
Researcher, Universidad Juárez Autónoma de Tabasco, Mexico
Pio Sifuentes Gallardo
Researcher, Universidad Juárez Autónoma de Tabasco, Mexico
&
Ma Guadalupe Rivera Ruedas
Researcher, Universidad Juárez Autónoma de Tabasco, Mexico

Formulation for Producing High Strength Hydraulic Concrete Added with Biogenic Nano CaCO3 Structures

The concrete occupies the second place in the materials more consumed in the world after the steel. It is estimated that annually used three tons per person, with the proposed urban developments to prevent the agglomeration of population in capital cities, is expected to demand for concrete continue to grow [1]. So research on innovations in this type of materials, are directed toward studies of the mechanical behaviour of concrete and its structural elements at level micro and nano scale. In this research proposal we propose to obtain the high strength hydraulic concrete added with nano CaCO3 structures from biogenic origin. 6 assay specimens was determined based on the NOM for the construction. Prepared mixtures of concrete, were incorporated since 1, 2, 3, 4 to 5% of oyster shell powder to the total weight of the mixture The test to determine the normal consistency of the cement was carried out in accordance with the standard NMX-C-057-ONNCCE-2015. The mechanical assays were carried out, together with the proof of the cement and test of the relative density and water absorption of samples. The analysis to nano and microstructural level of components, shows a free pore morphology and homogeneous dispersion of agglomerates in size of 1□m, the SEM EDS confirms the presence of the element O, C, Si and Ca

Way Long
Assistant Professor, National Pingtung University of Science and Technology, Taiwan
&
Chun-Chun Chien
Associate Professor, Fooyin University, Taiwan

Modified Acoustic Property of Bamboo Violin Soundboard using the Microphone Array Method

Violin has been researched since the time it was invented, such as wood species, grain, lacquer and acoustic properties. In general, making a violin with (*Picea abies*) and (*Acer platanoides*). The most commonly used wood on violin such as spruce and maple for the front and back sound boards. Bamboo is a sustainable material which is a fast growing and high mechanical properties as tensile, compressive strength, shrinkage, resistibility and elasticity. This research was developed a bamboo violin through scientific experiments, explore the acoustic characteristics on bamboo violin sound boards, and design a new model and working process according to its specialty. Moso Bamboo (*Phyllostachys edulis)* as a material for violin, using acoustic mapping technology to explore the soundboards in different geometric conditions and make the adjustments in conjunction with the production process by integrating the results. The research results integrated as (1) the acoustic mapping was created by the array setup with 23 microphones to measure the vibro-acoustic of sound board in various status which can be verified through the experiment. (2) the production process or size template can be adjusted to change the tone of the bamboo sound boards on the results of the experiment. (3) it can be seen that the change of sound-boards thickness affects the loudness and sharpness of acoustic properties. (4) to promote the bamboo violin can also be made by materials other than wood, spreading the making processes of a violin with high quality sound performance. Through the microphone array method can rapid and accurate detect the acoustic response of boards. Furthermore, it obtained the acoustic contour map which could obvious describe the distribution and performance of the sound at various location of the sound board.

Camelia Maier
Professor, Texas Woman's University, USA

Texas Woman's University Pollinator Gardens – Working toward Conservation and Sustainability Education

Plant-pollinator interactions have benefited human society for centuries. Recent research has brought to the attention of scientists and citizens the decline of wild pollinators, such as bees, butterflies, flies, and beetles. There is evidence that urban areas can support higher populations of some pollinators than farmland and boost bee numbers in adjacent farmland. Understanding the socio-economic consequences of pollinator-supporting practices is essential to effectively enhancing wild pollinator richness in "real-world" landscapes.

