2012

Environment Abstracts

Seventh Annual International Conference on Environment 14-17 May 2012, Athens, Greece

Edited by Gregory T. Papanikos

THE ATHENS INSTITUTE FOR EDUCATION AND RESEARCH

Environment Abstracts

7th Annual International Conference on Environment 14-17 May 2012, Athens, Greece

Edited by Gregory T. Papanikos

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Preface

This abstract book includes all the abstracts of the papers presented at the *7th Annual International Conference on Environment, 14-17 May 2012,* organized by the Athens Institute for Education and Research. In total there were 58 papers and 71 presenters, coming from 28 different countries (Belgium, Brazil, China, Estonia, France, India, Indonesia, Italy, Iran, Iraq, Korea, Libya, Malaysia, Mexico, New Zealand, Qatar, Turkey, Saudi Arabia, Rumania, South Africa, South Korea, Slovenia, Thailand, Spain, Serbia, Sweden, UK and USA). The conference was organized into 12 sessions that included areas of Energy Optimization, Water Management, Environment, Sustainable Development, Optimization of Resources and other related fields. As it is the publication policy of the Institute, the papers presented in this conference will be considered for publication in one of the books of ATINER.

The Institute 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 in Athens and exchange ideas on their research and consider the future developments of their fields of study. Our mission is to make ATHENS a place where academics and researchers from all over the world meet to discuss the developments of their discipline and present their work. To serve this purpose, conferences are organized along the lines of well established and well defined scientific disciplines. In addition, interdisciplinary conferences are also organized because they serve the mission statement of the Institute. Since 1995, ATINER has organized more than 150 international conferences and has published over 100 books. Academically, the Institute is organized into four research divisions and nineteen research units. Each research unit organizes at least one annual conference and undertakes various small and large research projects.

I would like to thank all the participants, the members of the organizing and academic committee and most importantly the administration staff of ATINER for putting this conference together.

Gregory T. Papanikos
President

FINAL CONFERENCE PROGRAM
7th Annual International Conference on Environment, 14-17 May 2012, Athens, Greece
PROGRAM

Conference Venue: Metropolitan Hotel of Athens, 385 Syngrou Ave., 175 64, Athens, Greece

ORGANIZING AND SCIENTIFIC COMMITTEE

1. Dr. Gregory T. Papanikos, President, ATINER.
2. Dr. Theophile Theopanides, Honorary Professor, National Technical University of Athens, Greece & University of Montreal, Canada.
3. Dr. George Poulos, Vice-President of Research, ATINER & Emeritus Professor, University of South Africa, South Africa.
4. Dr. Nicholas Pappas, Vice-President of Academics, ATINER & Professor, Sam Houston University, USA.
5. Dr. Iakovos Caravanos, Professor, Hunter College of the City University of New York, USA.
6. Dr. Keith Edmister, Professor, North Carolina University, USA.
7. Dr. Stevan Gressit, Medical Director, Office of Adult Mental Health, USA.
8. Dr. Eva Maleviti, Researcher, ATINER, Greece.
9. Dr. Hudu Mikail Garba, Ph.D. Candidate, Department of Pharmacology, School of Medicine, UOA, Greece.
10. Dr. Timothy Howe, Associate Professor of History and Ancient Studies, Saint Olaf College, USA.
11. Dr. Romana Elzbieta Pawlinska-Chmara, Assistant Professor, Opole University, Poland.
12. Dr. Salazar Raquel, Professor-Researcher, Universidad Autónoma Chapingo, Mexico.
13. Dr. Behzad Sani, Assistance Professor, Islamic Azad University, Iran.
14. Dr. Amit Sarin, Associate Professor, Amritsar College of Engineering and Technology, India.
15. Dr. Virginia Sisiopiku, Associate Professor, University of Alabama, USA.
16. Dr. Margarita Kefalaki, Director of Communication, ATINER.
17. Ms. Rouska Bozkova, Ph.D. Student, South West University Neofit Rilski, Bulgaria.
18. Ms. Eirini-Renata Dimitrokali, Ph.D. Student, University of Central Lancashire, U.K.
19. Mr. Vlasios Oikonomou, Researcher, University of Groningen, the Netherlands.
20. Ms. Lila Skountridaki, Researcher, ATINER & Ph.D. Student, University of Strathclyde, U.K.
21. Mr. Vasilis Charalampopoulos, Researcher, ATINER & Ph.D. Student, University of Strathclyde, U.K.

Administration: Fani Balaska, Stavroula Kiritsi, Eirini Lentzou, Konstantinos Manolidis, Katerina Maraki & Celia Sakka

CONFERENCE PROGRAM

Monday 14 May 2012

07:30-08:15 Registration
08:15-08:30 Welcome and Opening Remarks

- Dr. Gregory T. Papanikos, President, ATINER.
- Dr. George Poulos, Vice-President of Research, ATINER & Emeritus Professor, University of South Africa, South Africa.
- Dr. Nicholas Pappas, Vice-President of Academics, ATINER & Professor, Sam Houston University, USA.

08:30-10:45 Session I (Room A): Energy Optimization I **Chair:** Pappas, N., Vice-President of Academics, ATINER & Professor, Sam Houston University, USA.
1. *Anderson, J., Professor, West Virginia University, USA. Reducing Impacts of Poultry Litter on Water Quality by Developing Markets for Energy and Mine Land Reclamation. 2. Jin, S.J., Master Course, Seoul National University of Science & Technology, South Korea & Yoo, S.H., Professor, Seoul National University of Science & Technology, South Korea. The Impact of the Supply Shortage in Electricity on the Korean National Economy: An Input-Output Analysis. (Monday, 14th of May, 2012) 3. Aslan, Z., Teaching Member, Istanbul Aydin University, Turkey & Tokgozlu, A., Assistant Professor, Istanbul Aydin University, Turkey. The Role of Atmospheric Instability and Importance of Wind Shear Exponent on Wind Energy Potential. (Monday, 14th of May, 2012) 4. Dimitriou, I., Researcher, Swedish University of Agricultural Sciences, Sweden. The Impact of Short Rotation Energy Crops Grown on Agricultural Land on Water and Soil Quality. 5. Jung, I.H., Researcher, Korea Atomic Energy Research Institute, Korea, Lee, M.J., Researcher, Korea Atomic Energy Research Institute, Korea & Mah, Y.J., Researcher, Korea Atomic Energy Research Institute, Korea. Decomposition of Pollutant Waste using an Electron Beam Accelerator. (Monday, 14th of May, 2012, morning)

10:45-12:30 Session II (Room A): Environment I **Chair:** *Anderson, J., Professor, West Virginia University, USA.	**10:45-12:30 Session III (Room B): Water Management I** **Chair:** Naser, H., Director of Remote Sensing Center, University of Kufa, Iraq.
1. Miller, J., Professor, Western Carolina University, USA, Mackin, G., Associate Professor, Northern Kentucky University, USA, Lechler, P., Western Carolina University, USA, Lord, M., Western Carolina University, USA & Lorentz, S., Western Carolina University, USA. Influence of Process Zone Structure and Connectivity on the Transport	1. Pintar, A., Head of Laboratory, National Institute of Chemistry, Slovenia. Catalytic Wet-Air Oxidation as an Efficient Treatment Technique for Removal of Organic Pollutants and Detoxification of Wastewaters. 2. Woo, M., Associate Professor, The Citadel, USA. Modeling the Removal of Stromwater Pollutants and the Mixing Mechanism of Stormwater

and Fate of Non-Point Source Pollutants, Mkabela Basin, South Africa. 2. Leaver, J., Associate Professor, Unitec Institute of Technology, New Zealand. Influence of Plug-in Hybrid Vehicles in Reducing Greenhouse Gas Emissions in the Vehicle Transport Sector of New Zealand. 3. Evaristo de Jesus, K.R., Researcher, Embrapa Environment, Brazil. Impact Assessment of Nanotechnology: A Methodology Proposal for Environmental Evaluation. (Monday, 14th of May, 2012) 4. Konuk, N., Researcher, Ondokuz Mayis University, Turkey, Turan, N.G., Associate Professor, Ondokuz Mayis University, Turkey & Ergun, O.N., Professor, Ondokuz Mayis University, Turkey. Evaluation of Air Pollution Caused by the Uncontrolled Urbanization: A Case Study from Samsun, Turkey. 5. Cesario de Oliveira, L.A., Professor, University of Sao Paulo, Brazil & Rego Barros Barbosa Cesario de Oliveira, S.A., Professor, Paulista University, Brazil. The Understanding of What is Environment. The Complexity and the Possibilities of Transformation through Education at the University.	Runoff. 3. Rodriguez, A., Researcher, CIDETEQ S.C., Mexico, Cardenas, J., Professor, CIDETEQ S.C., Mexico, Garcia, L., Professor, CIDETEQ S.C., Mexico, Villalon, M., Professor, CIDETEQ S.C., Mexico, Munoz, C.H., Professor, CIDETEQ S.C., Mexico & Ramirez, J.A., Professor, CIDETEQ S.C., Mexico. Integral Development of a Project for the Improvement of Operation Municipal Slaughterhouse, and the Technology of Sustainable Use of Waste and Wastewater. 4. Vrtovsek, J., Researcher, National Institute of Chemistry, Slovenia. A Novel Small-Scale System for Domestic Wastewater Treatment and Reuse.

12:30-14:00 Session IV (Room A): Environment II **Chair:** Aslan, Z., Teaching Member, Istanbul Aydin University, Turkey.	**12:30-14:00 Session V (Room B): Optimization of Resources I** **Chair:** *Alhajery, K., Manager, Royal Commission, Saudi Arabia.
1. Park, Y.C., Associate Professor, Jeju National University, Korea & Kim, J., Ph.D. Student, Jeju National University, Korea. An Experimental Study on Cycle Performance of the Mobile Air Conditioner. 2. Ngatindriatun, N., Lecturer & Researcher, Diponegoro University, Indonesia & Susilowati, I., Lecturer, Diponegoro University, Indonesia. The Impact of Pesticides Use on Onion Farming in Brebes Regency, Central Java-Indonesia: A Model towards Environmental Betterment. 3. Ryu, J-Y., Researcher, Korea Atomic	1. Li, L., Professor, Nanjing University of Technology, China. Hydrogen Production by Hydrolysis of Magnesium-Based Hydrides. 2. Manurakchinakorn, S., Assistant Professor, Walailak University, Thailand, Wisitsak, P., Researcher, Walailak University, Thailand, Pukahuta, C., Assistant Professor, Ubon Ratchathani University, Thailand & Chitradon, L., Associate Professor, Kasetsart University, Thailand. Evaluation of Nitrogen Supplements for Delignification in Sunflower Seed Hull by Lentinus polychrous Lev.

Energy Research Institute, Republic of Korea, Choi, C.Y., Researcher, Korea Atomic Energy Research Institute, Republic of Korea, Kim, J.B., Researcher, Korea Atomic Energy Research Institute, Republic of Korea, Yoon, Y.M., Researcher, Korea Atomic Energy Research Institute, Republic of Korea & Lee, S.J., Researcher, Korea Atomic Energy Research Institute, Republic of Korea. The Comparison of Destruction of SF6 & NF3, A Potent Greenhouse and Toxic Gases, by Electron-Beam Irradiation Technology. 4. Ergun, O.N., Professor, Ondokuz Mayis University, Turkey, Coruh, S., Ondokuz Mayıs University, Turkey & Geyikci, F., Ondokuz Mayıs University, Turkey. Dye Removal from Aqueous Solution by Adsorption on to Fly Ash.	3. *Martin-Luengo, M.A., Researcher, ICMM, CSIC, Spain, Yates, M., ICP, CSIC, Spain, Ramos, M., CBMSO-UPM, Spain, Salgado, J. L., AIZCE, Spain, Reilly, G. University of Sheffield, UK, Vervaet, C., University of Ghent, Belgium, Valenzuela, L. MEC, Spain, Saez Rojo, E., ICMM, CSIC, MartÃnez Serrano, A. M., ICMM, CSIC, Medina, L., ICMM, CSIC, Vega, L. ICP, CSIC, Diaz, M., ICP, CSIC, Nogales, S., ICP, CSIC, Spain. Sustainable Materials and commodities from agro industrial wastes. Biorefinery and Ecomaterials. 4. Park, S.Y., Ph.D. Student, Korea University, Korea Yoo, S.H., Professor, Seoul National University of Science & Technology, South Korea & Kwak, S.J., Professor, Korea University, Korea. The Economic Value of LNG in the Korean Manufacturing Industry. (Monday, 14th of May, 2012) 5. Brumatti, C.R., Ph.D. Student, Embrapa Environment, Brazil & Evaristo de Jesus, K.R., Researcher, Embrapa Environment, Brazil. A Proposed Impact Assessment Method for Genetically Modified Plants (AS-GMP Method). (Monday, 14th of May, 2012) 6. Abuelela, A., Student, Qatar University, Qatar, Khraisheh, M., Associate Professor, Qatar University, Qatar, Elkhalifa, S., Student, Qatar University, Qatar & Doualeh, N., Student, Qatar University, Qatar. Carbon Footprint for the Petrochemical Industry in Qatar: A Case Study for the VCM Process.

