



JOINT EVENT

5th World Conference on **Climate Change**

**&**

16th Annual Meeting on

**Environmental Toxicology and Biological Systems**

October 04-06, 2018
London, UK

# Scientific Tracks & Abstracts

# Day 1

# Day-1

## SESSIONS

**Effective Adaptation | $CO_2$ Capture and Sequestration | Renewable Energy to Mitigate Climate Change | Sustainability & Climate Change**

**Chair: Paul Alexander Comet,** Houston, USA
**Co-Chair: Zhenghui Xie,** Chinese Academy of Sciences, China

## SESSION INTRODUCTION

**Title: Hydrologic and climatic responses to global anthropogenic groundwater extraction**
**Zhenghui Xie,** Chinese Academy of Sciences, China

**Title: Potential glacial lake outburst flood (GLOF) in Santa Lucia village, Lake Region, Chile**
**Francisco Ferrando A,** University of Chile, Chile

**Title: Urban and architectural approaches for an effective climate change adaptation in Latin America**
**Irene Perez Lopez,** Pan-American Observatory of Landscape, Territory and Architecture, Spain

**Title: The role of spatial analysis in avoiding climate change maladaptation–A systematic review**
**Chia-Fa Chi,** National Sun Yat-sen University, Taiwan

**Title: Exploring perceptions of local stakeholders on climate change adaptation in Central and Western Terai, Nepal**
**Shree Kumar Maharjan,** Hiroshima University, Japan

**Title: A framework for achieving carbon-free society**
**Dai-Yeun Jeong,** Asia Climate Change Education Center, South Korea

**Title: Impacts of climate change on large-scale weather driven energy system design decisions for the 21st century**
**Kozarcanin Smail,** Aarhus University, Denmark

Zhenghui Xie et al., Environ Pollut Climate Change 2018, Volume 2
DOI: 10.4172/2573-458X-C1-002



# Hydrologic and climatic responses to global anthropogenic groundwater extraction

**Zhenghui Xie, Liu S, Zeng Y, Gao J, Qin P, Jia B, Xie J, Liu B, Li R, Wang Y** and **Wang L**
Chinese Academy of Sciences, China

Anthropogenic groundwater exploitation essentially changes soil moisture, land-atmosphere water and energy fluxes, even climate system. In over-exploited regions, the terrestrial water storage has been rapidly depleted, causing water unsustainability and climate change. Quantifying the hydrologic and climatic responses to anthropogenic groundwater extraction not only advances our understanding on the hydrological cycle with human intervention, but also benefits effective human water management. In this paper, the authors incorporated a scheme of anthropogenic groundwater exploitation into the Community Earth System Model 1.2.0, and conducted a series of simulations over globe to investigate the effects of groundwater exploitation on the hydrological processes and climate system around the world. The framework of the coupled model are shown in Fig. 1. The model was also applied over Heihe River Basin in northwestern China for investigating the impacts of water use and groundwater lateral flow on basin-scale land processes, and the eco-hydrological effects of stream-aquifer water interaction over riverbanks. Results show that groundwater exploitation caused drying in deep soil layers but wetting in upper layers, with a rapidly declining water table in areas with the most severe groundwater extraction, including the central United States, North China Plains and the north India and Pakistan. The atmosphere also responded to groundwater extraction, with cooling at the 850 hPa level over the north India and Pakistan and a large area in North China and central Russia. Increased precipitation occurred in North China Plains. Decreased precipitation occurred in north India because the Indian monsoon and its transport of water vapor were weaker as a result of cooling induced by groundwater use. Local terrestrial water storage was unsustainable at the current high extraction rate. Thus, a balance between reduced water withdrawal and rapid economic development must be achieved to maintain a sustainable water resource, especially in over-exploited regions.

## Recent Publications

1. Xie Z, Liu S, Zeng Y, Gao J, Qin P, et al. (2018) A high-resolution land model with groundwater lateral flow, water use and soil freeze-thaw front dynamics and its applications in an endorheic basin. Journal of Geophysical Research-Atmospheres 123.
2. Zeng Y, Xie Z and Zou J (2016) Hydrologic and climatic responses to global anthropogenic groundwater extraction. Journal of Climate 30:71–90.
3. Zeng Y, Xie Z, Yu Y, Liu S, Wang L, et al. (2016) Effects of anthropogenic water regulation and groundwater lateral flow on land processes. Journal of Advances in Modeling Earth System 8:1106–1131.
4. Zeng Y, Xie Z, Yu Y, Liu S, Wang L, et al. (2016) Ecohydrological effects of stream–aquifer water interaction: a case study of the Heihe River basin, northwestern China. Hydrology and Earth System Sciences 20:2333–2352.

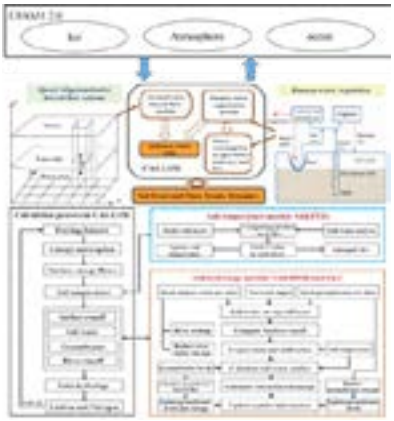

**Figure 1:** Framework of the coupled model

## Biography

Zhenghui Xie, Professor/Dr., State Key Laboratory of Numerical Modelling for Atmospheric Sciences and Geophysical Fluid Dynamics, Institute of Atmospheric Physics, Chinese Academy of Sciences, Deputy Director of. He got Ph.D. from Institute of Computational Mathematics, Chinese Academy of Sciences in 1996, and master degree from Hunan University in 1988. He visited Civil and Environmental Engineering, University of California at Berkeley, USA, and University of Tennessee at Knoxville, USA as visiting Assistant Professor during 1998-2001,. He is working on the development of a land surface model in the climate system and its applications, land surface models and their coupling with regional and general climate models, macro-scale land hydrological models and their parameter calibrations and transfers, interactions between climate and vegetation, land data assimilation and its applications, and computational mathematics and geophysical fluid dynamics. http://web.lasg.ac.cn/staff/xie/xie.htm

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Francisco Ferrando A et al., Environ Pollut Climate Change 2018, Volume 2
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# Potential glacial lake outburst flood (GLOF) in Santa Lucia village, Lake Region, Chile

**Francisco Ferrando A** and **Pablo Sarricolea**
University of Chile, Chile

The Santa Lucía village (Lat.: 43°24'50"S – Long.: 72°21'59"W; 236 m.a.s.l.) is located near to the Frio River, Lake Region. This village has risks considering the natural system dynamics of the place where it is located; a wide and deep glacial valley surrounded by mountain chains with summits 1700–1800 m.a.s.l., where there are several glaciers. The analysis of the geographic surrounding of the Santa Lucía village reveals that there exist potential hazards in the nearest associated with the geomorphology and the glacial context of the upper Frio River valley. These threats are related to four glaciers that have proglacial lagoons and to the effect of the warming tendencies, with the consequent ice structural stability loss, meaning potential scenery of GLOF's occurrence, and a possibility of a disaster for the village. The climate of the zone is characterized by considerable temperature variations, with more than 20°C in summer, and <0°C in winter, and by 3000 mm of precipitation. In summer 2017, a debris flow was triggered by a 122 mm/24 hours precipitation; intensity that is the double of the 60 mm/24 hours stablished by Hauser (1985) for the occurrence of mass movements in central Chile. This rain, that unchained a slope-slide and then a debris flow, happened over 1400 m.a.s.l., indicating where the high of the 0°C isotherm was during the event. Because no temperature information, the MODIS thermal sensor data gives the possibility to approximate the altitude and the tendency of the 0°C isotherm, process directly ligated to the occurrence of GLOF's. According to the results of the thermal sensor data for the 2001–2017 period, the height of the 0°C isotherm was increased in ±400 m. This result, not sufficient accuracy ($R^2$=0.3342), can be associated with an increase of the potential hazard of GLOF's, and constitute information for the determination of a new location for the Santa Lucia village.