Given that Texas Woman's University (TWU) is promoting sustainability, the time was right to establish sustainable native plant gardens on campus to attract and sustain vital, yet dwindling, populations of insect pollinators, such as the Monarchs and many other butterflies, native bees, etc., conserve water, and demonstrate how such projects can be effectively developed to respond to the likelihood of a hotter and drier climate in the future. The project proposed to restore and sustain a natural habitat for pollinators by replacing the lawn with native plants. Given the Texas' unique position along the Monarch butterfly migration route, TWU and its partners are taking a leadership role in conserving and enhancing habitat for the iconic Monarch butterfly, for the good of the people and the planet.

The size of the TWU pollinator garden may be small but with outreach activities in the area for the creation of similar pollinators gardens, it will have an extensive impact addressing habitat loss and sustainability issues. The gardens gave students many opportunities to "learn by doing" and also assured accessibility to all stakeholders and the community at large. Activities that seek sustainable solutions to protect the environment also strengthens our communities and fosters prosperity. The strategy of developing self-sustaining habitats using native flora could have significant impact on improving the pollinator populations in the area farmlands and has significant potential financial impacts for agriculture and therefore on prosperity, through improved pollinator availability and planet-wide impact of food production.

We have created educational materials for target audiences and disseminated them at several regional activities to increase civic responsibility for pollinator habitat preservation and restoration. The gardens are informative through the use of interpretive signage, other educational materials, a website (https://twu.edu/butterfly-garden/) and guided tours. Socially, the project is enhancing education of the university

community and general public on conservation and sustainability and promotes the development, planning, building, or modification of communities to promote sustainable living/gardens through outreach (at the level of school district, City of Denton, and other organizations and businesses). We expect our students and partners to use the sustainability knowledge and practices learned through our garden activities to educate others, starting with their families and friends, and apply them to their own life style.

Ian McKendry
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Suppression of Mountain Convective Boundary Layer "Handover" Processes by Persistent Wildfire Smoke Plumes in Southwestern British Columbia

Climate change is contributing to increased frequency of widespread and persistent summer multi-day episodes characterized by dense layers of wildfire smoke emanating from wildfires across western North America. These events often occur under otherwise clear sky anti-cyclonic weather conditions and have significant impacts on surface temperatures, air quality, surface radiation and energy budgets, and carbon budgets. Here, we propose a previously undocumented stability-related impact of wildfire smoke layers on mountain meteorology. This positive feedback, which suppresses mountain "handover processes", is additional to those already documented and expected over flat terrain. The focus of this observational study is in the vicinity of Grouse Mountain, near Vancouver, British Columbia. Modelling is conducted using the WRF model while observations include a mini micropulse LiDAR and vertical sounding using mini sondes (WINDSOND). Results show suppressed convective venting and a more stable vertical profiles due to the radiative effects of smoke. We expect the processes described to have general application and represent a previously undocumented feedback mechanism associated with climate change and wildfire incidence.

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Atmospheric Pollution by Pm-2.5 and Co in Urban-Rural Zones of Chile

The topography of continental Chile in the central and south regions is characterized by small valleys defining a territory extremely susceptible to urban atmospheric pollution by gases and particles. On the other hand, new urban zones are quickly emerging from rural migrations in the main cities of our country, where these urban processes have involved several social problems associated to poverty. Therefore, the atmospheric pollution has emerged as one of the most critical aspect related to the impacts in public health of the Chilean population.

In the present work, we analyze the atmospheric urban pollution of two main cities associated to this particular profile of developing urban-rural zones by use of biomass, as the main energy source of these regions. One of them, Talagante city, is localized in the southwest of the Metropolitan Region (latitude 33º south), while the other city is Padre Las Casas in the Temuco Region (latitude 45º south). Both cities are distanced each other by 800 km, however they present similar patterns of atmospheric pollution behavior.