14:00-15:00 Lunch (details during registration)

15:00-16:30 Session VI (Room A): Sustainable Development

Chair: *Martin-Luengo, M.A., Researcher, Institute of Materials Science of Madrid, Spain.

1. *Alhajery, K., Manager, Royal Commission, Saudi Arabia. Yanbu Industrial City as a Model for Sustainable Development. (Monday, 14th of May, 2012)
2. Banaduc, D., Lecturer, Lucian Blaga University of Sibiu, Romania & Curtean-Banaduc, A., Associate Professor, Lucian Blaga University of Sibiu, Romania. Using Predictive Modeling of Lotic Biodiversity for Sustainable Management of Rivers – Timiş River (Romania) Case Study.
3. Choi, H., Ph.D. Student, Korea University, Korea, Yoo, S.H., Professor, Korea University, Korea & Kwak, S.J., Professor, Korea University, Korea. Oil Consumption and Economic Growth in Brazil. (Monday, 14th of May, 2012)

4. Akbulut, T., Professor, Istanbul University, Turkey, Ayrilmis, N., Associate Professor, Istanbul University, Turkey, Ozden, O., Assistant Professor, Istanbul University, Turkey, Candan,Z., Graduate Research Assistant, Istanbul University, Turkey & Avci, E., Graduate Research Assistant, Istanbul University, Turkey. Waste Paper Sludge as a Raw Material in Particleboard Manufacture.
5. Ayrilmis, N., Associate Professor, Istanbul University, TurkeyAkbulut, T., Professor, Istanbul University, Turkey, Elmas, G.E., Istanbul University, Turkey & Kaymakci, A., Istanbul University, Turkey. High Performance Lignocellulosic/Thermoplastic Composite from Rice Husk and Aluminium Polyethylene of Used Beverage Carton.
6. Dundar, T., Associate Professor, Istanbul University, Turkey & Avci, E., Researcher, Istanbul University, Turkey. Application of Acoustic Tomography Technique for Detection of Decay in Urban Trees.

21:00–22:30 Greek Night (Details during registration)

Tuesday 15 May 2012

08:00-10:00 Session VII (Room A): Energy Optimization II

Chair: *Antonious, G., Principal Investigator, Kentucky State University, USA.

1. *Ghangrekar, M., Professor, Indian Institute of Technology Kharagpur, India, Sajana, T.K., Researcher, Indian Institute of Technology Kharagpur, India, Mohapatra, L., Researcher, Indian Institute of Technology Kharagpur, India & Mitra, A., Associate Professor, Indian Institute of Technology Kharagpur, India. Effect of Preatreatment of Anodic Inoculum and Presence of Algae on Performance of Microbial Fuel Cell.
2. Mackin, G., Associate Professor, Northern Kentucky University, USA, Miller, J., Professor, Western Carolina University, USA & Lechler, P., Western Carolina University, USA. Modelling Geochemical Changes of Sediment within Alluvial Systems.
3. Loumakis, G., Researcher, Glasgow Caledonian University, Scotland, Stas, B., Lecturer, Glasgow Caledonian University, Scotland & Wood, B., Professor, Glasgow Caledonian University, Scotland. A Review of Solar Thermal Applications Using Polymer Materials.
4. Stephan, E., Ph.D. Student, University of Lyon, France. The Diversity of Limestone and the Implication for Energy Efficiency of Buildings.
5. Yang, Y., Student, The University of Hong Kong, China. Numerical Simulation on the Local Impact of an Operating Wind Turbine.
6. Yu, C., Student, The University of Hong Kong, China & Leung, D.Y.C., Professor, The University of Hong Kong, China. Life Cycle Analysis for Petroleum Fuels and Renewable Jet Fuels.

10:00-12:00 Session VIII (Room A): Environment III **Chair:** *Ghangrekar, M., Professor, Indian Institute of Technology Kharagpur, India.	**10:00-12:00 Session IX (Room B): Health and Medicines** **Chair:** Mackin, G., Associate Professor, Northern Kentucky University, USA
1. Mihajlov, A., Professor, University of Novi Sad, Serbia. Green(Ing) Economy: The Question of Environmental Liability. 2. Santos, G.M.M. Professor, Universidade Estadual de Feira Santana, Brazil, Brito, A.F. Graduated Student, Universidade Estadual de	1. Kotzias, D., Head of Unit, European Commission, Joint Research Centre, Institute for Health and Consumer Protection, Italy. Chemicals In Indoor Air-Factors Affecting Wellbeing and Comfort. (Tuesday, 15th of May, 2012) 2. Stewart, H., Doctor of Pharmacy Candidate, University of New

Feira Santana, Brazil & Presley, S.J. Professor, University of Connecticut, USA. Temporal and Trophic Niche Overlap in a Guild of Flower-Visiting Ants in a Seasonal Semiarid Tropical Environment. 3. Carreira da Cruz, M.A., Scientific Advisor, Free University of Brussels, Belgium. The New Architecture of Environmental Impact in Public Procurement: Which Role for the LCA Tools? (Tuesday, 15th of May, 2012) 4. Kara, Y., Researcher, Mugla University, Turkey. Measuring Environmental Sustainability of Turkish Metropolitan Municipalities. 5. Etieyibo, E., Lecturer, University of Witwatersrand, South Africa. Climate System and Global Warming. 6. Naser, H., Director of Remote Sensing Center, University of Kufa, Iraq. Environmental Effects of the Marshes Area in South of Iraq.	England, College of Pharmacy, USA, Malinowski, A., BS, Doctor of Pharmacy Candidate, University of New England, College of Pharmacy, USA, McCall III, K., L., BSPharm, PharmD, Chair & Associate Professor, University of New England, College of Pharmacy, USA Sullivan, M., PharmD, Assistant Professor, University of New England, College of Pharmacy, USA & Gressitt, S., MD, Founding Director, International Institute for Pharmaceutical Safety, USA. Analysis and Comparison of Pharmaceutical Waste Collection Data by Multiple Methods. 3. Turan, N.G., Associate Professor, Ondokuz Mayis University, Turkey, Konuk, N., Professor, Ondokuz Mayis University, Turkey & Ergun, O.N., Professor, Ondokuz Mayis University, Turkey. Recent Patterns and Trends of Hazardous Waste Management: A Case Study.

12:00-13:30 Session X (Room A): Water Management II **Chair:** Urfi, A., Associate Professor, University of Delhi, India.	**12:00-13:30 Session XI (Room B): Optimization of Resources II** **Chair:** Tosun, A.N., Assistant Professor, Hacettepe University, Turkey.
1. Lorentz, S., Associate Professor, University of KwaZulu-Natal, South Africa. Event Based Hydraulic Control and Connectivity Influences of Nutrient and Sediment Migration, Mkabela Basin, South Africa. 2. *Antonious, G., Principal Investigator, Kentucky State University, USA. A Simplified Bioremediation Technique for Herbicide Removal from Runoff Water. 3. Viipsi, K., Researcher, Tallinn University of Technology, Estonia, Sjöberg, S., Researcher, Umeå University, Sweden, Tõnsuaadu, K., Researcher, Tallinn University of Technology, Estonia & Shchukarev, A., Reseracher, Umeå University, Sweden. .Impact of EDTA and Humic Substances on the Removal of Cd2+ and Zn2+ from Aqueous Solutions by Apatite. 4. Chable, C., Student, University Juarez	1. Cole, C., Researcher, Loughborough University, UK, Osmani, M., Lecturer, Loughborough University, UK, Quddus, M., Lecturer, , Loughborough University, UK, Wheatley, A., Professor, Loughborough University, UK, Kay, K., Policy and Development Manager, Charnwood Borough Council, UK & Mortimer, J., Contract Manager, Serco, UK. Household Waste Management Practices in Charnwood Borough, England. 2. Italiano, C., Ph.D. Student, University of Messina, Italy. Reactivity and Stability Pattern of Ceria-Based Noble and Transition Metal-Oxide Catalysts in the Wet Air Oxidation (CWAO) Of Phenol. 3. Shamia, G., Staff Member, University of Garyounis, Libya. The Robustness of Ecological Measure Generalizing the Hill Index and its Application to Bacterial Data. (Tuesday, 15th of May, 2012)

Autonomy of Tabasco, Mexico. Chemical Analysis and Determination of particle Size of the Samaria River Sediments (Tabasco, Mexico) Using Scanning Electron Microscopy.	4. Kuklyte, L., Student, Texas A & M at Galveston, USA. An Inverse Model of Mercury Contamination in Pelagic Fishes.

13:30-14:30 Lunch (Details during registration)

14:30-16:00 Session XII (Room A): Environment IV
Chair: Lorentz, S., Associate Professor, University of KwaZulu-Natal, South Africa.

1. Urfi, A., Associate Professor, University of Delhi, India. Some Aspects of Conservation of Indian Heronries: The Human Dimension.
2. Tosun, A.N., Assistant Professor, Hacettepe University, Turkey. Arising Legal Issues when Environmental Protection Policies are tried to be Carried out by Taxation.
3. Vellinger, C., Ph.D. Student, University of Lorraine, France. Is Multiple Contamination Systematically Increasing Environmental Risk: A Case Study Based on Arsenate and Cadmium Interaction in a Freshwater Amphipod.
4. Kazemi, R., Faculty Member, Islamic Azad University, Iran. Estimating Marginal External Environmental Costs of Road Transportation in Iran.
5. Uygunoglu, T., Associate Professor, Afyon Kocatepe University, Turkey & Kahraman, E., Ph.D. Student, Afyon Kocatepe University, Turkey. Influence of Mineral Additives on Resistance of Concrete at Elevated Temperature.

17:00-20:00 Urban Walk (Details during registration)

20:00-21:00 Dinner (Details during registration)

Wednesday 16 May 2012
Cruise: (Details during registration)
Thursday 17 May 2012
Delphi Visit: (Details during registration)

Aida Abuelela
Student, Qatar University, Qatar,

Majeda Khraisheh
Associate Professor, Qatar University, Qatar,

Samar Elkhalifa
Student, Qatar University, Qatar
&
Neima Doualeh
Student, Qatar University, Qatar

Carbon Footprint for the Petrochemical Industry in Qatar: A Case Study for the VCM Process

Qatar has seen unprecedented development in past decade as a main result of its massive oil and gas industry. It has the third confirmed reserve on natural gas in the world. With 55.4 tonnes of carbon dioxide per person, Qatar has the highest carbon footprint globally, about 10 times the global average.

Against this background, there have been attempts to investigate ways to reduce carbon emissions since CO2 was deemed to be one of the major green house gases. Power generation is by far the biggest contributor to anthropogenic (man made) carbon emissions. The carbon emission mitigation methods currently considered include "end of pipe" solutions and "at source" solutions. The techniques currently identified to capture carbon emissions from point sources from industrial activities include post combustion capture, precombustion capture and oxyfuel based capture. These techniques are currently at various stages of development.

Against this background of state of the art in carbon capture approaches for greenhouse gas mitigation, it is important to obtain reasonably accurate CO2 emissions. Whilst this may not be a major problem in fossil fuel power plants for domestic electricity generation, it is significantly different in chemical plants, namely, petrochemical complexes where the carbon footprint is estimated from several sources that utilize fossil fuel as its primary energy supply. In a typical chemical process, we may have chemical reactors with endothermic reactions (heat input needed), distillation columns (with steam reboilers), compression operations (driven by high pressure steam or gas turbines), electrically driven pumps for a range of operations including cooling, refrigeration loops driven by compressors (and ultimately gas turbines). Each section of the plant will have its thermal duty that can

be traced back to the primary fossil fuel energy that will be converted to the form of intended convenience (electrical, kinetic, thermal, etc.

In this paper, a typical petrochemical process, namely the Vinyl Chloride Monomer (VCM) process has been selected for carbon footprinting. The primary fossil fuel equivalents which in turn will be turned into CO2 emissions using combustion processes were identified. Industrial standard simulation software HYSYS was used to carry out the calculations on the heat duties of the entire plant. Energy intensive sections in the VCM process were identified and their associated CO2 footprint calculated. This paper will offer the results of such study and its significance and benefits to Qatar.

Turgay Akbulut
Professor, Istanbul University, Turkey

Nadir Ayrilmis
Associate Professor, Istanbul University, Turkey,

Oznur Ozden
Assistant Professor, Istanbul University, Turkey,

Zeki Candan
Graduate Research Assistant, Istanbul University, Turkey
&
Erkan Avci
Graduate Research Assistant, Istanbul University, Turkey

Waste Paper Sludge as a Raw Material in Particleboard Manufacture

Utilization of paper mill sludge that is produced during paper making operation was investigated for the manufacture of particleboard as a raw material. Paper sludge including considerable inorganic materials caused environmental pollution and is not rationally used in any usage area. For this aim, paper sludge was obtained from Kartonsan company located in Izmit and used for the manufacture of experimental panels at the forestry faculty, Istanbul University. After the paper sludge was dried in an oven and then ground with a laboratory mill, its physical and chemical properties such as dimension, ash content, klason lignin content, and holocellulose content were determined at department of forest products chemistry and technology. Following the characteristics of the paper sludge, it was blended with wood particle and fibers at various levels. The experimental panels were manufactured at the pilot plant at the department. The paper sludge was added in surface layers (top and bottom) and core layer of three-layer particleboard. Urea-formaldehyde resin was used in the manufacture of the experimental panels at various amounts based on the oven dry particle/fiber weight panels. After the panel manufacture, test specimens were cut from the panels and then physical and mechanical tests were performed according to the related European standards. The findings obtained from test specimens were compared to the values are given in the standards. In the event of positive values of the panels, paper sludge which was a problem for paper mills used waste papers had a potential as a raw material for particleboard manufacture. In addition, this potential fiber resource could be recycled in the wood-based panel industry. Paper sludge,

approx. 300.000 ton/year obtained from 10 paper mills located in Turkey can prevent some wood imports and contribute national economy.