**Figure 1:** Frío River & Santa Lucia Village. (AfR: No risk área)

## Recent Publications

1. Vergara Dal Pont I, Santibañez F, Araneo D, Ferrando F and Moreiras S (2018) Determination of probabilities for the generation of high-discharge flows in the middle basin of Elqui River, Chile. Rev. Natural Hazards 16.
2. Janke J, Bellisario A and Ferrando F (2015) Classification of debris-covered glaciers and rock glaciers in the Andes of Central Chile. Geomorphology 241(2015):98–121.
3. Bellisario A, Ferrando F and Janke J (2013) Water resources in Chile: The critical relation between glaciers and mining for sustainable water management. Revista Investigaciones Geográficas 46(2013):3–24.

## Biography

Francisco Ferrando A Geographer and Doctor in geography and territorial ordering, has his expertise in hydrology, glacial geomorphology, rock glaciers and Andean permafrost, and in the effect of global warming on their mass balance. Also, participate in governance actions about mining activities impact on the cryosphere and water quality and security. How titular professor of the department of geography of the University of Chile, brings the courses of Hydrology, Natural Hazards & Risks, and Introduction to Glaciology. At the magister, is responsible for the seminar about Climate change & Rock glaciers.

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## Urban and architectural approaches for an effective climate change adaptation in Latin America

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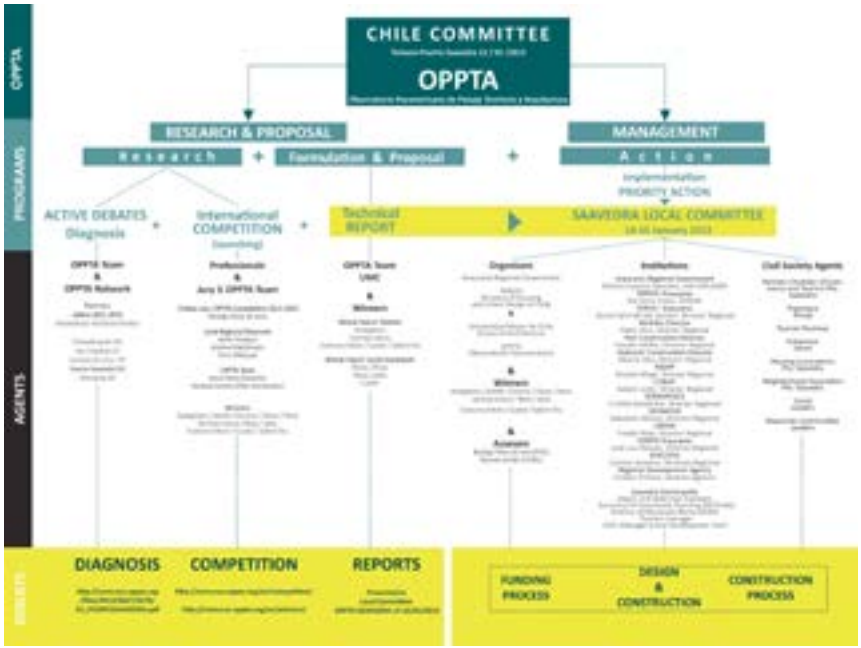
Since 2011, Pan-American Observatory of Landscape, Territory and Architecture (OPPTA) works simultaneously on risk cause by the impacts of climate change and natural hazards in five Latin American cities. The number of unexpected and unprecedented effects of climate change and natural disasters affecting the Latin-American sub-continent in a short period of time motivated OPPTA to develop a concurrent methodology of research proposals and action to approach infrastructural, architectural, landscape and social actions, improving living condition, minimizing vulnerability and promoting the resilience of cities and communities. The proposed methodology is based on the development of five programs: active debates, competition, priority action, WikiPan and publications, which deal respectively with: research, design and implementation of projects, and the creation of an open database and publications to disseminate the results. This methodology settles mechanisms and processes to work through a multidisciplinary and transnational network along Europe and America, involving researchers, professionals and institutions, of both public and private sector. The aim of this research includes the study of risk and its associated problems to identify patterns, concurrencies and differences at the technical, infrastructural and political (identification of public policies and governance in Latin America) level. Among the 12 initial candidates, five sites have been selected: Chimalhuacán (Mexico), Lima (Peru), Puerto Saavedra (Chile), San Cristobal (Colombia) and Petropolis (Brazil). The particular context and specific problems associated to each site stimulate a simultaneous search for common solutions to ensure an effective adaptation. As a result, the technical proposals were implemented throughout the Priority Action Programme, which incorporates sustainable and resilient development plans and project; design of public infrastructures to minimize vulnerability; networks of resilience green-public areas; organization of educational programs and citizen participation with regards to urban agriculture and horticulture, waste and water management; etcetera, to ensure mitigation and endangered environment preservation.



**Recent Publications**

1. Pérez Maldonado (2017) Strategic Urban Plan for the Araucania Region (Chile): The environmental awareness of the community. PLEA Conference, Edinburgh, Scotland.
2. Pérez Varela (2016) OPPTA methodology for intervention in areas affected by risk in Latin America. Procedia Engineering 161(V).
3. Zazo Aláez and Pérez Varela (2016) ARA project: municipality strategic plan for the implementation of climate change adaptation in Chimalhuacán, México. 'Cambio climático y ciudades de América Latina', University of Externado, Colombia, 978-958-710.
4. Pérez (2015) Toward an infrastructural architecture and urban design. Exploration in Big Scale Architecture Project. Urbano, n. 32, 0717-3997/O718-3607.
5. Pérez, Varela (2014). Emergency Landscape in five study cases in Latin America. IFLA, 978-987-96680-2-3

**Biography**

Irene Perez Lopez (PhD in Architecture ETSAM-UPM, President of OPPTA). Sheisco-founder of the Pan-American Observatory of Landscape, Territory and Architecture OPPTA, a non-profit internationalorganizationfocusedontheprotection, restoration, recovery and reconstruction of urban and rural environmentswith a specialfocusonsustainableurbandesign and planning, riskmanagement (ClimateChange and man-madepressureonenvironment), and theimplementation of Resilience cities and societies. Sheworked as director of TerritorioMayor (2013-14), the Centre forUrbanStudies at the Mayor University in Chile, onthedevelopment of consultancies and design-ledresearchregardingtosustainableurbancityplanning, landscape and territory. Previously, shefoundedherown office focusonthedevelopment of architecture, urbandesign and landscapearchitectureprojects. In addition, Irene has beenAssociateProfessor and AssistantProfessor at theBíoBíoUniversity, Mayor University, Salamanca University and theSchool of Architecture at thePolytechnicUniversity of Madrid ETSAM-UPM.