We have mainly analyzed the fine particulate matter (PM-2.5) and the carbon monoxide gas as two main pollutants in the urban atmosphere of both cities by means of a monitoring network for air quality depending of the Chilean Ministry of Environment. We have chosen this last gas (CO), as a typical tracer for biomass combustion. Our results permit us to appreciate the atmospheric pollution behavior of the last decade. The experimental measurements were obtained by means of automatic recorder systems of PM-2.5 and CO every hour and daily mean values. On the other hand, we have compared the atmospheric pollution episodes and the medical consultations by cardiorespiratory diseases at the public hospitals of both cities. The observed correlations between both parameters are significant in order to generate new policies on public health.

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Graphene Zeolite-based Granular Media Filtration System for the Pretreatment of Brackish Water

In desalination, membrane-based processes are widely used in water treatment such as reverse osmosis and forward osmosis due to its high rejection and efficiency. However, membrane fouling, due to species such as precipitates, suspended solids and dissolved solids (Voutchkov, 2010; Zhao et al, 2008), is one of the major drawbacks of these technologies limiting rejection and performance of the membrane (El-Manharawy et al, 2001; Den et al, 2008). Thus, there is a need to look for alternatives in the design and material selection used in the water treatment system with utmost consideration of efficiency, economic costs, and environmental impacts. A common practice is the incorporation of pretreatment to remove and mitigate membrane fouling prior to treatment (Schafer et al, 2004; Sutzkover-gutman et al, 2010; Voutchkov, 2010; Edzwald et al, 2011; Singh, 2015). Natural zeolite, a known adsorbent, in particular, is fairly cheap and abundant in the Philippines and can be used in water treatment applications. Its tendency to cationically exchange and adsorb species such Na^{+}, Ca^{2+} and NH^{4+} is being utilized and modified to design treatment materials that can even remove humic acid and other dissolved ions in effluents (Katsou et al., 2011;Wang et al., 2016; Selim et al., 2017). Graphene, a 2D carbon material, on the other hand, is currently a state-of-the-art material in water treatment due to its high surface area, permeability, and durable structure that can act as molecular sieve in certain contaminants such as dyes, heavy metals, and even pharmaceutical pollutants (Sealy et al., 2017; Ding et al., 2014; Rizzo et al., 2015; Lu et al, 2017). Thus, a mechanistic study employing coagulation and granular media filtration was performed to evaluate the efficiency of a pretreatment system designed for brackish water obtained from an urban river in the National Capital Region of the Philippines (Pasig, River, Napindan Hydraulic Control Structure, Taguig City). To obtain optimum conditions based on water quality parameters (Turbidity, Conductivity, Salinity, TDS and Dissolved Oxygen), optimization runs were conducted with varying coagulant dosage, pH and filter media configurations. Using ferric chloride ($FeCl_3$) as coagulant and the coupling of exfoliated graphene and natural zeolite as filter media, optimum conditions of pretreatment were determined to be with a dosage of 10 ppm $FeCl_3$ at pH 10 in the graphene-zeolite-based columns. Under these conditions, the removal efficiencies ranged from 30 to 99%. Raman Spectroscopy data revealed structural changes in the zeolite and carbon-based filter media wherein adsorption

was the dominant mechanism in the treatment process. This was further confirmed by laser microscopy imaging and topological analysis through morphological and roughness profile differences. X-ray fluorescence data also revealed elemental compositions of the samples before and after the two-stage treatment exhibiting adsorbed fouling species and other heavy metals from the synthetic and raw brackish water. Results indicated the effectiveness of the combined graphene-zeolite filter media in mitigating membrane fouling and pretreating brackish water as feed for membrane desalination processes.

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The Fate of Anthelmintics in Soy Plant

Emerging pollutants have raised great concern in past decades. Veterinary pharmaceuticals are nowadays indispensable in agriculture and livestock farming; however, their increased application over the last few years has raised concerns about their potential biological and environmental risks, warranting optimization and safety assessment considerations. For hundreds of years, liquid manure and other animal wastes from livestock farming have been applied to agricultural fields as a sustainable principle of nutrient recycling. As a result of a poor metabolism in farm animals, veterinary drugs occur ubiquitously in manure and finally reach via manure application the soil compartment.