Khalid Abduallah Alhajery
Manager, Royal Commission, Saudi Arabia

Yanbu Industrial City as a Model for Sustainable Development

The Bruntland Report issued by the UN in 1987 defined the modern SUSTAINABLE DEVLOPMENT concept, and is the reference background for all sustainability activities . It is worthy to mention that the Royal Commission was ahead of it's time back when it started in 1975 , with the formation of 2 new cities with their wide range of attractive sustainable features which can pass any environmental impact assessment by today's standards due to the endless positive outputs on socio-economic and environmental aspects.

Royal Commission's roles as a model and trend setter in sustainable development will be presented with focus on it's solid infrastructure components in both industrial and community zones with built to last specifications – High standards in all industrial projects – Environmental Impact Assessment process for all projects – how to be a green industry – some examples and case studies of green technologies.

Also to be shown will be application of concept of sustainability right from the early planning and design down to construction showing protection of all environmentally sensitive areas such as mangroves and coral reefs were considered as a priority at all stages which has led to perfect harmony between industry and environment

Turning the dream into reality will be presented as one of the many sustainable aspects of Yanbu , and also to be highlighted is the fact that Yanbu as a pollution-free city with high quality of life for it's inhabitants and it's green efforts.

It is quite apparent that even with the current drive toward green and sustainable development by different cities and municipalities , and even the emergence of new mega projects in the middle east , the Royal Commission Yanbu is still in a class by itself in being an existing livable 21st century city that lives up to it's name after more than 3 decades of hard work and dedicated efforts in master planning , with it's high score in environmental sustainability , character , identity , recreation , way of life and a solid long lasting infrastructure set-up .

The future Yanbu will also be featured and all it's prosperous projects and their positive socio-economic and green input to living communities in the whole western region.

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Reducing Impacts of Poultry Litter on Water Quality by Developing Markets for Energy and Mine Land Reclamation

Manure from livestock operations is increasingly viewed as an environmental liability due to water and air pollution concerns. In particular, the poultry industry in the Chesapeake Bay watershed (eastern North America) is under increased regulatory scrutiny due to nitrogen and phosphorus inputs into the Bay. Although poultry litter is valued as fertilizer, the cost of shipping the bulky material out of the watershed is prohibitive and much is still used on over-fertilized farmlands in the watershed. One potential solution for excess litter is to burn it, thereby producing energy, and conversion of the litter to biochar. Biochar has value for improving soil fertility and heavy metal remediation. Our overall program goal is to develop a comprehensive

strategy to convert poultry litter from an environmental liability into an economic and ecological asset. Our specific objectives are to evaluate the potential of biochar for reclamation of surface coal mine soils and to develop a comprehensive conceptual model for improving poultry litter waste management through market-driven alternatives. Our conceptual model evaluates poultry litter energy production (compost, methane, fuel oil, pyrolysis), water remediation (acid mine drainage, shale gas hydraulic fracturing water), and biochar production (mine soil amendment and poultry feed supplement) from environmental and economic perspectives. Biochar manipulated with various leaching and saturation pretreatments, influenced germination rates, number of days to germination, and aerial biomass of lettuce in topsoil and mineland soil experiments. Increased application rates and pretreatment saturation times improved germination and growth properties (compared to fertilizer, topsoil and mine soil only) particularly under drought conditions. Pretreatment leaching and saturation conditions reduced Na and K concentrations. Worm avoidance tests indicated that biochar had fewer worms than soil alone. Our biochar results indicate potential for mineland remediation and our conceptual model holds promise for reducing ecological liability, and enhancing economic and energy concerns.

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A Simplified Bioremediation Technique for Herbicide Removal from Runoff Water

Nine biobeds (ground cavity filled with a mixture of composted organic matter, topsoil, and a surface grass) were established at Kentucky State University research farm (Franklin County, Kentucky, USA) to study the impact of this practice on reducing surface runoff and seepage water contamination by residues of dimethazone and trifluralin herbicides arising from an agricultural field. Biobed (biofilter) systems were installed at the bottom of the slope of specially designed runoff plots to examine herbicides retention and degradation before entering streams and rivers. In addition to biobed systems, three soil management practices: municipal sewage sludge (SS), SS mixed with yard waste compost (SS + YW), and no-mulch roto-tilled bare soil (NM used for comparison purposes) were used to monitor the impact of soil amendments on herbicide residues in soil following natural rainfall events. Organic amendments increased soil organic matter content and herbicide residues retained in soil following natural rainfall events. Biobeds installed in NM soil reduced dimethazone and trifluralin by 84 and 82%, respectively in runoff water that would have been transported down the land slope of agricultural fields and contaminate natural water resources. Biobeds installed in SS and SS+YW treatments reduced dimethazone by 65 and 46% and trifluralin by 52 and 79%, respectively. These findings indicated that biobeds are effective for treating dimethazone and trifluralin residues in runoff water from agricultural fields. Accordingly, the use of biobeds in on-farm bioremediation of pesticide residues in surface runoff water might provide a potential solution to contaminated runoff and seepage water arising from agricultural production operations.

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The Role of Atmospheric Instability and Importance of Wind Shear Exponent on Wind Energy Potential

Wind speed variations are function of atmospheric stability. One of the indicators of the evolution of atmospheric instability is the Richardson number. It is a function of the static stability and wind shear. The logarithmic wind profile is commonly used for wind energy evaluation processes in the atmospheric surface layer. Definition of the vertical variation of horizontal wind speeds above the ground by logarithmic profile is limited by 100 meters. The main objective of this study is to take into account atmospheric instability and wind shear exponent in wind power assessment. In this paper, stability parameters and wind shear exponent have been calculated by using radiosonde data and the mobile wind measuring system (tower) for the local area of Isparta; Mediterranean Region in Turkey between 2001 and 2002. These data were analyzed to define hourly, daily, monthly and seasonal variations of the Richardson number and wind shear exponent at the first part of the paper. Analyses of early morning soundings produced negative skewwness and afternoon soundings produced a positive skewwness for Ri numbers. The larger negative values of Ri numbers (extremely unstable conditions) have been observed in early morning in winter at the lower levels of atmosphere. The larger positive values than in the first layer have been recorded in the afternoon in the study area for the second layer in winter. The second part of this study covers wind speed variations, the role of atmospheric stability and importance of wind shear exponent on hourly, daily, monthly and seasonal variations of wind energy potential.

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High Performance Lignocellulosic/Thermoplastic Composite From Rice Husk and Aluminium Polyethylene of Used Beverage Carton

Lignocellulosic reinforced thermoplastic composites are relatively new wood materials and are essentially a combination of wood or other lignocellulosics from agricultural plants, and thermoplastic materials along with some additives. Polyethylene (PE), polypropylene (PP), and polyvinylchloride (PVC) are the most used plastics for lignocellulosic reinforced thermoplastic composites. Used beverage carton (UBC) is composed of 70–90% paper, 10-25% low density polyethylene (LDPE), and about 5% aluminum which is existing components of the UBC. Recovering waste material from the UBCs to manufacture a value-added product with an economical and efficient method is an important issue from the perspective of environmental pollution. Rice husks are an important by-product of the rice milling process and are a major waste product of the agricultural industry. It is reported that about 0.23 tons of rice husks are generated per ton of rice produced. The reasons behind the use of rice husks in the thermoplastics are its high availability, low bulk density (90-150 kg/m3), toughness, abrasive in nature, resistance to weathering and unique composition. This study investigated that the physical and mechanical properties of the waste aluminum polyethylene reinforced with rice husk flour. The rice husk content in the composite varied from 40 to 60 wt % in the composites. The LDPE with aluminum particles and rice husk flour were compounded into pellets by twin-screw extrusion, and the test specimens were prepared by injection molding. The composites were manufactured using various weight percentages of LDPE/ricehusk and maleic anhydride-grafted PE. Thickness swelling, water absorption, modulus of rupture, modulus of elasticity, and tensile strength values

were measured. Test results showed that aluminum particles in the LDPE positively affected mechanical properties of the samples as compared to traditional rice husk reinforced polyethylene composites. Based on the findings obtained from the present study, the LDPE with aluminum particles obtained from the UBC could be efficiently used in the manufacture of high performance thermoplastic composite reinforced the lignocellulosics.

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Using Predictive Modeling of Lotic Biodiversity For Sustainable Management of Rivers – Timiş River (Romania) Case Study

In the circumstances of increasing anthropogenic use of the lotic systems resources and services, this study aim is to highlight the importance of the biodiversity quantifying for the assessment of the degree of homeostasis and of the support capacity of rivers; also it underlines the usefulness of mathematical models which reveal biodiversity-biotope factors relations, for the prognoses of the evolution of these systems.

The study presents the description of the structure and diversity analysis of benthic macroinvertebrates and fish communities of the upper and middle Timiş River (241 km length, 5795 km2 watershed) in correlation with biotope characteristics and modeling the biotope-biodiversity relations. Timiş was selected due to its dimensions, high variability biotopes and human impact.

The results are based on quantitative benthic macroinvertebrates and fish samples of 21 sampling stations. The assessed biotope variables were: altitude, slope, riverbed width, depth, type of substratum, pools, riffles, runs and bends presence, bank vegetation, channel modification, riverine land use, multi annual average water discharge and water chemical characteristics.

Achieving the statistical analysis it was found that significant statistical relations exist between the benthic macroinvertebrates assemblages diversity and the following biotope parameters: slope, type of substratum, bank vegetation, bank line dynamics, riverine land use, dissolved oxygen, biochemical oxygen demand, organic matter quantities, total hardness, chloride and sulphates quantities, degree of mineralization, the fish assemblages diversity are statistical related with riverbed width and depth, pools and runs alternate, bank vegetation type, channel modification.

Mathematical models were developed to forecast the macroinvertebrates and fish community's diversity dynamic (as river ecological status indicators) in the conditions of the biotope variables changing induced by human activities, and to be useful for lotic ecosystems management.

The biodiversity assessment and the obtained models allow the establishment of the zonation, priorities, objectives and measurements for the studied river sustainable management

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A Proposed Impact Assessment Method for Genetically Modified Plants (AS-GMP Method)

An essential step in the development of products based on biotechnology is an assessment of their potential economic impacts and safety, including an evaluation of the potential impact of transgenic crops and practices related to their cultivation on the environment and human or animal health. The purpose of this paper is to provide an assessment method to evaluate the impact of biotechnologies that uses quantifiable parameters and allows a comparative analysis between conventional technology and technologies using GMOs. This paper introduces a method to perform an impact analysis associated with the commercial release and use of genetically modified plants, the Assessment System GMP Method. The assessment is performed through indicators that are arranged according to their dimension criterion likewise: environmental, economic, social, capability and institutional approach. To perform an accurate evaluation of the GMP specific indicators related to genetic modification are grouped in common fields: genetic insert features, GM plant features, gene flow, food/feed field, introduction of the GMP, unexpected occurrences and specific indicators. The novelty is the possibility to include specific parameters to the biotechnology under assessment. In this case by case analysis the factors of moderation and the indexes are parameterized to perform an available assessment.

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The New Architecture of Environmental Impact in Public Procurement: Which Role for the LCA Tools?

For a decade, a new architecture of the environmental impact definition has emerged in the framework of industrial production policies at the light of new scientific and industrial trends.

The European Commission has launched a wave of strategies and regulations based on this new architecture with – notably – the Integrated Product Policy (IPP) Strategy and the Ecoconception Directive.

The core of this new definition of environmental impact is the cradle-to-grave perspective that reshapes the concept of environmental output. The idea is going further than the traditionnal limits of the ouputs limited strictly to the only use of a product. The operational translation of the cradle-to-grave perspective is the Life Cycle Thinging (LCT) covering the Life Cycle Analysis and the Life Cycle Assessment (LCA).

LCA covers a global and multidimensional perception of the various environmental impacts (eutrophisation, acidification, greenhouse gas emissions, ecotoxicity, ionising raditions, ...) that occur at the various steps of the product's life till its end: production process, commercialization, use, and waste elimination treatment. Quickly, methodologies and tools have been developed to insure a standardisation of the LCA.

In this framework, world organisations and European authorities have, since the Johannesburg Sustainable Development Summit, made recommendations to national authorities to integrate this new architecture – as well as new tools based on the latter – in their policies. One of the most important fields of public policies where this new architecture can have a significant impact is the issue of public procurement or purchasing. This contribution aims to analyze the challenge of the implementation of green public procurement based on this new architecture of environmental impacts. How can Life Cycle Thinking impact public procurement? What are the consequences of this integration on the legal field? How can LCA tools have a role in public procurement? These are the central questions of this contribution.