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**Notes:**

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# The role of spatial analysis in avoiding climate change maladaptation—a systematic review

**Chia-Fa Chi**[1,2], **Dan Ware**[2], **Willow Hallgren**[2], **Rodger Tomlinson**[2] and **Shiau-Yun Lu**[1]
[1]National Sun Yat-sen University, Taiwan
[2]Griffith University, Australia

As the practice of climate change adaptation has developed rapidly over recent decades, so has the evidence of maladaptation associated with adaptation initiatives, particularly in the form of risk transfer and risk substitution. Increasing our understanding of maladaptation is important so as to avoid negative outcomes of adaptation project implementation. However, as a research topic, maladaptation has received limited attention to date. Previous research has focused on the development of conceptual frameworks that can assist in defining and evaluating maladaptation, which can be applied to adaptation planning processes seeking to avoid maladaptation. However, practical case studies and methods which can assess and evaluate the risk of maladaptation by integrating both spatial and temporal aspects in a simulation tool have not been done to date. This paper aims to fill this gap by exploring the existing knowledge on maladaptation to climate change, and the interaction between land use change, adaptation planning and project design with the purpose of extending our conceptual understanding. We adopted a systematic review method which involved considering several questions including: (a) What are the definitions and categories of maladaptation? (b) What methods and theoretical frameworks exist for the assessment and evaluation of the risks of maladaptation? (c) How have climate-related research communities considered the issues of maladaptation? (d) What are the experimental studies on land use change which could be applied to minimize the risks of maladaptation in the future adaptation planning? We conclude that future research on maladaptation should integrate spatial analysis methods to assist the identification of maladaptation risk at the initial stage of adaptation planning.

## Recent Publications

1. Shiau-Yun Lu, Chia-Fa Chi, Chia-Wen Hsu. 2017. Study of Land Use Changes in Coastal Zone and the Response to Climate Changes in Taiwan. Conference on Regional Sea-level Changes and Coastal Impacts. New York, USA.
2. Chia-Fa Chi, Shiau-Yun Lu. 2016. Linking Barriers for Adaptation and Maladaptation to Climate Change: A Brief Review. The 38th Ocean Engineering Conference in Taiwan. Taipei City, Taiwan.
3. Chia-Fa Chi, Shiau-Yun Lu, Jian-Cheng Chen. 2016. Assessing the Disaster Resilience in Four Coastal Communities, Pingtung, Taiwan. Fifth International Conference on Climate Change Adaptation 2016. Toronto, Canada.
4. Chia-Liang Chan, Shiau-Yun Lu, Kuo-Ching Huang, Chia-Fa Chi. 2015. Study for Adaptation Strategy Construction by Land-use Module Application. Climate Adaptation in Taiwan—International Conference of Climate Change Adaptation Technology. Taoyuan City, Taiwan.
5. Chia-Fa Chi, Shiau-Yun Lu, Jeng-Di Lee. 2015. Effective Adaptive Measures Could be Maladaptation: Case Study in Chiatung Coastal Area, Pingtung, Taiwan. The 2nd European Climate Change Adaptation Conference (ECCA). Copenhagen, Denmark.

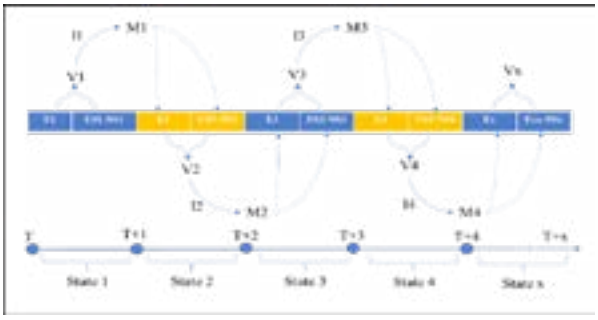

**Figure 1:** The Exacerbates Risk Concept of Maladaptation (revised from Magnan et al., 2016)

## Biography

Chia-Fa Chi is a Doctoral Candidate of the Department of Marine Environment and Engineering in National Sun Yat-sen University, Taiwan. His main research activities are focused on adaptation to climate change in coastal areas. In particular, he is interested in the issues of maladaptive risks. He has received awards of the Graduate Students Study Abroad Program which is sponsored by Taiwan Ministry of Science and Technology and National Sun Yat-sen University, separately.

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# Exploring perceptions of local stakeholders on climate change adaptation in Central and Western Terai, Nepal

**Shree Kumar Maharjan** and **Keshav Lall Maharjan**
Hiroshima University, Japan

Climate change has varied impacts on diverse livelihood sectors, which is more prominent at the community level. The stakeholders and local institutions have been supporting the communities either by building adaptive capacities and climate resilience or minimizing the impacts through different adaptation interventions. Some of these interventions are effective, whereas others need further dynamics and exertions considering the complexity of the climate risks and vulnerabilities. Hence, consolidated efforts of concerned stakeholders are required to minimize the present and future climate impacts. This study digs out and analyzes the perceptions of local stakeholders on climate change adaptation in Madi and Deukhuri valleys of Nepal through a questionnaire survey. These local stakeholders revealed flood, drought, cold wave and riverbank erosion as the major climatic risks and hazards found in the sites eventually impacting on the loss of agricultural production, loss of agricultural land and properties, loss of livestock, the emergence of diseases and pest. The stakeholders believed that most of the farmers dealing with these impacts were based on their traditional knowledge and practices, followed by with the support of NGOs and with the help of neighbors and community. The major supports of the stakeholders to deal with these impacts are on training and awareness, risk analysis and minimization, livelihood improvement, financial support, coordination and networking and facilitation in policy formulation. The stakeholders perceived that capacity building, appropriate technologies, community-based planning, prioritization of poor and marginalized, community fund and community-based monitoring, and evaluation were the most important supports required for the community, respectively.

## Recent Publications

1. Maharjan S K and Maharjan K L (2018) Roles and contributions of community seed banks in climate adaptation in Nepal. Development in Practice 28(2):292–302.
2. Maharjan S K (2017) Riverbed farming as source of income, family nutrition and food security for landless and poor farmers in Terai region of Nepal. Scientia Recerca: innovative Techniques in Agriculture 2(1):316–319.
3. Maharjan S K and Maharjan K L (2017) Indigenous peoples, indigenous knowledge and issues of indigenous peoples on climate change particularly REDD+ in developing countries. International Journal of Applied Sciences and Biotechnology 5(3):272–283.
4. Maharjan S K and Maharjan K L (2017) State of climate policies, plans/strategies and factors affecting its implementation in Nepal. International Journal of Conservation Science 8(3):485-496.
5. Maharjan S K, Maharjan K L, Tiwari U and Sen N P (2017) Participatory vulnerability assessment of climate change vulnerabilities and impacts in Madi Valley of Chitwan district, Nepal. Cogent Food and Agriculture 3(1).

## Biography

Shree Kumar Maharjan is currently pursuing his PhD at the Graduate School of International Development and Cooperation, Hiroshima University, Japan. He has been studying and researching on the issues of climate change adaptation in agriculture, indigenous peoples' rights, participatory approaches, community-based biodiversity management for almost a decade. He has published more than dozens of papers on these issues. His publication H-index is 3.

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## A framework for achieving carbon-free society

**Dai-Yeun Jeong**
Asia Climate Change Education Center, South Korea

**Statement of the Problems:** It has been scientifically proved that the emission of human-induced greenhouse gases is the major contributor to climate change. A variety of strategies are being implemented to reduce the emission of human-induced greenhouse gases at a global, national and regional level for achieving low-carbon and carbon-neutral society. However, the ultimate goal of climate change strategy is to achieve carbon-free society which is the state of, climate before industrialization advanced in the 18th century. Nonetheless, it is quite rare to establish the framework of carbon-free society.