We use for our experiment common agricultural crop *Glycine max* (L.) Merr., 1917, species Moravians. The plants were cultivated in green house and they were watered 3-times per week by 200 ml of nutrient solution. After 2 months, the plants were divided in three experimental groups (six plants per group) and we started with application of anthelmintics ivermectin (IVM) and fenbendazole (FBZ). The anthelmintics (10 μM concentration, pre-dissolved in dimethyl sulphoxide) in the nutrient medium were applied. The control group was watered by nutrient solution with dimethyl sulphoxide only. The plants were harvested after 45 days and the concentration of parent compounds and its metabolites were measured in roots, leaves, pods and seeds. Simultaneously the effect of anthelmintics on activity of antioxidant enzymes (GPX, APX, CAT, GR, and GST) was observed. Our results show that both compounds were readily uptaken by soy plant and distributed in all plant tissue. Also the metabolites were formed, predominantly in roots and leaves. The main biotransformation path led through oxidation and hydroxylation. The activities of antioxidant enzymes were not changed significantly. Our results show the potential risk of input of anthelmintics and their metabolites in food chain.

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The Katowice Climate Change Conference 2018 and its Implications for the EU

Research Question

The Katowice Climate Change Conference on 2 - 14 December 2018 has introduced new elements and dimensions of adaptation of the Paris Agreement.

Important questions such as the way stakeholders are engaged under the UN Climate Regime, introduction to loss and damage regime caused by climate change, introduction to adaptation and resilience and introduction to mitigation are going to be examined. These issues are of paramount importance for the EU since the USA's decision - one of the world's biggest producer of CO2 emissions - to leave the Paris Agreement. This paper is going to examine which are the legal implications resulting from EU's engagements.

Conceptual Framework

The tools that are going to be used in this research paper are the existing legal framework in international law, composed by the United Nations Framework Convention on Climate Change 1992, the Kyoto Protocol 1995 and the Paris Agreement on Climate Change 2016. Another important source will be the published material once the Katowice Climate Change Conference in December 2018 will share findings, suggestions and results. Finally, doctrine published by academia worldwide will be used in order to approach this research topic.

Expected Findings

1. Review of the way stakeholders are engaged on adaptation under the UN climate process[1]

Effective engagement of stakeholders is vital in supporting all adaptation activities at each step in the process. The conference is going to review in which way relevant multilateral, international, regional, national sub-national and local organisations, public and private sectors, civil society and other relevant stakeholders will undertake and support enhanced action on adaptation at all levels.

[1]https://unfccc.int/topics/adaptation-and-resilience/the-big-picture/how-are-stakeholders-engaged-on-adaptation-under-the-un-climate-process.

2. Introduction to the concept of loss and damage

New elements and dimensions of loss and damage under the Paris Agreement (Article 8)

The conference is going to present new elements and dimensions of loss and damage under the Paris Agreement which reaffirmed the Warsaw International Mechanism for Loss and Damage as the main vehicle under the United Nations Framework Convention on Climate Change (UNFCC) process to avert, minimize and address loss and damage associated with climate change impacts, including extreme weather events.

3. Introduction to adaptation and resilience

Within the UN climate change regime, Parties carry out adaptation-related activities in a number of work-streams, through work programs and in specialized groups and committees. These programs are going to be briefly presented and it is going to be demonstrated how adaptation may be introduced in the EU.

4. Introduction to mitigation

Measures are being taken to mitigate climate change world-wide in the effort of numerous countries to live up to their commitments under the Convention, the Kyoto Protocol and the Paris Agreement. This research article is going to demonstrate in which way it will be possible to facilitate assessment and analysis of such impacts and recommend specific actions.

According to the Convention, Kyoto Protocol and Paris Agreement Parties need to minimize adverse economic, social and environmental impacts on other Parties, especially developing country Parties.