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The Understanding of What is Environment. The Complexity and the Possibilities of Transformation Through Education at the University

The understanding of what is Environment. The complexity and the possibilities of transformation through education. In face of complexity of current environmental situation, issues related to the understanding of the environment has been shown to be multidisciplinary and to study such issues, education has important role to play. In this sense - educational and environmental - this paper will discuss the degree of prior knowledge and practical involvement of university students on issues related to the environment, including with respect to environmental health. Participants will research some college students volunteer in specific courses from Brazilian university.

Through interviews, will evaluate the transformation of student volunteers, respectively, before and after application of working hours in determined discipline involved with sustainability.

It will thus be seen the degree of prior knowledge as well as the degree of change that the discipline in question. Hence the contribution of this work to be presented in Athens. These results may help understand the human factor and the degree of importance of education, the challenges that present themselves today, considering the prospect of an improved understanding, comprehension and even the transformation of the individual student, part of the community, the reflect about the cultural context.

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Chemical Analysis and Determination of particle Size of the Samaria River Sediments (Tabasco, Mexico) Using Scanning Electron Microscopy

The alluvial flood plains of Tabasco contain thick sequences of fine-grained sediment that result from the deposition of suspended sediment during flood events. These environments constitute important storage zones for a wide range of sediment-associated nutrients and contaminants and many of the geochemical properties of the deposited sediment are strongly related to particle size. Recognition of the importance of composite suspended sediment particles in fluvial environments has generated a need for new field equipment and monitoring strategies capable of measuring the effective particle size characteristics of fluvial suspended sediment. This research presents effective and absolute particle size data derived from a range of sampling and measurement techniques for Samaria river in central Tabasco, México. Data from field-based water elutriation systems and scanning electron microscopy (SEM) show that composite particles dominate the suspended sediment load. Composite particles also contain significant clay and fine silt components which are an important control on the nutrient and contaminant loading of the sediment load. The Samaria river is one of the most important rivers in Tabasco and belongs to the Grijalva basin, the water is used in agriculture, as irrigation system and on the other hand it is also the supply for drinking water supplies to the city of Cunduacan, Tabasco and Chontalpa region. Samples were taken at strategic points of the river, which were transported to the laboratory to carry out morphological analysis placed in Imhoff cones to sediment particles by gravity and to know the volume of these. The sediments were analyzed in a scanning microscope to determinate the particle size and composition, and we found that these particles contain a wide range of chemical elements of which include: C, O, Na , Fe, Si, K, Mg, Al and Ca, clay compounds an its size particle range between 10 and 100 µm.

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Household Waste Management Practices in Charnwood Borough, England

Household waste recycling rates vary widely across the UK. The wide variety of collection methods, property types and local policy decisions affect the amount of household waste recycled and composted by a Local Authority. Legislative and financial measures introduced to reduce the amount of waste sent to landfill sites for disposal in the UK, have impacted on the way Local Authorities operate their household waste and recycling collection services.

Charnwood Borough Council (CBC), a Local Authority in England, is responsible for the collection of household waste and recycling from 67,000 households. This service is carried out under contract for the Local Authority by Serco, who also operate household waste collections for 14 other UK Local Authorities.

CBC introduced a variety of measures, including amendments to kerbside waste collections, changing collection frequency and increasing the number of materials segregated from residual waste for recovery. These actions and campaigns working with different partners to improve recycling beyond doorstep collections and to raise public awareness have seen the percentage of household waste recovered for recycling and composting in the Borough increase from 16% in 2002/03 to 46.1% in 2010/11.

This paper presents a case study on household waste and recycling collections operated in Charnwood Borough, setting out the local context, presenting performance data and comparing operational

procedures and the performance of other Local Authorities. It also explores the impact of local operational and policy issues on the amount of household waste collected for recycling.

The research found differences in household waste services and policies across the UK had potential to influence the amount of recyclates recovered. Local decision making and the ability to tailor services to suit different demographic area, together with partnership working between Authorities with different responsibilities for the same geographical area is supported to create sustainable waste management operations.

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Oil Consumption and Economic Growth in Brazil

This paper attemps to look into the causal relationship between oil consumption and economic growth in Brazil where oil consumption and economic growth has been rapidly increased in recent years, by using the cointegration and error-correction models. It employs annual data covering the period 1965-2010. The overall results indicate the existence of bi-directional causality between oil consumption and economic growth in the long-run. This means that an increase in oil consumption directly affects economic growth and that economic growth also stimulates further oil consumption in the lon-run. Thus, based on these results, policy maker could prepare for oil consumption infrastructure shortage which may affect continous economic growth.

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The Impact of Short Rotation Energy Crops Grown On Agricultural Land on Water and Soil Quality

The area of agricultural land cultivated with short rotation coppice (SRC) of willow or poplar for production of biomass for energy is expected to increase in the short-term in several European countries. This will have implications for various environmental issues, among others water and soil quality. As a perennial crop, SRC differs from arable crops in physical traits and management practices. Concerning groundwater quality, results so far imply low nutrient leaching when SRC compared to other "conventional" crops, but the long-term effects of SRC plantations applied with recycled by-products as sewage sludge and wastewater must also be considered. Extensive sampling of groundwater in several commercial SRC fields in Sweden and in adjacent, conventionally cropped farmland was been conducted showing that concentrations of NO3-N in the groundwater of SRC are much lower than the respective in adjacent fields. For PO4-P in the groundwater, a similar reduction was not obvious and more measurements need to be conducted. Similar comparisons between commercial SRC fields and adjacent fields were conducted in order to evaluate the effects of SRC cultivation on soil. Differences in heavy metal content (with special focus on Cd), pH, total carbon and nitrogen in the top and subsoil of such fields were conducted, indicating reduction of Cd (ca. 10% in the top soil on average) in SRC fields and increase of soil C in the same fields.

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Application of Acoustic Tomography Technique for Detection of Decay in Urban Trees

The presence of internal decay in an urban tree may result in the tree falling down and causing personal injury, death and/or property damage. Therefore, determination of the presence, size and location of internal decay of standing urban trees is very important in terms of life safety and property protection. In this study, application and accuracy of acoustic tomography technique for detection of decay in standing trees were investigated. Two important urban tree species of Istanbul, plane (Platanus orientalis) and ash (Fraxinus excelsior), were selected. The experiments were carried out on a 5 cm-thick-disc obtained from decayed tree trunk of selected tree species. A picture was taken of the cross section of each disc sample and acoustic tomography measurements were then made on the discs with Fakopp 2D Acoustic Tomograph. Followed the acoustic measurements, 2 by 2 cm gridlines were drawn on the sections from the center to the bark and Janka hardness test were made on the center of each 2 by 2 cm grid. After the hardness test, the discs were cut in to 2 by 2 by 5 cm pieces from the gridlines and acoustic measurements across to the fiber in two directions were repeated on these pieces with an ultrasonic timer device. Finally the densities of the exactly prismatic pieces were determined. The areas of deteriorations were determined on the pictures and 2D images obtained from acoustic tomograph by using software and compared each other. The hardness, the density, and the sound velocity distributions on the cross sections of the disks were also compared with the 2D tomography images. In addition, the relationships between the density and hardness variations and the sound velocity across to the fiber were determined by regression analyses. As a result, acoustic tomography demonstrated to be a very effective tool for the detection of internal decay, accurately locating the position of the anomalies and estimating their size and shape.

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Dye Removal from Aqueous Solution by Adsorption on to Fly Ash

Colored dye wastewater occurs as a direct result of the production of the dye and also as a consequence of its use in the textile and other industries. About 700,000 tonnes and 10,000 different types of dyes and pigments are being produced annually across the world. Even small quantities of dyes can color large water bodies, which not only affects aesthetic merit but also reduces light penetration and photosynthesis. Some dyes are synthetic in nature and are usually composed of aromatic rings in their structures, which make them carcinogenic and mutagenic, inert and non-biodegradable when discharged in to waste streams.

The adsorption process will provide an attractive technology if the sorbent is inexpensive and ready for use. In this study, a typical basic dye, crystal violet, was selected from aqueous solutions using fly ash. The effects of initial dye concentration, stirring time, initial dye solution, pH and adsorbent amount on the efficiency of crystal violet removal have been investigated. The Langmuir, Freundlich and Temkin isotherms were obtained using concentrations of crystal violet ranging 10 to 70 mg/l. The adsorption rate data was analysed according to the pseudo-first order kinetic, the pseudo-second order kinetic and interparticle diffusion kinetic models.

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Climate System and Global Warming

Issues about the climate system and global warming have been a major preoccupation of governments, international bodies, and commentators on the environment in the last two decades. The average temperature of Earth's atmosphere and oceans, we are told are rising, bringing with it some adverse environmental and health consequences. With regards to this environmental issue there are two broad agreements: that there is a general obligation to protect the climate system for the benefit of present and future generations, and that the biggest obligation falls on developed countries. In this paper I examine three important specific obligations imposed on developed countries that are outlined in the United Nations Framework Convention on Climate Change (UNFCCC), the body that provides an overall framework for intergovernmental efforts to tackle the problem posed by climate change. These are the obligations to: (i) prevent or minimize the causes of climate change and mitigate its adverse effects; (ii) assist developing countries that are vulnerable to the adverse effects of climate change in meeting the costs of adaptation to those adverse effects; (iii) support other developing countries by providing them with environmentally sound technologies and knowledge, and the financial means so that they can prevent or minimize the causes of climate change. I demonstrate that these obligations are framed as obligations of beneficence. I suggest that in order to get developed countries to realize these obligations it may be beneficial to frame them as obligations of justice.

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Impact Assessment of Nanotechnology: A Methodology Proposal for Environmental Evaluation

Nanotechnology provides the perspective of great advances in production and process, mainly in agriculture and health areas, what undoubtedly will promote an improvement of life quality and reduce impacts on the environment. In spite of a progressive increasing in the use of nanotechnologies worldwide, their potential is still repressed in Brazil, due to the early stage of the local development and the lack of specific methodologies that make impact assessment into a current practice. Therefore, the development of a methodology for the assessment of nanotechnology impacts is an effective mitigatory measure to face the growing challenges pointed out by scientists and legislators related to environmental degradation, ethical and social issues. The present study aims at creating and validating an impact assessment methodology based on technical data available about technology usage found in the literature, which could be employed as a guide to ex-ante or ex-post evaluations of nanotechnology uses and its implication in the environment exposure. The identification of potential impacts indicators of nanotechnologies were based on a survey in the specialized literature, where the focus was to gather the most relevant information useful to general public and scientists and decision makers of the public sphere. One hundred indicators were selected, sorted into four scopes: a) Environmental and Health Scope; b) Social, Ethical and Institutional Scope; c) Economic and Political Scope and, d) Science, Technology and Innovation Scope. In order to validate those indicators, they were organized as questions according to the format of the Delphi Method of Specialist Consults [1]. In the current stage of this study we expect gathering information collected during the remote round and the methodology proposed in the face-to-face round. This methodology will enable developing the software Impacts-Nano, which will be an alternative to assess the impacts of nanotechnologies.

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Effect of Pretreatment of Anodic Inoculum and Presence of Algae on Performance of Microbial Fuel Cell

The performance of microbial fuel cell (MFC) is affected by pretreatment of the sludge used as inoculum in the anode chamber and algal growth in the cathode chamber. The performances of two identical dual chambered MFCs were observed by inoculating anaerobic mixed sludge with sonication pretreatment and heat treatment. In addition, performance of MFCs made up of earthen–pot as an anode chamber was examined in oxidation pond acting as the cathode chamber in presence of mixed culture algae and pure culture of Spirulina platensis. The MFC with sonicated pretreatment of inoculum produced more power (3.79 W/m3) and the organic matter removal (83.24 %) as compared to the MFC inoculated with heat pretreated sludge and for later these values were 2.99 W/m3 and 69.07 %, respectively. These results demonstrate that sonication of inoculum is the better pretreatment for enhancing performance of MFC by suppressing the non-electrogenic bacteria in the anode chamber.

The MFCs having anode chamber made of earthen–pot were installed in the oxidation pond having mixed algal growth in cathode chamber (MFC-AT). This MFC-AT produced more power (4.5 W/m3) than the MFC having only tap water in the cathode chamber (MFC-TW) which gave maximum power density of 3 W/m3. This showed that the photosynthetic oxygen in the former MFC was useful for producing more power and eliminating the need of artificial aeration. The COD removal efficiency in the anode chamber was 90 % in MFC-AT and 85.3 % in MFC-TW. After 3 weeks, algal growth was found in the anode chamber of both these MFCs. Even with algal growth in the anode chamber, power production was increased further to 4.7 W/m3 and 3.3 W/m3 in MFC-AT and MFC-TW, respectively. But the COD removal

decreased to 85.3 % and 83.4 % in MFC-AT and MFC-TW, respectively. This showed that algal growth in anode chamber was not a hindrance in the power production as the production of organic matters by photosynthesis and dead cells of algae compensated the loss of substrate for the oxygen which is produced in the anode chamber. Using Spirulina in the cathode chamber power production of 3.8 W/m3 and the COD removal of 85.5 % was observed in MFC-AT.