**Contents of Presentation:** In the context mentioned above, this paper will present a framework for achieving carbon-free society through overcoming the limitations inherent in the existing framework promoting low-carbon and carbon-neutral society. The presentation will be composed of three parts. First: The difference in the concept and implication of low-carbon, carbon-neutral and carbon-free society will be examined. Second: The limitations inherent in the low-carbon and carbon-neutral frameworks will be critically examined in terms of their strategies for achieving the state of climate before industrialization has been advanced in the 18th century. Third: A framework for achieving carbon-free society will be presented in a way to overcoming the limitations inherent in the existing low-carbon and carbon-neutral frameworks, focusing on overall direction of nature-based and technology-based approach, major socio-economic sectors and strategies to be included, and methodologies for analyzing the efficiency and effectiveness of the strategies.

**Conclusion & Significance:** No country/region currently has all requirements necessary for promoting carbon-free society. In this context, as a concluding remark, what capacity should be built will be discussed. In a word, the key significance of the presentation is in seeking for the direction and contents of achieving carbon-free society which is the ultimate destination of climate change strategy.

### Recent Publications

1. Jeong D-Y (2011) An effectiveness analysis of climate change policy in South Korea. Journal of Environmental Impact Assessment 20(5):585–600.
2. Jeong D-Y (2009) An international comparative research on environmental carrying capacity among islands. Korean Social Science Journal 36(2):195–230.

### Biography

Dai-Yeun Jeong is presently the Director of Asia Climate Change Education Center and an Emeritus Professor of Environmental Sociology at Jeju National University in South Korea. He received BA and MA Degree in Sociology from Korea University (South Korea), and PhD in Environmental Sociology from The University of Queensland (Australia). He was a Professor of Sociology at Jeju National University (South Korea) from 1981 to 2012. His past major professional activities include a Teaching Professor at the University of Sheffield in UK, the President of Asia-Pacific Sociological Association, a Delegate of South Korean Government to UNFCCC, a Delegate of South Korean Government to OECD Environmental Meeting, and a Member of Presidential Commission on Sustainable Development, Republic of Korea, etc. He has published 60 environment-related research papers in domestic and international journals and 13 books including Environmental Sociology. He has conducted 91 unpublished environment-related research projects funded by domestic and international organizations.

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# Impacts of climate change on large-scale weather driven energy system design decisions for the 21st century

**Kozarcanin Smail**
Aarhus University, Denmark

Increasing global warming and the resulting climatic changes are likely to advance the weather-related risks that are facing many different human and natural systems. In the attempt to cushion these effects, mitigation strategies that rely on low-cost weather driven variable renewable energy technologies are gaining ground, and installed renewable energy generation capacities are increasing significantly. We present a study on, to what extend the weather is changing in a way that also directly impacts the best system design decisions for weather-driven sustainable energy systems. The latest generation of IPCC's climate projections, RCP2.6, RCP4.5 and RCP8.5, have been used to represent a broad range of climate outcomes during the 21st century. These are strongly influenced by climate policies representing the latest Paris agreement, imposition of high global greenhouse gas emission prices and lack of climate policies, respectively. On behalf of the EURO-CORDEX project, three hourly climate data have been provided from six different high-resolution regional climate models for Europe. We have then applied state-of-art methods to generate bias corrected wind and solar power production time series for the 21st century, and to correct the electric consumption profiles for heating and cooling for 30 European countries. To assess the far future impacts of climate change, the production and consumption profiles are applied to a fully connected, highly-renewable, large-scale European energy system. As a result, we found small changes in the relevant energy system key metrics of the combined system dynamics compared to historical values. We concluded that the effect of climate change can most likely be ignored in the context of energy system design for the 21st century. However, in correspondence with the literature, impacts of climate change are more prominent through the demand and these strongly outweigh the energy supply side impacts.

## Recent Publications

1. T Brown, D Schlachtberger, A Kies, S Schramm and M Greiner (2018) Synergies of sector coupling and transmission extension in a cost-optimised, highly renewable European energy system, preprint arXiv:1801.05290.
2. J Wohland, M Reyers, J Weber and D Witthaut (2017) More homogeneous wind conditions under strong climate change decrease the potential for inter-state balancing of electricity in Europe. Earth System Dynamics 8.4.
3. I Tobin, et al. (2016) Climate change impacts on the power generation potential of a European mid-century wind farm scenario. Environmental Research Letters 11(3):034013.
4. P Berril, et al. (2016) Environmental impacts of high penetration renewable energy scenarios for Europe. Environmental Research Letters 11(1):014012.

## Biography

Kozarcanin Smail is passionate in understanding and proposing ways of how the humanity is able to mitigate climate change during the 21st century. This interest has led him to join the Aarhus University, Sustainable Energy System group where he is employed as a PhD Fellow. He has his expertise within the subject of climate change impacts on future highly renewable large scale energy systems.

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**Notes:**

## SESSIONS

**Environmental Science | Toxicology | Toxicity Testing**

**Chair:** **Manuela Marcoli,** University of Genova, Italy
**Co-Chair:** **Edwin J Routledge,** Brunel University London, UK

## SESSION INTRODUCTION

**Title:** **Directed evolution, biotechnology and in silico analysis of reaction centre proteins for microorganisms and biomimetic-based biosensors in environmental toxicity monitoring**
**Maria Teresa Giardi,** Biosensor Srl, Italy

**Title:** **Effects of aluminium salts and cyclic volatile methylsiloxanes on dna damage and dna repair in immortalised non-transformed human breast epithelial cells**
**Abdullah Mohammed O Farasani,** Jazan University, Saudi Arabia

**Title:** **How abbvie tries to fend off world's blockbuster no. 1 from generic competition**
**Seyed Jamaleddin Shahtaheri,** Tehran University of Medical Sciences, Iran

**Title:** **Unravelling the chemistry behind the toxic effects of refining wastewater: Characterization and remediation**
**Angela Pinzon-Espinosa,** Brunel University London, UK

**Title:** **Prediction of compounds' toxicities and its applications**
**Jianhua YAO,** Chinese Academy of Sciences, China

**Title:** **Differences of $PM_{2.5}$ from various combusted materials**
**Fawei Yan,** Renmin University of China, China

**Title:** **Synthesis of heterogeneous catalyst for biodiesel production from cooking oil**
**Sadia Nasreen,** University of Engineering and Technology Taxila, Pakistan

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# Directed evolution, biotechnology and in silico analysis of reaction centre proteins for microorganisms and biomimetic-based biosensors in environmental toxicity monitoring

**Maria Teresa Giardi**[1,2], **Gianni Basile**[2] and **Mehmet Turemis**[2]
[1]CNR-Institute of Crystallography, Italy
[2]Biosensor Srl, Italy

Tons of chemical compounds derived from human and industrial activities are incessantly threatening our environment. Current approaches for monitoring of pollutants include precise and accurate assessment of individual compounds by chemical analyses, which are however unable to provide information about bioavailability, effect on living organisms, and synergistic or antagonistic behaviour in mixtures, thus requiring combination with biomarker assays and ecosystem monitoring. These methodology strategy is time and labour intensive, demands ex-situ collection at individual locations and extensive sample preparation, and has elevated costs depending on the complexity.