Conclusions and Key Contributions to the Academic, Policy Making Community or Industry

- Presentation of EU's legal commitments as a stakeholder to the UN legal framework on climate change following the Katowice Climate Change Conference.
- Implications of these legal commitments to the industry in the EU.

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A New Synonym for Beijing's Environmental Quality – "Beijing Blue"

In recent years, due to the rapid economic development, the rapid increase in population, coupled with its special terrain and atmospheric environment characteristics, environment pollution in Beijing has become increasingly serious, causing widespread concern. Since 2013, Beijing has issued a number of plans and measures to comprehensively deal with the environmental situation of Beijing from four aspects, namely pollution control, environmental management, environmental law enforcement and environmental safety supervision, as well as joint prevention and control with the beijing-tianjin-hebei region and its surrounding areas and the active participation of the public. So far, the environmental quality of Beijing has been significantly improved, such as the average annual $PM_{2.5}$ concentration of 58 micrograms per cubic meter in Beijing in 2017, down 35.6 percent from 2013; the number of days with air quality reaching the standard (excellent and good) was 226 in 2017, and the proportion of days with the standard was 62.1%, an increase of 50 days compared with 2013; days of heavy air pollution (severe and serious pollution) were 23 days, with an incidence of 6.3 percent, 35 days less than in 2013. After the unremitting efforts of all parties, "Beijing Blue" is visible at any time. People will often take photos and post them on Weibo, WeChat and other major online platforms. The words reveal the joy and excitement of Beijing's environmental improvement, in stark contrast to the previous smoggy weather. ''Beijing Blue'' has become a new synonym for Beijing's environmental quality.

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Pretreatment of Brackish Water through Chitosan Coagulation and Slow Sand Filtration for Desalination Applications

Due to the aggressive and non-stop developments in urban and industrial areas; agricultural, domestic and industrial pollution; and watershed degradation, global water security has been severely impacted thus limiting potable water availability throughout the world. Desalination presents a reliable and sustainable solution to this growing problem, since 96.7% of all water is in the form of seawater (Shiklomanov, 2011). One of the biggest challenges of the desalination process, however, is the occurrence of membrane fouling. To address this problem, pretreatment operations are usually performed to remove large amount of contaminants and foulants in the water. Coagulation is one of the most commonly used water treatment process for its capability to remove natural organic matter and suspended particles in raw water (AWWA, ASCE, 2012). However, due to the negative environmental effects of using chemical-based coagulants, using natural coagulants has started to gain appeal. Natural coagulants produce lesser amount of sludge and because of their biodegradability properties, sludge treatment is easier and less harmful to the environment (Choy, Prasad, et.al., 2014; Bergamasco, Bouchard, et.al., 2009). Chitosan, one of the existing effective natural coagulants, is a biodegradable, non-toxic, high molecular weight, linear cationic biopolymer, known for its strong positive charge permitting it to bind excellently to negatively charged surfaces (Kawamura, 1991). Furthermore, for enhanced water treatment, filtration processes are usually utilized after coagulation as secondary treatment. In this study, chitosan coagulation and slow sand filtration were performed to improve the water quality, particularly turbidity, conductivity, TDS, DO and salinity, of brackish water to avoid or minimize fouling phenomena during desalination. The coagulation process was carried out in a conventional jar test apparatus using synthetic brackish water as initial feed. To induce turbidity, a set amount of kaoline clay was added to all samples to achieve uniform initial turbidity of approximately 100 NTU. The pH and initial coagulant concentration were varied for each sample to identify the optimal condition of coagulant performance. A laboratory scale slow sand filtration set-up was constructed to facilitate the next step of this study. Other set-up modifications were also performed, such as adding activated carbon at the bottom of the whole filter column and replacing the gravel with zeolite of the same size, to test if there would be a significant effect on removal efficiencies of the parameters. Results show