When Tilapia fishes were grown in the cathode chamber for the experimental duration of 50 days, it was observed that the fish growth was not affected by presence of bio-electrochemical system and the fishes remained nearer to the MFC for most of the time. The specific growth rate of fish was higher in the presence of MFC. These results are encouraging and further studies are on to optimize power from MFC while simultaneously treating wastewater.

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Reactivity and Stability Pattern of Ceria-Based Noble and Transition Metal-Oxide Catalysts in the Wet Air Oxidation (CWAO) of Phenol

The huge variety of organic chemicals manufactured by the modern chemical industry and the extraordinary industrial development of the last decades are pressing a big interest in developing efficient processes for the detoxification of various industrial aqueous streams [1-2]. Catalytic wet air oxidation (CWAO) appears as one of the most promising processes, ensuring a high efficiency in the abatement of toxic and refractory pollutants by means of an oxidizing source under relatively mild condition (100-250°C, 5-50 bar) and in the presence of a suitable catalyst.

Therefore, a comparative study of the activity-selectivity pattern of ceria-based noble (Pt/CeO2) and transition metal-oxide (MnCeOx) catalysts in the wet air oxidation of phenol (CWAO) at different catalyst-to-phenol weight ratio (R, 1-5) has been probed using a stirred batch reactor with continuous oxygen feed (TR, 150°C; PO2, 0.9 MPa). Then, the stability pattern has been also investigated by running 5 consecutive reaction cycles of 6h at a fixed R of 5. Both Pt/CeO2 and MnCeOx catalysts features a Langmuir-Hinshelwood (L-H) mechanism enabling a superior water purification efficiency in comparison to the homogeneous CWAO processes [3]. A dual-site L-H reaction mechanism based on surface adsorption and mineralization steps and the relative kinetic analysis show that the former determines the rate of phenol and TOC removal, while the latter controls the selectivity and the rate of the catalyst fouling [4]. The MnCeOx system shows a superior CWAO performance in terms of adsorption and mineralization capacities, explaining a higher resistance to fouling deactivation than the Pt/CeO2 system [3,4].

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The Impact of the Supply Shortage in Electricity on the Korean National Economy: An Input-Output Analysis

The electricity has been playing an important role in the economic development of Korea and thus has become a critical factor sustaining the well-being of the Korean people. This paper attempts to investigate the impact of the supply shortage in electricity on the Korean national economy using input-output (I-O) analysis. To this end, 2009 I-O table produced by the Bank of Korea and supply-driven I-O model are employed. Furthermore, we pay particular attention to the electricity sector by taking the sector as exogenous and then investigating its economic impacts. The estimation results of the supply shortage cost of each sector are presented. The overall impact of the supply shortage by 1 kWh of electricity is estimated to 134.8 Korean won, which is quite high, compared with the average price of electricity is 83.59 Korean won per 1 kWh. Therefore, the Korean government should endeavor to overcome the constraints on electricity supply.

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Decomposition of Pollutant Waste using an Electron Beam Accelerator

We developed a novel technology of decomposing chlorinated compounds in liquid using an e-beam. Distinct feature is accomplishing at ambient temperature and pressure without any additives. Residual pollutant materials were depended on absorption dose, but aliphatic chlorides were produced at higher dose.

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Measuring Environmental Sustainability of Turkish Metropolitan Municipalities

Turkey has been experiencing rapid urbanization since 1950's. Statistics show the urbanization rate is 69% and it is estimated that the mentioned rate will rise up to 84% over the next four decades (UNDP, 2008). Rapid and unplanned urbanization have a large impact on the environment in terms of degradation of the urban environment, waste, water, air, and resource consumption. Since many urban environmental problems are the results of poor management, improving urban governance is essential to assure sustainable human settlements. As an initial step the accurate assessment of urban areas' environmental sustainability is required. The objective of this study is to develop a tool in order to measure environmental sustainability of Turkish metropolitans and rank them regarding their environmental performance. To this aim, an Analytical Hierarchy Process (AHP) model is proposed since AHP provides means of measuring environmental performance. SuperDecisions software v.2.0.8 is used for the analysis and 16 metropolitan municipalities are ranked according to a set of five main criteria namely, air pollution, water, waste, biodiversity & forestry, and population stress. The results indicate that Antalya (0.0932) is the best performer and is followed by Mersin (0.0773) and İstanbul (0.0714). Gaziantep (0.0466), Kayseri (0.0441), and Diyarbakır (0.0428) on the other hand, are rated as the least environmental sustainable cities. The results also show that, high income metropolitans achieve generally high levels of urban environment sustainability.

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Estimating Marginal External Environmental Costs of Road Transportation in Iran

Environmental External costs of road transportation sector are costs which are imposed on environment by users of road transportation and are not compensated for by perpetrators causing it. The most important external costs are the costs of global warming, the costs of air pollution, the costs of noise. These costs and benefits are very important in long-term planning in transportation sector.

The main purpose of this article is offering models of quantitative estimation of introduced costs. Accordingly, first, external costs were identified and introduced. Then, considering statistical limitations in the country, measurable costs on the country roads and models of external costs estimation were offered and the required data for various external costs estimation were identified.

The costs of global warming and air pollution have been estimated for Tehran- Qom freeway in the year 1389.The costs were estimated not only in terms of per vehicle km, but also in terms of the whole length of the desired road and also in terms of the total desired cost for the total desired road traffic along entire road length.

This estimation has been done per vehicle km for 5 groups of vehicles: cars and vans, minibuses and light duty trucks, buses, heavy duty trucks (16-32t), and heavy duty trucks (> 32t).

Results show that, 3-up axle trucks (with 93/72 tomans) have had the highest share in the environmental marginal external costs per vehicle km.

Computation of total external costs of Tehran- Qom highway in 1389 showed that generally, in this year, this freeway incurred environmental external costs equal to 82 billion tomans which entirely clarifies the necessity of authorities' serious attention to the issue of external costs.

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Evaluation of Air Pollution Caused by the Uncontrolled Urbanization: A Case Study from Samsun, Turkey

Nearly half the world's population now lives in urban settlement. Urban offers the lure of better employment, education, health care, and culture; and they contribute disproportionately to national economies. However, current worldwide urbanization presents important challenges of urban poverty, megacities, social deterioration, and environmental degradation. The main contributions to environmental degradation are the absence of full participation, inadequate governance, inadequate regulatory and economic policies, and insufficient knowledge and information. To reverse urban environmental degradation in most developing countries as Turkey, it is essential to understand and specify the factors that perpetuate the lack of appropriate preventive and curative environmental actions.

Turkey is a developing country in which 68 million people are living with quite different socioeconomic and demographic features and dietary habits. Turkey has been affected by urbanization like other developing countries since its very firs years of development, with a rate increasing from 18.5% in 1950 to about 62% after 2000. Cities with already inadequate infrastructure facilities have to face congested population problems coupled with illegal settlements due to migration from the small settlement units to the large metropolises.

The purpose of this study is to provide a broad overview of the recent patterns and trends of urbanization in developing countries. It is targeted to emphasize the factors aggravating urban environmental degradation in these countries. Some results of urban environmental degradation in Turkey are presented and discussed.

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Chemicals In Indoor Air-Factors Affecting Wellbeing and Comfort

In the last decades indoor air pollution has been recognized as an emerging environmental health issue. Several hundred of chemicals belonging to various chemical classes have been identified in indoor environments. For most of them toxicological information is missing or not well established. Since European citizens spend more than 85% of their time indoors, exposure to indoor air chemicals even at low concentration levels and for a longer period of time might represent a serious human health risk.

It is an increasing number of studies dealing with indoor air pollution and its impact on comfort and human health. However, the risk perception of people with respect to indoor versus outdoor air pollution is, often, characterized by a lack of awareness that indoor environments may contain some of the pollutants found outdoors and quite a number of different ones.

Existing information on the health impact of indoor air pollutants in Europe is partial and not conclusive, since the design of experimental and epidemiological investigations to date does not follow an integrated approach to studying human health effects of chronic low dose exposure to pollutants and pollutant mixtures. Thus, the progress made to quantify exposure to indoor air toxicants and to assess the associated health risk for humans is limited.

We need to change the current paradigm for assessing health risks of indoor air contaminants.

This should aim to pull together chemical, toxicological and epidemiological information regarding health effects of typical indoor air mixtures instead of focusing solely on toxicity of individual chemicals. Linking such observations with exposure scenarios on the basis of consumer choice and environmental conditions would allow the translation of scientific evidence into policy-relevant knowledge.

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An Inverse Model of Mercury Contamination in Pelagic Fishes

Mercury is a naturally occurring element that can be hazardous at high concentrations. Major anthropogenic mercury sources are industrial waste such as chlor-alkali plants and fossil fuel combustion. Once mercury enters marine systems it can be converted in the sediment by microbes to its most toxic form - methyl mercury. Methyl mercury is a neurotoxin and poses a great risk to human health and is especially dangerous to pregnant women and developing foetuses. Mercury bio-magnifies from small benthic invertebrates to large pelagic fish thus it reaches the human population through fish consumption. The current focus of my research is the rate of mercury bio-magnification in large pelagic marine fish. Mercury concentrations were measured in eight pelagic fish species using DMA 80 analyzer in order to determine mercury accumulation rates in different species. Knowledge of the methylation process and mercury transfer in the food web is essential to ensure protection of the environment and human health.

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Influence of Plug-in Hybrid Vehicles in Reducing Greenhouse Gas Emissions in the Vehicle Transport Sector of New Zealand

New Zealand is a small isolated island nation in the South Pacific with a population of 4.3 million people. As part of national branding to promote exports of bio-commodities especially from agriculture and horticulture and encourage tourism New Zealand is aiming to reduce greenhouse gas emissions to 50% of 1990 levels by 2050. New Zealand has an abundant supply of low cost renewable electricity generation that could be used for powering an electric vehicle fleet and reducing greenhouse gas emissions. This reserve using biomass and wind alone is as much as 11 times the 2009 annual electricity demand. In this study we investigate the potential impact of plug-in hybrids (PHEV) on greenhouse gas emissions (GHG) from the New Zealand vehicle fleet to 2050 using the partial equilibrium techno-economic model UniSyD. The model operates electricity, hydrogen, biomass and vehicle markets in 13 regions of New Zealand and has a high degree of technological specificity. We find that the impact of consumer purchase perceptions of capital cost, fuel savings, and infrastructure availability have the effect of reducing the market share of PHEVs with a range of 64 km from 27% to 9% under a scenario where the oil and carbon prices stabilize in 2030 at US$120/bbl and US$60/t-CO2eq. respectively. In addition we find the market share of PHEVs is strongly correlated with range. PHEVs with a range of 16 km achieve five times more market share than PHEVs with a range of 256 km however reductions in GHG are 15% and 9% respectively over a fleet with no PHEVs. By 2050 PHEVs could consume up to 5% of electricity from the national grid and reduce GHG emissions by over 20% if market share of the vehicle fleet reaches a predicted maximum of 27%. Fiscally neutral federal policies are shown to mitigate consumer barriers.

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Hydrogen Production by Hydrolysis of Magnesium-Based Hydrides

Hydrogen production by the hydrolysis of magnesium-based hydrides has been regarded as a promising solution for on-board vehicle hydrogen storage because of the high gravimetric density of 7.6 wt.% (MgH2), as well as, the ability to produce twice as much hydrogen during hydrolysis. This paper presents an investigation on the hydrogen production by the hydrolysis of magnesium-based hydrides which are prepared by the material processing of HCS+MM, that is hydriding combustion synthesis (HCS) followed by mechanical milling (MM). Specifically, the effects of the HCS condition (e.g., the Mg/Ni ratio, the holding time at synthesis temperature), the different milling times, the process control agents of MM and the hydrolysis temperatures on the microstructures of HCS+MM products, as well as, the hydrolysis properties were investigated. The results showed that the HCS+MM products were mainly comprised of MgH2 and Mg2NiH4. The kinetic analyses of hydrolysis indicated that hydrolysis process divided into two parts: part one is the surface control reaction before the formation of Mg(OH)2 layer and part two is the diffusion control reaction after the formation of Mg(OH)2 layer. The ball milling process could be used to prepare the fine particles to increase the specific surface area and to extend the rapid reaction time of the formation of Mg(OH)2. The results showed that both the hydrogen amount and reaction rate were all increased by increasing temperature. In the 333 K water, Mg99Ni hydrides could produce 1350 ml/g hydrogen (12.1 wt.%, 79.5 % in conversion) within 60 min.

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Event Based Hydraulic Control and Connectivity Influences of Nutrient and Sediment Migration, Mkabela Basin, South Africa

Sediment and nutrient loads from agricultural sources can deteriorate the water quality of both surface water and groundwater resources. In order to manage these Non-Point Source impacts, a sound understanding of pollutant and particle movement through contributing land forms and stream network, is required. In this study, event based analysis of sediment, nutrient and stable isotope sampling are combined with hydrometric observations to describe and quantify particle and nutrient movement in a predominantly sugar cane catchment in the Mkabela river in south eastern South Africa.