To overcome these challenges, biosensor and bioassay technology can furnish advanced devices for water monitoring with greater efficiency. Indeed, integrated, cost-effective, easy to use, and fast biosensors can be projected to characterize the extent of pollution at relevant spatio-temporal scales and in terms of ecological effects. Despite this great potential, most of the published works focused on analyses of fresh water, mainly because of the highly demanding working environment that seawater constitutes. To face the challenges posed by real environments, biosensors need to be fully automated, very robust (resistant to physical impacts, high corrosion, and biofouling), drift-free or with accurate calibration, with minimal power consumption, user-friendly, and enough sensitive to measure pollutants at very low concentrations. Several examples of biosensor development for marine measurements of eutrophication, pesticides, anti-biofouling agents, polycyclic aromatic hydrocarbons, endocrine disruptors, trace metals, organism detection and algal toxins have been described in literature.

Algal biosensors react very broadly to toxicity and their detection mechanism frequently relies on measurement of the photosynthetic activity caused by 33% of pesticides actually in the market. Biosensing applications of photosynthetic organisms are based on the inhibition of the electron transfer occurring after a few minutes exposure of photosystem II (PSII) to certain pollutants, or to adverse physicochemical conditions changing the local chemical equilibrium. Indeed, when pollutants such as photosynthetic pesticides are present and encounter the photosystem, they can bind the reaction centre D1 protein and directly or indirectly inhibit the transport of electrons from the primary acceptor, plastoquinone A (QA), to the secondary quinone (QB) along the photosynthetic chain. This inhibition results in a variation of PSII fluorescence emission in a pollutant concentration-dependent manner that can be monitored by optical transduction. Based on this approach, several microalgal biosensors have been designed for pesticide and heavy metal detection in fresh water. However, hyper-saline conditions present in marine environment and stress conditions during environmental monitoring may affect the photosynthetic process resulting in significant changes in the bioassay performance. Herein we present the development of an optical bioassay for detection of photosynthetic pesticides from different chemical classes in real water samples by exploiting various green microalgae strains. Therefore, the main objectives were to select the most appropriate microalgae strains to achieve stability and adaptability into real matrices, and to develop a bioassay integrated with portable fluorescence instrumentation allowing pesticide detection at relevant environmental concentrations. Several microalgae species from Chlorophyceae, Trebouxiophyceae, Dinoflagellates, Diatoms and Eustigmatophyceae groups with different marine and non-marine origins, including fresh water and soil, were analysed. Lipid content of selected microalgae suggested that *C. mirabilis* and symbiotic associations between *C.vulgaris* and protozoa were the microorganisms with higher potential to acclimate to high salinity environments being mainly constituted by unsaturated lipids involved in responses to several environmental stresses.

Among the wide range of microalgae species, which have been employed to develop biosensor technology, *Chlamydomonas reinhardtii* was especially studied since it possess a number of features that suite perfectly the requirements of an early warning environmental biosensor. It is a grass organism, easily cultivable having 8 hours doubling time and it can grow with or without carbon source, besides, it is easily transformable and all 3 genomes are sequenced. Recent our efforts have focused on increasing the stability and selectivity of PSII from microalgae for the detection of different subclasses of pollutants. These goals were achieved by using the alga *C. reinhardtii* mutated at the D1 protein herbicide-binding site by site-directed mutagenesis. *C. reinhardtii* was also modified introducing in the chloroplast antioxidant peptides, known in food able to reduce the content of free radicals, thus lessening the photooxidative membrane damage. Measurements of *in-vivo* antioxidant activity showed that mutant strains have improved their survival rate in the presence of singlet oxygen precursors, which highly exceeds the survival rate of control algae, showing increased stability and sensitivity for biosensor applications.

Beyond these scientific achievements, nowadays the market needs highly specific and precise *in situ* measurement devices able to collect and send the data in real-time for periods of months without maintenance under multi-stressors. These devices demand more robust algal biomediators. Thus, the challenge is the preservation of the algal photosynthetic functionality when integrated with electronic components or operated under fluctuating environmental conditions. To this end *C. reinhardtii* mutants able to quench $1O_2$ and other ROS, were integrated into a newly developed miniature and portable electrochemical/optical device, to measure and collect PSII data in real-time for long periods. Several photosynthetic pollutants spiked in real samples were detected within 10 min in concentrations between ng/L-µg/L and the different algae species tested showed diverse pesticide sensitivities.

Always towards to increase the biomediator performance, biomimetic peptides of the photosynthetic D1 binding niche of the microalgae C. reinhardtii were developed, both by chemical and biological synthesis, as suggested by in silico analysis. Standing out among the others, the biomimetic mutant peptide, D1pepS268C, bound to specific quantum dots, showed high ability to mimic the microalgae in binding pesticides. Replacement of whole microalgae cells or their photosynthetic apparatus by mimetic peptide improved the system in terms of stability.

This approach allowed also the integration of the biomediators with quantum dots and innovative stretchable printed electrodes-based electrochemical biosensor as a wearable point-of-use screening tool for toxicity environmental analyses.

**Biography**

Maria Teresa Giardi has worked as the manager of research at the National Council of Research (IC-CNR) in Rome till 2015. She is now associated to CNR, working at the company Biosensor srl as research director and CEO. Her background is in industrial chemistry with extensive experience in biochemistry and molecular biology; her main interest is on photosynthetic protein stabilization and utilization in biosensors for real toxicity environmental monitoring. She is a supervisor-coordinator of several national and international projects in the field of biosensors based on plants and microorganisms and of European Space Agency's projects involving space flights of engineered microorganisms to low orbit and to International Space

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**Notes:**

Abdullah Mohammed O Farasani et al., Environ Pollut Climate Change 2018, Volume 2
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# Effects of aluminium salts and cyclic volatile methylsiloxanes on DNA damage and DNA repair in immortalized non-transformed human breast epithelial cells

**Abdullah Mohammed O Farasani**[1,2] and **Darbre P D**[2]
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[2]University of Reading, UK

Dermal absorption of components of underarm cosmetics may be a contributory factor in breast cancer development. Aluminium (Al) salts are added as the active antiperspirant agent, and cyclic volatile methylsiloxanes (cVMS) are used for purposes of conditioning and spreading. Al has been measured in human breast tissue, breast cyst fluid, nipple aspirate fluid and milk: Al levels in breast tissue have been recently reported to be a risk factor for breast cancer in young women. cVMS have been measured in human milk. The objectives of this study were to investigate any genotoxic effects of exposure to the antiperspirant salts Al chloride and Al chlorohydrate, and to the cVMS hexamethylcyclotrisiloxane (D3), octamethylcyclotetrasiloxane (D4) and decamethylcyclopentasiloxane (D5) in immortalized non-transformed human breast epithelial cells. All these compounds enabled a dose-dependent growth of the non-transformed cells in suspension culture, which is an established marker of transformation. DNA damage was demonstrated using a comet assay. Long term (≥20 weeks) exposure to these compounds also resulted in loss of expression (mRNA and protein) of the breast cancer susceptibility gene BRCA1 which is a key gene in the repair of DNA in breast cells. Alterations to expression of other DNA repair genes at an mRNA level will be presented. If these compounds can both damage DNA and compromise DNA repair systems, then there is the potential for breast carcinogenesis.

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1. A and Darbre P D (2017) Exposure to cyclic volatile methylsiloxanes (cVMS) causes anchorage-independent growth and reduction of BRCA1 in non-transformed human breast epithelial cells. Journal of Applied Toxicology 37(4):454–461.
2. Farasani A (2017) Importance of exome sequencing in the human diseases and medical genetics. J Genet Genomic Sci. 2:006.
3. Farasani A and Darbre P D (2015) Effect of aluminium chloride and aluminium chlorohydrate on DNA repair processes in MCF10A immortalized non-transformed human breast epithelial cells. Journal of Inorganic Biochemistry 152(2015):186–9.