that adding 30 ppm of chitosan coupled with the adjustment to pH 10 yielded optimum coagulation results obtaining a turbidity removal efficiency of 99.25%. Meanwhile, modified slow sand filtration, wherein zeolite was used instead of gravel as underdrain, resulted in a 27.77% NaCl removal efficiency. To support these results, several sample characterizations were performed such as laser microscopy and topographical analysis to evaluate the roughness profile difference of zeolite before and after it was utilized for filtration, and X-ray fluorescence for elemental analysis of the water samples. This combined coagulation-filtration process offer a very simple but efficient, low-cost, environment-friendly and sustainable pretreatment technique of brackish water to avoid or minimize the occurrence of membrane fouling during desalination.

Emilia-Adela Salca
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Evaluation of the Surface Quality of Wood as a Function of Machining Parameters

The objective of this study was to evaluate the surface quality of the black alder (Alnus glutinosa L. Gaertn.) samples planed along the grain orientation. Two milling cutters having same diameter but equipped with straight and inclined brazed plates were employed for the tests. Defect free specimens with the same thickness were processed under laboratory conditions by applying various cutting schedules. The roughness of the samples was measured along the processing direction using a MicroProf FRT Optical Profilometer. The most widely used roughness parameter for processed surfaces, the processing roughness (Rk), was considered to quantify the surface of the samples. The surface quality of the specimens was evaluated as function of feed speeds, cutting depths and rotation speeds. Based on the findings of this work it was determined that at low rotation and feed speed using a light cutting depth, the milling cutter with inclined brazed plates resulted in samples with smoother surface as compared to those processed using the milling cutter with straight plates. It appears that high rotation speed had very little influence on overall roughness of the samples. It is expected that data from this study could be used as a quality control tool so that machining of black alder can be carried out more effectively and efficiently in further processing such as producing parts for furniture sector.

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Towards Sustainable Energy Technologies: The Case of the Micro Combined Heat and Power Systems

To facilitate the energy transition, it is necessary to develop sustainable energy technologies. The micro combined heat and power (μCHP) is such technology, which produces simultaneously decentralized thermal and electrical energy at low power (electrical power lower than 50 kWel). This technology recovers the "fatal heat" losses considered as "heat waste" produced in thermodynamics cycles for mechanic energy production. Micro-CHP technology offers significant benefits: reduced primary energy consumptions, reduced CO2 emissions, avoidance of central plant and network construction. Micro-CHP technology can contribute to the transition of the traditionally centralized energy supply system towards a more sustainable system. A wood pellet steam engine and a gas Stirling engine micro-CHP devices have been tested in INSA Strasbourg in order to characterize their performances. Two dynamic models based on these experimental investigations have been developed in order to predict their energy performance. These models have been implemented in the TRNSYS's numerical environment where an optimization platform has been implemented. Thermal and electrical energy storage systems and energy management controller have been implemented in this platform which is used to optimize the coupling between buildings and the micro combined heat and power devices by considering energetic, economic and environmental criteria. This work presents the micro combined heat and power systems, the simulation platform, the energy storage systems and the control strategies possibilities. We also show how the thermal sensitivity of the French energetic mix correlates the economic, environmental and energetic performances of the micro combined heat and power systems.

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Uptake and Biotransformation of Monepantel in Plants used as Livestock Feed

Drugs are potentially dangerous environmental contaminants, because they are designed to have biological effects at low concentrations. While drugs for human therapy are mostly excreted into sewerage and can be (at least partly) degraded, veterinary drugs mostly enter to the environment directly via animals excrements left in pastures or used in field fertilization. Excreted veterinary drugs in soil or water can be absorbed by plants, which might consequently be fed by animals. Monepantel (MOP), amino-acetonitrile derivative, is the newest anthelmintic intended for the treatment and control of gastrointestinal nematodes in ruminants. Contrary to other anthelmintics, the information about MOP environmental circulation, toxicity and its uptake and metabolism in plants is even almost none.