Observations of sediment, nitrate and phosphate fluxes were made on a nested basis at local, field and catchment (37km2) scales for a series of events. Water samples from surface and subsurface sources were analysed for δ18O and δ2H isotopes and the results used to interpret the connectivity of the contributing land forms and the stream network. Nested catchment scale sampling was focused on control features in the stream network, including road crossings, wetland zones and farm dams.

The results reveal the dominant influence of relatively insignificant structures, such as road culverts, in retarding the migration of sediments and nutrients. Farm dams are shown to limit the downstream migration of sediment and nutrients for all but the most intense events. However, certain events resulted in mixing in the dams and larger resultant outflow than inflow loads. These instances appear to be a combination of reservoir status, catchment antecedent conditions and rainfall depth and intensity. Isotope analyses reveal that the headwaters, comprising 70% of the catchment area, contribute as little as 29% of the total catchment discharge, due to the impoundments in this area. However, this contribution varies significantly for different events, reaching a maximum of 78% of the catchment discharge. The implications of these controls on estimating long term sediment and nutrient movement are discussed.

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A Review of Solar Thermal Applications Using Polymer Materials

The construction of solar thermal applications has largely relied on the use of heavy and expensive materials such as copper, aluminium and glass. With metal prices rising rapidly, appropriate replacements are crucial if costs are to be lowered. Furthermore the most common materials used in such applications weigh a lot, making the installation of a solar collector a complex approach that requires experienced people. An efficient way to cut down both on costs and on weight is to substitute the aforementioned materials with polymers. Polymers, especially commodity plastics, are lightweight, plentiful and very easy to manufacture and assemble in a variety of ways. Much advancement has been made, both into polymers research in order to identify the best available and most suitable materials, as well as into designs incorporating either an all-polymer approach or by substituting other materials with polymers. The following paper makes a review of the history of using polymer materials in solar thermal applications, looks at the latest progress that has taken place and also gives an insight into possible future advancements.

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Modelling Geochemical Changes of Sediment within Alluvial Systems

The complex processes involved in the erosion, transport, deposition and remobilization of sediment ultimately result in a deposit that represents a mixture of material derived from multiple source areas within a watershed. If the physical and geochemical properties of the source area sediments are conserved during the transportational and depositional process, then it is theoretically possible to determine through the use of a sediment mixing model the relative contributions that each source contributed to the resulting mixture. These types of resulting fingerprinting mixing models are is based on several assumptions including the conservative transport of the element, the predominance of dilution as the control on elemental concentrations across the tributary confluence, and an accurate characterization of the average elemental concentrations within the alluvial sediments. During this investigation, a frequently utilized mixing model was modified to (1) determine the relative contribution of trace metals to the axial channel from tributaries, and (2) estimate the relative amount of storage or remobilization of sediment-borne trace metals between tributary confluences (called a river link). The model was subsequently applied and evaluated along the Upper Little Tennessee River in western North Carolina, USA where toxic traces metals (e.g., Cu, Cd, and Zn) are known to exceed background levels. Although some problems related to the representative sampling of bed material is evident, this novel modeling approach appears to possess considerable promise. Attention is focused on the development of the mixing model and its application with respect to geochemical changes at tributary confluences and along segments between tributaries.

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Evaluation of Nitrogen Supplements for Delignification in Sunflower Seed Hull by Lentinus Polychrous Lev.

Sunflower seed hull is an abundant byproduct of sunflower seed processing. Bioconversion of sunflower seed hull into useful value-added products is limited due to its high lignin content. Solid state fermentation using white-rot fungi is extensively known as an effective method for delignification of many agricultural wastes. *Lentinus polychrous* Lev. is an edible and commercially cultivated white-rot fungus in Thailand. *Lentinus polychrous* Lev. has been recognized for its bioremediation potential which is due to its extracellular secretion of ligninolytic enzymes. The ability of *Lentinus polychrous* Lev. to degrade lignin in sunflower seed hull has also been reported, however, lignin degradation by white-rot fungus is greatly influenced by the presence of nitrogen. The purpose of this work was to investigate the delignification capability of *Lentinus polychrous* Lev. in response to nitrogen supplementation in sunflower seed hull used as substrate for fermentation. Various nitrogen sources including organic nitrogen (peptone and yeast extract) and inorganic nitrogen (KNO3 and (NH4)2SO4) at low and high levels were incorporated into the sunflower seed hull and their effects on lignin loss, production of ligninolytic enzymes (laccase, manganese peroxidase and lignin peroxidase) and fungal growth were monitored during fermentation by *Lentinus polychrous* Lev. for 30 days at 35oC. It was found that *Lentinus polychrous* Lev. was able to utilize the inorganic nitrogen sources better than the organic nitrogen sources. Addition of 3 mM-N KNO3 resulted in the highest extents of delignification and laccase production, whereas the highest extent of manganese peroxidase production was found by adding 2% peptone. The nitrogen supplementation stimulated the excretion of lignin peroxidase, however, small extent of lignin peroxidase activity was detected in all treatments throughout the fermentation period. The highest fungal growth was observed in the presence of 30 mM-N KNO3.

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Sustainable Materials and Commodities from Agro Industrial Wastes. Biorefinery and Ecomaterials

According to the "Millennium Ecosystem Assessment", in the last 50 years humankind has changed the ecosystems more rapidly and extensively than in any other comparable period of history. Unprecedented development has been achieved mainly in the industrialised countries, but this has given rise to strong contamination.

Spain, due to its Mediterranean climate has a large agricultural economy which gives rise to vast amounts of wastes of little or null value that can even represent an environmental hazard. In our group, agro industrial wastes have been converted into value added liquid substances and materials with several aims: decreasing pollution, giving added value to wastes and working in a sustainable way in which the wastes of an industry can be used as the raw materials of the same or others.

Several examples of our production are included in this summary: Beer production wastes used to prepare renewable raw biocompatible materials, more cost effective and environmentally sound than the synthetic ones, valuable catalysts for effluent decontamination with design based on rice subproducts, fine chemicals and intermediates prepared with solids based on sunflower wastes, avoiding the need for expensive and toxic petroleum derivatives. Alternative sources of energy (including sunlight) have been studied and compared to conventional heating to improve the sustainability of the processes.

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Green(Ing) Economy: The Question of Environmental Liability

When developing policy and tools for green(ing) economy the constituent parameter should be environmental liability with regard to remedying (the restoration of the damaged natural resources towards baseline condition of environmental damage), when environmental damage occurs.

This paper is highlighting this block within the developing of activity/process, as well as the issue of historical pollution (very often technological heritage from obsolete technologies). Research is more focused to environmental liability related to the management of waste from extractive industries.

The European Commission adopted a Report from October 2010 (as well as ongoing analysisis) on the effectiveness of the EU Environmental Liability Directive in terms of remediation of environmental damage and on the availability of financial security to cover environmental liability, was taken in account.

The approach is adapted to EU candidate/potential candidate countries/countries in transition, highlighted the importance to clarify environmental liability for historical pollution in countries/territories younger than pollution occurred.

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Influence of Process Zone Structure and Connectivity on the Transport and Fate of Non-Point Source Pollutants, Mkabela Basin, South Africa

The management of non-point source (NPS) pollution has proven to be a difficult problem requiring a sound understanding of pollutant and particle movement through the drainage system. The primary objective of this investigation was to obtain an understanding of NPS pollutant source(s), transport, and storage within the Mkabela basin, a representative agricultural catchment within the KwaZulu-Natal Midlands of southeastern South Africa, by combining geomorphic, hydrologic, and geochemical fingerprinting analyses.

Fingerprinting studies suggest that silt- and clay-rich layers found within wetland and reservoir deposits are derived from the erosion of fine-grained, valley bottom soils frequently utilized as vegetable fields. Coarser-grained deposits within the wetlands and reservoirs presumably result from the erosion of sandier hillslope soils extensively utilized for sugar cane. Erosion of these upland cane fields occurs during relatively high magnitude runoff events that are capable of transporting sand-sized sediment off the slopes, and which create reservoir deposits lacking significant fine particles. Thus, the source of sediment to the axial valley varies as a function of runoff magnitude. However, sediment and nutrient export from the basin was significantly altered in the 1990s by the construction of a drainage ditch through an unchanneled mid-basin wetland that altered the hydrologic connectivity of the catchment. Prior to its construction, sediment was largely deposited in wetlands that encompassed a majority of the valley

floor within upper catchment areas. Following construction of the ditch, sediments were transported from the headwaters through downstream wetlands and dams (reservoirs) to a low-gradient alluvial channel boarded by an extensive riparian zone. Thus, the axial drainage system is now geomorphically and hydrologically connected during most events throughout the study basin. The study indicates that increased valley connectivity partly negated the positive benefits of controlling sediment/nutrient exports from the catchment by means of upland based, best management practices.

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Environmental Effects of the Marshes Area in South of Iraq

Many changes have been happened in the marshes during the drying period which affect the biological contents in these marshes as well as the climatic changes on whole area in the south of Iraq, this study was based on studying the area by making use of the satellite images since 1976 through 2009 and give some suggestion to get rid of these unwanted effect.

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The Impact of Pesticides Use on Onion Farming in Brebes Regency, Central Java-Indonesia: A Model towards Environmental Betterment

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An Experimental Study on Cycle Performance of the Mobile Air Conditioner

Operating characteristic of an air conditioning system for vehicle is dynamic and anomalous. Due to the dynamic behavior of the system, the performance measurement should be taken in account in many different kind of environmental condition with various thermodynamic variables.

One of the driving condition of the system, rotating speed of the compressor for air conditioning is the most important factor consideration that is directly connected to the vehicle engine through clutch and belt. The engine was simulated with 18.5KW class AC motor to drive the compressor.

The study was conducted to get performance information at various driving condition of the vehicle. The experiments was performed in 3 driving mode (Idling, Intermediate and Highway speed) on the same compartment temperature condition and changing inlet air temperature and air flow rate passing through the outdoor heat exchanger. For the cyclic operation of the system in the mobile air conditioning system, the on/off operation of the blower fan of the indoor heat exchanger was conducted to know about the effect of the heat release during the off period of the compressor.

As results, cooling capacity decreased a little in steady state with reducing the outdoor temperature however the power consumption of the system increased significantly. This is due to high specific volume of the circulating refrigerants in the suction line of the compressor by overheating of the refrigerant.

In the experiment for the on and off operation of the blower fan in the compartment heat exchanger, the delay time of the system was reduce more that continuous operation of the fan.

Changing the driving speed of the vehicle yields the variation of the compressor speed. The test for the variation of the compressor was conducted in 3 kinds of operation mode with Idling(900rpm), Intermediate (1800rpm) and Highway(2500rpm) speed. Each mode showed similar level of cooling capacity, however, power consumption show a considerable different. System efficiency is highest at idling-mode operation in the experiments.

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The Economic Value of LNG in the Korean Manufacturing Industry

Although LNG is an important input to industrial production for manufacturing firms, its economic value has been rarely investigated in the literature. This paper attempts to estimate the economic value of LNG in Korea's manufacturing sector by employing the concept of the value of marginal product (VMP). For this, we used data on 328 firms using LNG as an input. Two types of production functions (the Cobb-Douglas and trans-log functions) are applied. The result of the specification test indicates that the trans-log function is more appropriate for estimating the data. The output elasticity and VMP of industrial LNG are estimated to be 0.1346 and KRW 6,844 (USD 6.22) per m3, respectively. The results have important implications for various areas of industrial LNG management. For example, any cost-benefit analysis of new projects providing industrial LNG requires information on the economic value of industrial LNG. In addition, such information is useful for the Korean government's future policies on LNG pricing.

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Catalytic Wet-Air Oxidation as an Efficient Treatment Technique For Removal of Organic Pollutants and Detoxification of Wastewaters

One of the most promising options for removal of toxic and non-biodegradable organic compounds from industrial wastewaters is destruction of these contaminants by means of catalytic wet-air oxidation (CWAO). In this three-phase process, the organic pollutants are oxidized by activated oxygen species in the presence of a solid catalyst into biodegradable intermediate products or mineralized into CO2, water and associated inorganic salts. Titania and zirconia supported Ru catalysts have received much attention recently, because they exhibit high activity and chemical resistance in CWAO of various model pollutants and industrial effluents. In this work, the performance of various TiO2 and Ru/TiO2 catalysts to promote oxidation of aqueous solutions of formic acid, acetic acid, phenol and bisphenol A was investigated in a continuous-flow trickle-bed reactor.

The catalysts containing 1.5 and 3.0 wt. % of Ru were prepared by incipient-wetness impregnation of TiO2 extrudates (Degussa-Hüls) with an aqueous solution of RuCl3. The obtained precursors were dried and reduced for 1 h in H2 atmosphere at 573 K. CWAO of aqueous solutions of examined pollutants (feed concentration up to 2.0 g/l) by using pure O2 or air was carried out in a continuous-flow trickle-bed reactor (PID Eng&Tech, model MA-Ref). The reactor operated in the low-interaction (LIR) trickle-flow regime at T=328-523 K and Ptot.=10-50 bar. Chemical analyses (TOC, HPLC) and toxicity tests with organisms from different taxonomic groups (bacteria Vibrio fischeri, water fleas Daphnia magna and unicellular green algae Desmodesmus subspicatus) were used to get information about the toxicity impact of the feed and treated solutions.