## Biography

Abdullah Mohammed O Farasani received his PhD from Reading University, UK in 2016 for his work on genotoxicity of cosmetic chemicals in human breast epithelial cells. He is currently working as the head of Genetic Unit in the MLT Department at Jazan University, Saudi Arabia.

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**Notes:**

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# Development of dispersive liquid-liquid microextraction procedure for trace determination of pesticide malathion in urine samples

**Seyed Jamaleddin Shahtaheri, Maryam Ramin** and **Monireh Khadem**
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**Background:** Measurement of pesticides in biological matrices is a serious challenge for researches because of their very low concentration in different matrices. The aim of this study was to develop a new sample preparation method with high accuracy, validity, simplicity as well as a short retention time for chromatographic determination of the pesticide malathion.

**Methods:** Dispersive liquid-liquid micro-extraction (DLLME) technique coupled with high performance liquid chromatography equipped with ultra violet detector (HPLC-UV) was developed for trace extraction and determination of pesticide malathion in human urine samples. One variable at a time (OVAT) method was used to optimize parameters affecting the malathion extraction. Different parameters such as extraction solvent, disperser solvent, volume of the extraction solvent, volume of the disperser solvent, centrifugation time and speed salt addition, and sample pH were studied and optimized.

**Results:** Under the optimized conditions, the limit of detection and enrichment factor of the developed procedure were 0.5 $\mu gL^{-1}$ and 200, respectively. The calibration curve was linear in the concentration range of 2-250 $\mu gL^{-1}$. The relative standard deviation for six replicate experiments at 200 $\mu gL^{-1}$ concentration was less than 3%. The relative recoveries of spiked urine samples were 96.3%, 101.7% and 97.3% at three different concentration levels of 50, 200, and 1000 $\mu gL^{-1}$, respectively.

**Conclusion:** According to the obtained results, DLLME procedure was successfully developed for the extraction of malathion from human urine samples. Compared to other extraction techniques, the proposed procedure had some advantages such as shorter extraction time, better reproducibility, and higher enrichment factor.

## Recent Publications

1. Khadem M, Faridbod F, Norouzi P, Rahimi Foroushani A, Ganjali MR, Shahtaheri SJ, Yarahmadi R (2017).Modification of carbon paste electrode basec on molecularly imprinted polymer for electrochemical determination of diazinon in biological and environmental samples, Electro analysis, Vol. 29, 708-715.
2. 2. Khadem M, Faridbod F, Norouzi P, Rahimi Foroushani A, Ganjali MR, Shahtaheri SJ, Yarahmadi R Design and synthesis of a highly selective electrochemical sensor for occupational monitoring of diazinone, Journal of Health and Safety at Work, Vol. 7, No. 1, 9-23.
3. 3. Harati B, Shahtaheri SJ, Karimi A, Azam K (2017). Evaluation of health risk assessment of occupational exposure to chemical pollutant in an automobile manufacturing industry, Journal of Health and Safety at Work, Vol. 7, No. 2, 121-131.
4. Ghahri A, Golbabaei F, Vafajoo L, Mireskandari SM, Yaseri M, Shahtaheri SJ (2017). Removal of Greenhouse Gas (N2O) by Catalytic Decomposition on Natural Clinoptilolite Zeolites Impregnated with Cobalt. International Journal of Environmental Research, Vol. 11, No. 3, 327-337.
5. 5. Kakavandi NR, Ezoddin M, Abdi K, Ghazi-Khansari M, Amini M, Shahtaheri SJ (2017). Ion pair-switchable-hydrophilicity solvent based homogeneous liquid-liquid microextraction for the determination of paraquat in environmental and biological samples prior to high-performance liquid chromatography, Journal of Separation Science, Vol. 40, 3703-3709.

## Biography

Seyed Jamaleddin Shahtaheri completed his PhD from Surrey University, Guildford, England in 1996. He is an Academic Member of the Department of Occupational Health Engineering, Tehran University of Medical Sciences, Iran, acting as the Dean Research Deputy at the Institute for Environmental Research at the same university. He is a Member of the Persistent Organic Pollutant Review Committee (POPRC) under the Stockholm Convention, UNEP, UN. He has published more than 150 papers in reputed journals and has been serving as an Editorial Board Member of seven national and international journals.

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Angela Pinzon-Espinosa et al., Environ Pollut Climate Change 2018, Volume 2
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# Unravelling the chemistry behind the toxic effects of refining wastewater: Characterization and remediation

**Angela Pinzon-Espinosa** and **Rakesh Kanda**
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Refining transforms crude oil into marketable products with high commercial value, providing a third of the global energy requirements and numerous raw materials. The process, however, emits vast amounts of wastewater that can have harmful effects on wildlife and human health but the link between chemistry and observed toxicity is fragile because little progress has been made in determining causative agents. Consequently, current treatment technologies are not targeting key toxicants nor providing safe effluents. Here we show that naphthenic acids are important components of refining wastewater, resulting from the processing of heavy crude oil, and that they have an important contribution to the toxic effects exerted by these effluents. Furthermore, we found that their chemical stability makes them highly resistant to remediation using bacteria and Fe-TAML/$H_2O_2$ systems under laboratory conditions, and only sequential aliquots of Fe-TAML catalysts and $H_2O_2$ showed to degrade naphthenic acids (50 ppm) within 72 hours. We anticipate our results to be a starting point for better environmental regulations relevant to refining wastewater resulting from heavy crude oil, as naphthenic acids are not currently considered in the effluent guidelines for the refining sector. Furthermore, the degradation of naphthenic acids under mild conditions using Fe-TAML/$H_2O_2$ systems indicates that these catalysts hold promise for the remediation of refining wastewater in real-life scenarios.


**Figure:** Analysis of petroleum refining effluents conducted to identify contaminants causing toxicity towards luminescent bacteria (Vibrio fischeri), and subsequent evaluation of bacteria (Pseudomonas putida) and synthetic enzymes (Fe-TAML activators) as low-cost clean-up technologies to provide high-quality effluents suitable for recycling or safe discharge.

## Recent Publications

1. Pinzón-Espinosa A, Martinez-Matamoros D, Castellanos L, Duque C, Rodríguez J, Jiménez C, Ramos F (2017) Cereusitin A, a cyclic tetrapeptide from a Bacillus cereus strain isolated from the soft coral Antillogorgia (syn. Pseudopterogorgia) elisabethae. Tetrahedron Letters, 58(7), 634 – 637.
2. Gutiérrez V, Pinzón-Espinosa A, Casas J, Martínez M (2008) Determination of cellulolytic activity in soil from Stevia rebaudiana Bertoni crops. Agronomía Colombiana, 26(3), 497 – 504.

## Biography

Angela Pinzon-Espinosa is a Water Scientist working at the interface between Microbiology and Chemistry. Her research interests are directed towards the link between water quality, health, environment, and the different strategies to tackle water pollution. Her current research focuses on the detection and identification of toxic chemicals in industrial effluents using luminescent bacteria, and the development of low-cost clean-up technologies targeting refining chemicals. She is particularly interested in the science behind pollution control and the use of science for regulatory purposes, but keen on expanding her expertise to environmental management aiming to provide clean and safe water.