Based on the facts, we decided to study the uptake, transport and biotransformation of MOP in two plants, *Plantago lanceolata* and *Medicago sativa*, common in pastures and used as a ruminant feed. The whole plant regenerants were cultivated on the agar nutrient medium supplemented with MOP (final concentration 10 μM, pre-dissolved in DMSO). Plant roots, top parts of leaves and basal parts of leaves were collected after 1, 2, 3, 4, 5 and 6 weeks of cultivation. MOP metabolites were identified and semi-quantified using UHPLC-MS/MS technique with a triple quadrupole mass analyser.

Our results showed that both plants were able to uptake, transport and metabolize MOP. Several metabolites were found not only in roots but also in the leaves. Based on metabolite structures, the schemes of metabolic pathways of MOP in *Plantago lanceolata* and *Medicago sativa* were proposed. The fact that MOP and its metabolites are presented in leaves which might be consumed by animals emphasize the risk of undesired circulation of MOP in the environment with many pharmacological and toxicological consequences.

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Evaluation of Corner Joint Strength of Particleboard and Sandwich Panels bonded with Starch

Aim of study: The objective of this work is to evaluate effect of strength corner joint properties of the box shaped furniture design from eastern redcedar (*Juniperus virginiana L.)* and corn starch as a binder southern samples. Differences in different type of corner joint techniques (plain glued corner, glued and screwed corner and glued with dovel corners were evaluated.

Area of study: This study was performed at the laboratories of Department of Natural Resource Ecology and Management, Oklahoma State University, Stillwater, Oklahoma, USA and supported by The Scientific and Technological Research Council of Turkey (TUBITAK) 2219 grant.

Material and Methods: Eastern redcedar (*Juniperus virginiana L.)* particle samples and corn starch obtained from Oklahoma City OK, glutaraldehyde were bought from Aldrich chemicals used as experimental panels. Corner elements such as screw, glue and dovel obtained from Stillwater Oklahoma. Overlaid and non-overlaid particleboards and sandwich panels used at L type corner joints. Tension and compression strength moment values tested.

Main results: Particleboard panel jointed using dowel resulted in the highest tension strength moment values followed by the specimens having sandwich type configuration combined with dowel. Particleboard as well as overlaid sandwich type of panels glued using PVAc had the lowest strength values.

Highlights: It appears that composite panel manufactured with modified starch would have a potential to be used for corner joints having satisfactory strength values. It seem that overlaying of the samples adversely influenced their overall corner joint strength properties.

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The Expected Environmental Impact of Increased Pesticide use on the Mortality of Pollinators and Hive Productivity

A significant portion of agricultural food crops as well as wild plants depends on ecological services of pollinating insects, with the honeybee (*Apis mellifera)* being a dominant factor especially in agricultural fields and orchards. Honeybees are major pollinators: pollinating 70 of the around 100 crop species that comprise 90% of the human food production with economic value of billions of US $ a year. Lose honeybees, is expected to affect the food chain of our world, as we know.

Thus, the phenomenon of honeybee colony collapses during the past decades has created great concern not only among beekeepers, but also among farmers and policy makers. Studies have pointed toward multiple environmental drivers in honeybee colony losses and decline, such as climate change, hive pests and pathogens, decrease in quality of bee pasture as well as extensive exposure to agrochemicals. Our study examined honeybee exposure to airborne agrochemical. The findings in this study revealed residues of different agrochemicals (acaricides, insecticides, fungicides and herbicides) in honeybee colonies and hive products. In some cases these exposures resulted in considerable bee mortality and colony death. Furthermore, as the honeybees are exposed to a high number of different synthetic plant protection chemicals, the impact of individual compounds is difficult to determine as commercial products are often composed of mixtures of generic compounds and agricultural areas treated against multiple “enemies”. Besides the acute damages, chronic exposure of pollinators to toxic chemicals, even at sub-lethal doses, is expected to have long-term negative effects on honeybee behavior.