Complete oxidation of formic acid was obtained at mild operating conditions (383 K), and no catalyst deactivation occurred that could be attributed to the dissolution of active ingredient material. In parallel to HCOOH oxidation, oxidation of metallic Ru clusters to RuO2 takes place. However, the nature of Ru active phase has no influence on measured conversions of formic acid. It was further observed that besides oxidation route thermal decomposition contributes significantly to the removal of formic acid; Ru/TiO2 catalysts could be thus efficiently used for transformation of HCOOH to H2 (as a green fuel) and CO2 in an inert atmosphere. Liquid-phase oxidation of recalcitrant

acetic acid was found to be structure sensitive; the highest catalyst activity was obtained, when Ru phase on the catalyst surface prevailed in zero-valent state. The Ru/TiO2 catalysts enable complete removal of phenol and bisphenol A as well as more than 99 % removal of TOC at temperatures above 473 K. At these conditions, no carbonaceous deposits were accumulated on the catalyst surface.

Bioassays were found as a complement to chemical analyses for reducing the toxicological impact on the ecosystem. In the presence of a Ru/TiO2 catalyst, the toxicity to Vibrio fischeri, Daphnia magna and Desmodesmus subspicatus of the oxidized materials was greatly decreased; for example, toxicity of aqueous phenol and bisphenol A solutions treated by the CWAO process was reduced by more than 98 %. However, despite the notable decrease in toxicity, end-product solutions are generally more toxic than indicated by the concentrations of total organic carbon remaining in the final solutions. Before discharging treated wastewater streams to the environment, evaluations of the residual toxicity of solutions containing end products of CWAO should be performed that are based on actual bioassays, and not only on the potential of the process for destroying the original material entering the process.

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Integral Development of a Project for the Improvement of Operation Municipal Slaughterhouse, and the Technology of Sustainable Use of Waste and Wastewater

In order to analyze the current operation process of the municipal slaughterhouses and propose actions for an appropriate control, as well as implement the reduction of water used per slaughtered animal, this is a study about green production applied to the processes in a elected municipal slaughterhouse, in order to propose an integrated preventive environmental strategy to processes, products and services; to increase efficiency and to reduce risks to humans and to the environment, based on treatability tests of the wastewater, a water treatment system will be conceptualized, and a mobile prototype will be designed and built (1.5 m3/day) which will operate in a slaughterhouse taken as a study case, in order to demonstrate the efficiency in the treatment of these wastewaters. The treatment of the residues originated by the inadequate functioning of the tracks by means of the technology of the anaerobic digestion will have a positive impact, since it is a solution to the problematic of the environmental pollution. Along with the prototype, a technology folder will be developed, containing technical specifications, a comparative analysis of production units and the business plan that will provide all the necessary information to evaluate the project and general guidelines to implement it in other municipalities of the State of Querétaro. By an agreement with users

(SEDESU) will conduct the training, operation and monitoring of the functionality of the prototype, which can be installed in some municipal slaughterhouse in the State of Querétaro to demonstrate it. This work is part of a comprehensive project for improving municipal slaughterhouses operation and technology for sustainable use of its waste and wastewater.

The results will be disseminated at conferences and specialized biotechnology of anaerobic digestion, and it would be a successful implementation of this technology to solve a pollution problem ancestral, and boost power generation.

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The Comparison of Destruction of SF6 & NF3, A Potent Greenhouse and Toxic Gases, by Electron-Beam Irradiation Technology

Sulfur hexafluoride (SF6) and nitrogen trifluoride (NF3) are usually used as novel etching and cleaning gases in semiconductor industry and electrical equipments. Their global warming potentials (GWP) are 22,450 and 18,000 times relative to CO2 and atmospheric lifetimes are 3,200 and 740 years, respectively. In addition, NF3 is very toxic (threshold limit value of 10 ppm) and chemically reactive and SF6 is a colorless, odourless, and electrical characteristic. Therefore it is strongly required to destruct these two gases from industrial processes because of more and more emission of them into atmosphere. The purpose of this study is an introduction of a new technology for these two gases destruction.

The experiments were conducted in a continuous type pilot scale, with a capacity of 3m3/hr with NF3 and SF6 of 1000 ppm. The electron beam was generated with an ELV-4 type (EB-Tech Co, LTD, Korea) with an 1 MeV, a 40 mA current, and 40 kW power of a commercial scale accelerator. The applied dose (irradiated energy to NF3 and SF6 gases, 1 kGy = 1 kJ/kg) was varied from 0 to 400 kGy. The analytical techniques used for this study included GC (Gas Chromatography, 7890N, Agilent Technology) and FTIR (MIDAC i4001).

Results, shown in Figure 1, indicate the DRE (Destruction Removal Efficiency, %) of NF3 and SF6 gases for doses of 0 kGy, 50 kGy, 100 kGy, 200 kGy, 300 kGy, 400 kGy, respectively. The DREs of NF3 and SF6 gases increased with increasing the amount of a dose, and maximum DREs of NF3 and SF6 were about 90% and 96%, respectively

at 400kGy. As shown below in Figure 1, electro-beam irradiation technology is much more effective for SF6 gas destruction than for NF3 gas. DRE of NF3 gas slightly increased, but DRE of SF6 gas drastically increased with increasing dose.

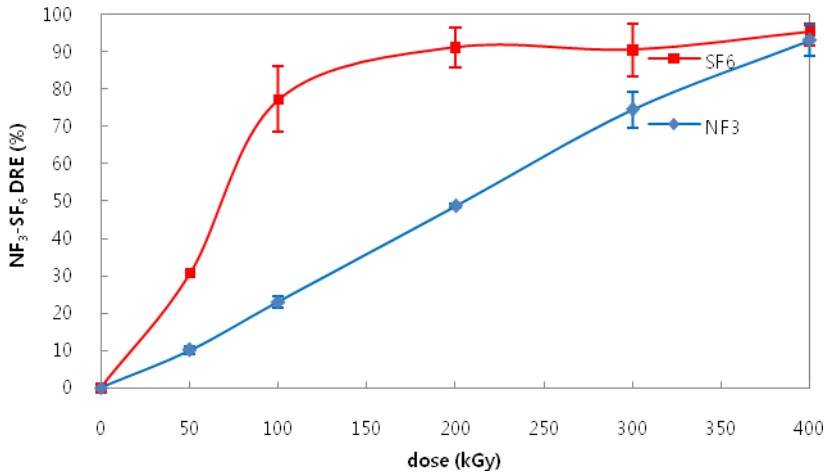

Figure 1. DREs of NF3 and SF6 gases as a function of doses.

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Temporal and Trophic Niche Overlap in a Guild of Flower-Visiting Ants in a Seasonal Semiarid Tropical Environment

There is no information on the use of floral resources by ants in the Caatingas or on the effect of seasonal vegetation dynamics on the composition and structure of the guild of flower-visiting ants. Productivity in the Caatinga changes greatly between the dry and the green seasons, which may affect the trophic or temporal niches of flower-visiting insects. Hence, we evaluated aspects of niche overlap separately for each season. This suite of analyses should falsify some hypotheses and help us to focus future studies of ant-plant interactions on hypotheses that are consistent with the observed patterns of resource use. Studies of assemblages of insects that have largely agonistic relationships with plants are rare compared to those that study mutualistic relationships between plants and animals. Flowers have evolved multiple defense mechanisms to protect against nectar-thieving ants, which may decrease plant reproductive success. We evaluated season-specific patterns of biodiversity as well as trophic and temporal niche overlap for flower-visiting ants in the Brazilian Caatingas (dry scrub, tropical vegetation). Ant richness and evenness did not vary with season; however, Shannon diversity and Berger-Parker dominance were greater and lower, respectively, during the green season compared to the dry season. Trophic overlap was greater during the dry season than the green season. In contrast, temporal overlap was greater during the green season than the dry season. The most common flower-visiting ant (Camponotus blandus) exhibited season specific trophic and temporal niches. Flower-visiting ants exhibited seasonal complementarity, but within seasons species exhibited both trophic and temporal overlap, suggesting that competition for floral resources is not a strong structuring force in this guild.

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The Robustness of Ecological Measure Generalizing the Hill Index and its Application to Bacterial Data

In this paper, we defined ecological measure generalizing the Hill index. The Improved Generalized Diversity Index (IGDI) has been proposed as a tool that can be used to identify data including that it contains hierarchical components and measure the ecological condition of an area. It generalizes in a natural way the Hill's family to incorporate species relatedness.

Case study using our method will be shown. The purposes of this investigation are to study the diversity within species of bacterial data using analysis was carried out for phylogenetic entropy populates all genera. Such a decomposition can be made precise if the total species diversity is decomposed into the genus diversity and the average species diversity within genera.

The results of the analysis showed that there are close results between the diversity for whole data and by decomposition property. Using this terminology, we agree, that generalized index is one of the best approaches to quantify community diversity in ecology.

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The Diversity of Limestone and the Implication for Energy Efficiency of Buildings

Building sector represents about 40% of the world wide energy consumption. Old buildings, which are more energy consuming than recent ones, reflect a social and cultural heritage to be protected. However, in this context of reduction of greenhouse gas emissions, most of the existing buildings have to be retrofitted. These constructions present a large potential for energy savings. Old buildings are constructed with traditional techniques and local materials. So, these constructions depend on the size, the local style of construction and the material available on site. However, the majority of them has been built with stone. Among the diversity of existing stones, limestone represents 10% of the total sedimentary stock. It is widely used for constructions in many countries as Canada, Belgium and France. Nevertheless, every quarries extract different types of limestone with specific characteristics. Currently, there is no relationship identified between properties of material and building behavior.

The aims of this paper are to examine the diversity of limestone in the world at the scale of the material (porosity, thermal conductivity, vapor permeability…) and to establish a link with the building behavior (energy consumption, discomfort temperature, pathologies…). The method is based on a classification of limestone used in constructions in function of few properties. Moreover, some limestone buildings are monitored to study internal temperatures, relative humidity, energy consumption and pathologies.

Measures highlight differences between types of limestone about their thermal properties. Few of them can be particularly submitted to pathologies. So, they can be more interesting to analyze. This is the case of Tuffeau (a limestone of Loire Valley in France). Its important porosity (about 45%) causes water pathologies (black crust, disintegration…) which influence thermal efficiency and which can be accentuated by retrofitting.

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Analysis and Comparison of Pharmaceutical Waste Collection Data by Multiple Methods; USA, State of Maine

Objective

There is a critical need for pharmaceutical (medication) waste collection and disposal programs that are accessible to the consumer, both in urban and rural areas. The goal of this project was to collect data regarding unused medications in order to inform public health policy, increase patient safety, improve pharmacy practice, decrease poisonings, abuse, misuse, and diversion of medications and to document medication disposal programs.

Methods

Medication drop-off events were conducted in April and October of 2011. Data entry into the Pharmaceutical Collection Monitoring SystemTM (PCMS) was analyzed based on medication classification, controlled substance category, therapeutic class, and medication percent waste (units returned divided by units dispensed). Mail-back data consisted of a convenience sample and utilized DAWN (Drug Abuse Warning Network) classifications.

Results

Medication drop-off events resulted in a collection of 3400 individual medications from 300 discrete participants. A total of 141,095 units (capsules, tablets, milliliters, patches, or grams) were collected representing 75.6% (±9.1%) medication waste when compared to the

amount dispensed. The medications returned via the mail-back method totaled 11,382 individual items.

Conclusion

The significant quantity of medications collected including controlled substances and the high proportion of medication waste underscores the need for pharmaceutical waste collection programs. The need also exists for medication education for all health care providers, government officials, and communities in order to decrease poisonings, abuse, misuse, and diversion.

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Arising Legal Issues when Environmental Protection Policies are tried to be Carried out by Taxation

Environmental protection is government's task, which is assigned within the scope of the 56th Article of the Constitution. There are many tasks which are given to the State by the Constitution. Meeting the public expenses, securing the social justice, providing economic development, pursuing principle of equality are some of them. As the government tries to carry out many tasks simultaneously and uses the tax policies as a mean in this endeavor, variety of issues arises.

The first issue is not always attaining the expected results by environmental taxes. Regulations, which cause unexpected changes in consumer preferences, and environmentally hazardous economic activities which cannot be prevented are one of the notable reasons for the occurrence of this situation. For example, when low taxes are collected for the energy sources, which are used in the kitchen for social reasons, consumers start to use these sources with motorized vehicles.

The second issue is environment related regulations, which pose an obstacle to the other constitutional tasks expected to be carried out by the government. For example, the environmental taxes that have negative effects on growth and employment are contrary to government's task of providing economic development.

A third issue; the government suffers financial losses while trying to reach its aim of protecting the environment, in order to compensate the tax losses and meet public expenses the government goes into raising the taxes but in such cases it may violate equality and social justice principles.

In this regard, when tax-related measures are in question, the balance between purposes of the government should be well considered.

In this study, legal issues which arise when the environmental protection policies are tried to be carried out by means of taxation, will be examined.