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## Prediction of compounds' toxicities and its applications

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Chinese Academy of Sciences, China

A compound is a chemical entity consisting of two or more different atoms combined by chemical bonds. Their properties are basically physical, chemical, biological, toxicological, etc., and depend on their chemical structure. Toxicity is one of the properties of compounds, and is related to their chemical structures. Toxicology involves the study of the adverse effects of chemical substances on living organisms and is a discipline related to biology, chemistry, pharmacology, medicine, and nursing. Its research content includes: symptoms, mechanism, treatment and determination of poisoning. Generally, in toxicology, there are six types of toxicity: acute, mutagenic, irritative, carcinogenic, reproductive, and multiple doses. To obtain the toxicity evaluation of compounds, traditionally, people evaluated their toxicities by microbiological, animal experiments, or got them from human events reports. With the increment of experimental data, development of computer science and chemoinformatics technology, computer aided prediction toxicity of compounds become another effective way to obtain information about toxicity of compounds step by step. At present, it is being applied in related fields, such as chemical toxicity assessment concerning environmental protection, food industry, study of TCM (traditional Chinese medicine), agricultural production and pharmaceutical industry, and plays a key role. Actually, in computer aided prediction toxicity of compounds, combination of data mining, analysis of relationship between reliable experimental data and chemical structures was used to obtain the knowledge/rules which would be employed to predict toxicity of a compound based on its chemical structure. Herein, two works of our group will be presented: strategies and methods of computer-aided prediction of toxicity and; evaluation of toxicity for a pesticide and its metabolites, formulating plans of environmental protection.

### Biography

Jianhua YAO has her expertise in Chemoinformatics and its applications in all domains which relate to Chemistry. She has studied prediction of compounds properties for more than 10 years and developed prediction system of acute toxicity, mutagenic toxicity and carcinogenic toxicity. These systems have been applied in environmental protection.

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**Notes:**

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# Differences in $PM_{2.5}$ from various combusted materials

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[2]Renmin University of China, China

$PM_{2.5}$ now is a very hot topic in China and the government is taking sustained efforts to resolve this problem. Especially, in Beijing, restricting vehicles, restriction on constructions, closing low-end factories that contaminate the environment, are several means to reduce the $PM_{2.5}$ generation by all respects. However, $PM_{2.5}$ emerges from many sources, including natural and anthropogenic discharges. One of the main anthropogenic sources is combustion. Fuel burning is a very important source. Many researchers have deeply studied the formation of $PM_{2.5}$ from coal combustion or oil combustions. However, the research on $PM_{2.5}$ from other combustions is a rarity. Hence, several materials were combusted including plastic, wood and glass as the research subjects in the same operation condition in this study. These three represent three kinds of materials, chemical organic matter, organic biomass and inorganic matter. Information such as $PM_{2.5}$ production and $PM_{2.5}$ morphology were collected. The findings suggested that different wastes would exhibit different $PM_{2.5}$ emission potentials in the same combustion operation condition and the morphologies of $PM_{2.5}$ from various combustion sources is also identifiable. By weighing the filter mass increase before and after combustion, the $PM_{2.5}$ yields could be calculated. Also by using SEM to analyze the $PM_{2.5}$ collected on the filter, $PM_{2.5}$ morphology is analyzed. Plastic combustion bears the highest $PM_{2.5}$ discharge potential during incomplete burning with tremendous spherical particulates in the images. Glass bears no $PM_{2.5}$ discharge potential for its incombustible properties. While wood would generate $PM_{2.5}$ in an irregular shape with a moderate production.

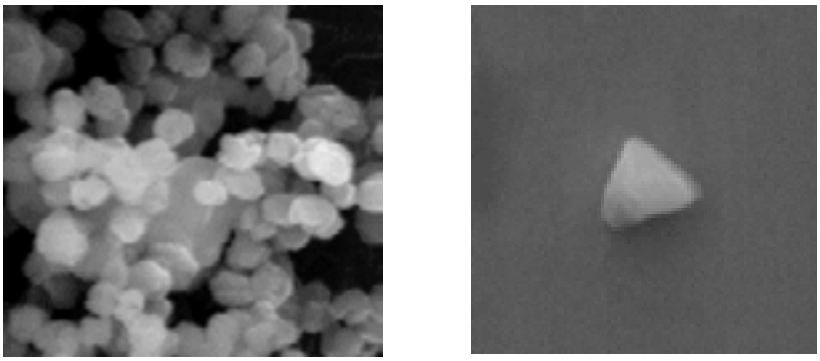

**Figure 1:** Images of the $PM_{2.5}$ from the combustion of plastic and wood (left plastic, right wood).

## Recent Publications

1. Fenfen Zhu and Fawei Yan (2017) $PM_{2.5}$ emission behavior from laboratory-scale combustion of typical municipal solid waste components and their morphological characteristics. Energy & Fuels 111:855-876.
2. Fawei Yan and Fenfen Zhu (2016) Preliminary study of $PM_{2.5}$ formation during municipal solid waste incineration. Procedia Environmental Sciences 31:475–481.

## Biography

Fawei Yan, studied his Masters of Engineering in School of Natural Resources and Environment, Renmin University of China, majoring in Environmental Science from 2014 to 2017. During school time (2010-2017), he participated in many research programs, for example, $PM_{2.5}$ Formation, Lignocellulose Degradation (Microorganism), Waste Combustion, Soil Analysis and so on. Especially, he took part in the research Antibiotics Degradation in Water in University of Nebraska Lincoln, USA for almost 2 months in 2013. Now he work in the Planning and Development Department, Beijing New International Airport. He has his expertise in Environment Research such as $PM_{2.5}$, waste combustion. His research interests are $PM_{2.5}$ Generation and Green Airport.

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## Synthesis of heterogeneous catalyst for biodiesel production from cooking oil

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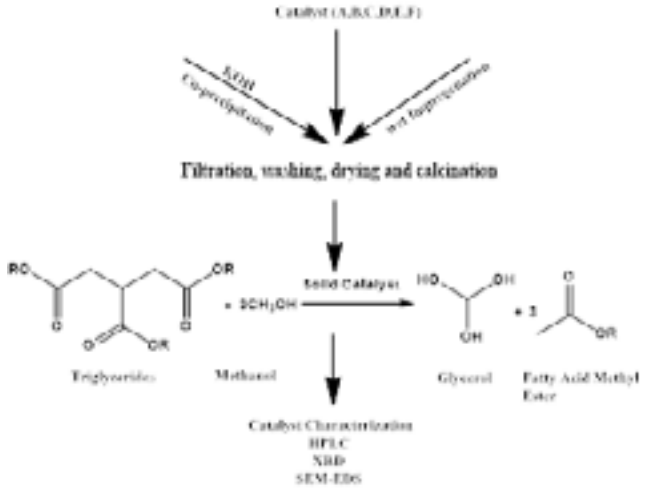
Biodiesel, a promising alternative diesel fuel produced by a catalytic transesterification of vegetable oils, has become more attractive nowadays, because of its environmental concerns and the fact that it is made from renewable resources. In this work, the transesterification of soybean oil with methanol has been studied in a heterogeneous system, using Zn, Mn, K and Ce supported by a mixture of porcelain, cinder and ceramic. 0.5 and 1 mm of Zn, Mn, K and Ce in 7 g of support were loaded, followed by calcinations at 600°C for 4h. Fresh and used catalyst were characterized by means of various spectroscopic techniques such as scanning electron microscopy (SEM) and TG conversion was checked by HPLC. It has been observed that 1M $ZnCO_3$ loaded in the support gives 93% TG conversion

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3. Sadia Nasreen, Hui Liu, Liaqat Ali Qureshi, Zakari Sissou, Ivana Lukic, et al. (2016) Heterogeneous kinetic of soybean oil transesterification with rare earth metal catalysts. Chemical Industry and Chemical Engineering Quarterly 22(4):419–429.