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Recent Patterns and Trends of Hazardous Waste Management: A Case Study

In the last two decades, hazardous waste management is the major problem being faced by municipalities because it involves a huge expenditure and receives scant attention. It is not only a technical problem but it also is strongly influenced by political, legal, socio-cultural, environmental and economic factors, as well as available resources. Hazardous waste management system deals with the hazardous waste from its source of generation until its final disposal, which includes all the operations and transformation of this waste. Improper management of hazardous wastes constitutes a growing concern for cities in developing countries. Proper management requires the construction and installation of essential facilities and machinery, based on a suitable management plan. Hazardous waste management planning strategies should advocate avoiding waste generation, using cleaner technology, promoting waste recycling and recovery, using suitable treatment for generated waste and adequate waste final disposal. The purpose of this study is to provide a broad overview of the recent patterns and trends of hazardous waste management in Samsun, Turkey. The dynamics of hazardous waste management problems and causes are outlined. It is targeted to emphasize the importance of reorganizing the institutional tools in a wide-angle perspective in order to generate coherent solutions to hazardous waste management problems in Samsun, Turkey.

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Some Aspects of Conservation of Indian Heronries: The Human Dimension

Heronries - nesting sites of colonially nesting waterbirds including species of darter, cormorant, heron, egret, ibis, spoonbill, pelican and stork, belonging to families Anhingidae, Phalacrocoracidae, Ardeidae, Threskiornithidae, Pelecanidae and Ciconiidae are prevalent across the length and breadth of India, inside and outside the protected areas network, in the countryside and also in urban parks. Besides providing nesting habitat for endangered species of birds, heronries being a concentration of breeding effort in space and time are ecologically and conservationally significant, providing us with a unique opportunity to institute long term population monitoring programmes which can be valuable for understanding impacts of urbanization and climate change on biodiversity. Because of their diversity and unique location the conservation aspects of heronries are different from the conventional approaches and so far have remained peripheral to most conservation strategies. In this paper some efforts taken by government agencies, spirited environmental NGO activists etc are reviewed with the help of case studies and an examination of popular narratives on heronries. The paper discusses the future directions for conservation work, emphasizing the role of environmental education.

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Influence of Mineral Additives on Resistance of Concrete at Elevated Temperature

Concrete containing mineral admixtures is used extensively throughout the world for their good performance and for ecological and economic reason. They save energy, conserve resources and have many technical benefits. In this study, an experimental investigation was performed to evaluate the influence of elevated temperatures on the mechanical properties of self-consolidating concrete containing the mineral additives as powder material. The ordinary Portland cement (OPC) was used as binder, and limestone powder, silica fume and brick powder was used as mineral additive materials. The OPC were partially replaced by 0, 10, 20 and 30% of each type of mineral admixture. The blended concrete paste was prepared using the water-binder ratio of 0.5 wt% of blended cement. The experiments were carried out on mortar specimens. In addition, superplasticizer admixture and natural sand in size of 0-1 mm were used in the production of mortars. The fresh mortars were first cured at 100% relative humidity for 24 hours and then cured in water for 28 days. The hardened concrete mortars were thermally treated at 20 (room temperature), 200, 400, 600, 800 and 1000 oC for 2 hours. The compressive strength, tensile strength and loss of density of self-consolidating concrete mortars were compared with those of the pure ordinary Portland concrete. The results showed that the addition of mineral additives to OPC improves the performance of the produced blended concrete when exposed to elevated temperatures.

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Is Multiple Contamination Systematically Increasing Environmental Risk: A Case Study Based on Arsenate and Cadmium Interaction in a Freshwater Amphipod

Because toxicants rarely occur alone in environment, a major challenge in risk assessment is to address the combined effects of chemicals on aquatic organisms. This presentation aims at investigating the joint toxicity action of binary mixtures of cadmium and arsenate on a freshwater amphipod Gammarus pulex. Individuals were exposed during 240 hours at four single arsenate or cadmium concentrations and binary mixtures of these metals according to a complete factorial plane. Observed mortality in binary mixtures was compared to observed mortality in single arsenate or cadmium exposures. In addition, interactive effects (antagonistic, additive or synergistic) were evaluated using a predictive model for the theoretically expected interactive effect of chemicals. For all the tested concentration combinations, we observed an antagonist 'between-metals' interaction on Gammarus pulex mortality. This antagonistic effect was more marked for the lowest than for the highest (i.e. 1502.0 µgAsV L-1 and 28.5 µgCd L-1) tested concentrations of individual metals in binary mixtures. Metal concentrations in body tissues were evaluated and were significantly lower in binary mixtures than in single metal exposures at similar concentration, especially for combinations corresponding to the highest concentrations of both metals (1502.0 µgAsV L-1 and 28.5 µgCd L-1).

Results are discussed in terms of (i) environmental risk assessment of binary mixtures; (ii) mechanisms of uptake and bioconcentration and (iii) relationships between metal concentration in gammarid body and observed toxicity.

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Impact of EDTA and Humic Substances on the Removal of Cd2+ and Zn2+ from Aqueous Solutions by Apatite

Apatites are effective metal ions binding materials and therefore recommended to stabilise toxic metals in contaminated soils and waters. As real systems often contain different complexing ligands, it is important to examine how these ligands affect metal ions sorption processes. The aim of the present study was to investigate the sorption processes of Cd2+ and Zn2+ (Me) on hydroxy- and fluorapatite in the absence/presence of EDTA or a humic substance (HUM).

The presence of EDTA increased the dissolution of apatite and decreased the amounts of Me ions sorbed because of the formation of Ca/Cd/ZnEDTA2- complexes. The dissolved HUM was bound to apatite, but the amount of Cd2+ bound to apatite was not affected by HUM.

The sorption of Cd2+ and Zn2+ on AP occurs mainly by ion exchange reactions with Ca2+. An equilibrium model was designed to describe proton- and ligand- (EDTA) promoted dissolution of HAP as well as surface phase transformations in the presence of Cd2+ and CdEDTA2-. The model obtained describes well experimental results and reveals that metal ions are sorbed by formation of a new, less soluble metal-substituted surface layer with the composition Ca8.4-xMex(HPO4)1.6(PO4)4.4(OH)0.4.

The strength of Cd2+ fixation in apatite structure depends on apatite structure and on the composition of sorption and desorption solutions.

It was concluded that sorption of Cd2+ and Zn2+ on apatite depends on the specific surface area of the apatite particles, on solution pH and cationic composition, Ca/P mole ratio in apatite, as well as on the presence of chelating compounds. The addition of apatite into soil will decrease the mobility of toxic metal ions by binding them to the apatite

surface. Considering apatites as possible sorbents for heavy metals in environment, it is necessary to take into account the presence of chelating compounds that can notably change the character of the binding process and stability of the compounds formed.

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A Novel Small-Scale System For Domestic Wastewater Treatment And Reuse

The lack of appropriate drinking water represents a problem all over the world, which is potentiated by the population increase and higher urbanization level. At the same time, the majority of households consumes daily large quantities of potable water even for purposes (e.g. flushing the toilet bowl), where such a water quality is not required. The use of rainwater and the recycling of residential wastewater are emerging as integral parts of water demand management, promoting the preservation of high-quality potable water as well as reducing the spread of pollutants in the environment and reducing overall supply costs. On-site residential wastewater (greywater) treatment and reuse represents the largest potential source of water savings. Greywater (GW) is the wastewater collected separately from sewage flow from washing machines, bath tubs, showers and bathroom sinks.

A compact system for the treatment/reuse of GW was invented recently at the National Institute of Chemistry in Ljubljana. The benefits of biological treatment and UV disinfection processes are combined in a compact reactor unit, which can also serve as a toilet flush reservoir. Submersed biological (biofilm) reactor is used for the elimination of biodegradable organic material. The reactor is packed with a special biomass carrier (high specific surface-to-volume ratio), which enables intensive degradation of organic loading. UV disinfection step that utilizes low-pressure mercury lamp (254 nm) is used for partial disinfection of collected water and prevention of bacterial growth. The unit is equipped with a level sensor, control module and electromagnetic valves that ensure unattended operation and self-cleaning of the system regarding the removal of accumulated solids. In the periods when GW is not available, the system is partially filled with tap water and behaves as an ordinary toilet flush reservoir.

Quality of water treated in a wide range of operating conditions of the GW treatment/reuse system will be presented in the paper. The obtained results demonstrate that this novel system, which operates at ambient temperature as a semi-continuous recycle reactor, enables significant removal of organic matter (conversions up to 65 %, expressed as total organic carbon) without the occurrence of foaming and malodour. Low concentration of dispersed microorganisms was measured in treated grey water; importantly, no coliforms were accumulated in the unit, even after long-term operation. Finally, the results confirm that the proposed system can be efficiently installed in individual domestic residences, where it can contribute to substantial potable water savings (up to 30 %).

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Modeling the Removal of Stromwater Pollutants and the Mixing Mechanism of Stormwater Runoff

This paper describes the development of an innovative and a first of its kind pre- and post construction water quality model for designing a stormwater best management practice (BMP). It models the trapping efficiencies and removal of common stormwater pollutants. The paper is actually the combination of two separate researches by tracing stormwater runoff pollutants beginning with their removal and ultimately their integration in the environment. It first presents the theory and development of a stormwater runoff pollutants removal model for flow through a non-structural BMP that can be incorporated into the design of a stormwater management plan. This is followed by the steps in analyzing the mixing mechanism of stormwater runoff with the ambient waters of a receiving water body.

The first part of the model is the development of a complex hydrodynamic mathematical pre- or post construction water quality model to design and size vegetated filter strip (VFS) stormwater best management practice. It calculates the effectiveness of VFSs in removing common stormwater pollutants (sediment, total nitrogen and total phosphorus). The deterministic algorithms used in the pollutant removal processes in the model are based on predicting stormwater runoff rates and pollutant loads and routing these loadings through the BMP using technologies that have been experimentally validated. It must be used with site-specific data of the location to which it will be applied. The second part describes the water quality impacts of stormwater runoff from land surface to a receiving water body using the concepts of mixing zone theory. For water quality management and environmental impact prediction, it is necessary to evaluate the existing and expected water quality of the ultimate receiving water body. It is critical to research and understand the mixing behavior of pollutants in stormwater runoff when discharged into a receiving water body.

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Numerical Simulation on the Local Impact of an Operating Wind Turbine

Wind energy is commonly considered to be a clean and environmentally friendly renewable energy resource, as they do not pollute our atmosphere with greenhouse gas, nor do they cause any radioactive problems compared to nuclear energy. However, there are still some environmental impacts due to the installation and operation of the wind turbines that cannot be ignored, such as noise, visual and climatic impact. Especially, the observed local climate change in some wind turbine areas has attracted general concern in recent years. Experts suspected that the a long time operation of the wind turbines in an area can cause changes to the local precipitation, the speed of the water evaporation of the earth surface, the frequency of the drought happens and so on. Nevertheless, we still cannot figure out whether these changes will be caused by wind turbines or not. Because of the big geometry size of the commercial wind turbine, the experiment method is very limited to conduct this research. Numerical simulation by CFD is considered to be a suitable approach to investigate the local impacts of an operating wind turbine. This paper provides an overview of the potential environmental impacts of wind turbines and describes a valid 3-D numerical simulation approach to model the operation of a wind turbine, in which the frozen blade method is used to model the rotation of the wind blades. In this research, a wind-tunnel test has been undertaken before the numerical simulation, which is to validate the wind turbine model and the research method in CFD computation. More, two inlets, wind inlet and rain inlet, are given in this modeling to effectively obtain and analyze the local impact on the environment, like effects on the wake flow, humidity, temperature and direction of rain drop of the operating wind turbine.

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Life Cycle Analysis for Petroleum Fuels and Renewable Jet Fuels

At the time when the use of fossil fuel means ever increasing energy scarcity and environmental crisis in the world we live, we need greener innovations now more than ever. Growing attention has been drawn to biofuels such as ethanol and biodiesel and they have gradually taken up a certain amount of the total energy supply. Despite preferential development of them, environmental and ecological uncertainties still exist. Life cycle analysis (LCA), with deliberate system boundaries and life cycle inventories, has been applied by scientific literatures to calculate two principal functional units, the energy efficiency and GHG balance, from cradle to grave of different renewable biofuel resources. In order to calculate the particular greenhouse gas (GHG) balance and energy efficiency for selected fuel pathways, life cycle analysis (LCA) should be applied to account and trace the detailed fluxes of energy demand and GHG emission from cradle to grave. This paper focuses on LCA of conventional petroleum fuels and several hydro-processed renewable jet fuels using software SimaPro. The building of life cycle flow tree in SimaPro will combine the input and output with an emphasis on stages of raw material acquisition, liquid fuel production, transport, refueling and end use. With a consistent impact assessment method for simulation, equitable comparisons and comprehensive analysis had been made between selected fuel pathways for cumulative energy demand and global warming potential. However, the results of the entire lifetime estimates varied dramatically in production chains, which make it difficult to take a holistic view about energy intake and yields, economic costs and values, environmental impacts and their benefits. Apart from the diversity in system boundaries and life cycle inventories, a variance in terminologies and the limitations of interdisciplinary communication are the main factors that affect the quality of the results.