### Biography

Sadia Nasreen did her Doctorate in Environmental Engineering from China in 2015 with Professor Liu Hui. She specializes in catalysis of biofuel. Besides catalysis, her research interests include waste water treatment. Currently, she is working as an Assistant Professor at the University of Engineering and Technology, Taxila Pakistan.

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5th World Conference on **Climate Change**

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# Scientific Tracks & Abstracts

# Day 2

# Day-2

## SESSIONS

**Risks of Climate Change | Evidence of Climate Change | Oceans & Climate Change | Climate Change Challenges | Solutions for Climate Change | Enironmental Toxicology**

**Chair: Sara E Alexander,** Baylor University, USA
**Co-Chair: Zhenghui Xie,** Chinese Academy of Sciences, China

## SESSION INTRODUCTION

**Title: Impacts of climate change on the incidence of morbidity**
**Rachida El Morabet,** University Hassan II Casablanca, Morocco

**Title: Climate warming shifts Indian monsoon season: Evidence from observation**
**Elena Surovyatkina,** Potsdam Institute for Climate Impact Research, Germany

**Title: Dioxins and furans emissions: characteristics and strength**
**Anahit V Aleksandryan,** Ministry of Nature Protection of Republic of Armenia, Armenia

**Title: On aerosol-chemistry-cloud-climate interactions and entanglements**
**Rong-Ming Hu,** National University of Ireland Galway, Ireland

**Title: Recent shifts in continental shelf/slope oceanographic processes in the Northeastern United States**
**Glen Gawarkiewicz,** Woods Hole Oceanographic Institution, USA

**Title: International cooperation for DPRK's environmental restoration**
**Hyun-Ah CHOI,** Hanns Seidel Foundation Korea, Republic of Korea

**Title: The political ecology of 'climate change' in Texas: A steep learning curve for West Texas wheat farmers**
**Sara E Alexander,** Baylor University, USA

**Title: Managing agricultural water use with alternate wetting and drying (AWD): towards achieving Sustainable Development Goal 6**
**Mohammad Alauddin,** The University of Queensland, Australia

**Title: Waste, sustainability and money in controlling the carbon cycle and avoiding climate change**
**Paul Alexander Comet,** Houston, USA

**Title:** **Forest fires and social perception of the landscape: A study with Spanish population**
**Jaime Senabre,** University of Alicante, Spain

**Title:** **Development of sustainable aquaculture on the base of Sato-Umi to anticipate the environment and climate change in the coastal area of Indonesia**
**Suhendar I Sachoemar,** Agency for the Assessment and Application of Technology, Indonesia

**Title:** **The energy-water-health nexus under climate change in the United Arab Emirates—impacts and implications**
**William W Dougherty,** Climate Change Research Group, USA

**Title:** **Steady shrinking of the Dead Sea as a result of climate change in the Eastern Mediterranean**
**Pavel Kishcha,** Tel Aviv University, Israel

Rachida El Morabet, Environ Pollut Climate Change 2018, Volume 2
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## Impacts of climate change on the incidence of morbidity

**Rachida El Morabet**
University Hassan II Casablanca, Morocco

Human health is seriously affected by the impacts of climate change. WHO (World Health Organization) and IPCC (Intergovernmental Panel on Climate Change) have published several reports describing negative impacts of climate change on human health; this has resulted in the epidemiology of many diseases and conditions. Climate change has both direct (psychological effects arising from cold, heat and extreme weather) and indirect (change in behavior, forced migration etc.) impacts on human health. In 2015, WHO confirmed that floods cause contamination of freshwater sources, increases the risk of water borne diseases, provides breeding places for vectors of infectious diseases. In Morocco, the intensity and recurrence are enhanced due to climate change is a worrying phenomenon in recent years as the loss of life and property has increased. The rise in temperature additionally adds to this problem as it exacerbates diseases and number of deaths. The impact on health varies from region to region within a country partly due to geographic conditions. The nature and scale of impact will depend on the buffer capacity of the health systems (adaption and initial access of population to health services). Extreme weather conditions can result in requirement of health services which may surpass the capacity of existing health facilities rendering them vulnerable in future. The findings make a case for the Moroccan national health strategists to recognize the importance of overcoming major health risks presented to the population and citizens of Morocco. This can be achieved by identifying climate risks for health as a major challenge to be overcome in order to provide maximum protection of human health of citizens against these threats.

### Recent Publications

1. El Morabet R (2018) Effects of outdoor air pollution on human health. Reference Module in Earth Systems and Environmental Sciences. Elsevier DOI: 10.1016/B978-0-12-409548-9.11012–7.
2. El Morabet R, Aneflouss M and Mouak S (2018) Air pollution effects on health in Kenitra, Northern Morocco. Recent Advances in Environmental Science from the Euro-Mediterranean and Surrounding Regions. Springer DOI: 10.1007/978-3-319-70548-4–570.
3. Patz J A, Campbell-Lendrum D, Holloway T and Foley J A (2005) Impact of regional climate change on human health. Nature 438(7066):310.

### Biography

Rachida El Morabet holds a PhD in Biology from the Mohammed V University, Rabat, Morocco (2004), an Inter-University Diploma in Biotechnology, Paris, France (2001) and a University Pedagogy Certificate (teaching practices; learning theories; models assessment practices knowledge; educational resources and distance learning) (2014). She is an Associate Professor with the Department of Geography at FLSH-Mohammedia, Hassan II University of Casablanca, Morocco; Member of the Laboratory: Dynamics of Space and the Society; Research Team: the Dynamics of Natural Environments and their Impacts on Society and Territories; and Member of Center CERES [Center of Environmental, Human Security and Governance Research]. Her research interests include environmental issues in the era of global change, socio-ecological system (vulnerability and adaptation), and dynamics of natural systems. She received two gold medals with Honors of International Exhibition of Invention and Innovation, Casablanca, Morocco.

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Elena Surovyatkina, Environ Pollut Climate Change 2018, Volume 2
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## Climate warming shifts Indian monsoon season: Evidence from observation

**Elena Surovyatkina**
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**Statement of the Problem:** The Indian summer monsoon is the season of rain. The economy of India can maintain its GDP in the wake of a good monsoon. However, if monsoon gets delayed by even two weeks, it can spell disaster because of the high population depending on agriculture—70% of its people are directly related to farming. In Central India, the variability of monsoon is quite high due to local changes such as rapid urbanization and industrialization. The forecasting of climate phenomena on a seasonal scale is a challenge, mostly because there is no recent historical precedent for such change in the climate system.

**Methodology & Theoretical Orientation:** We forecasted monsoon using our recently developed methodology, which is based on the theory of critical transitions. Our predictions rely on observations of near-surface air temperature and relative humidity from both the ERA-40 and NCEP/NCAR re-analyses. We performed our forecasts for the onset and withdrawal of monsoon for the Central part of India.

**Findings:** It was revealed that climate change affects the Indian summer monsoon in two aspects: in the last decade, the intensity of monsoon rainfalls in the Central part of India has increased, and the onset and withdrawal of the monsoon have been delayed. This is due to an increase in spring temperatures and a slower cooling in autumn that is linked to global warming. The novel approach allows accounting climate change effects and predicting the monsoon onset and withdrawal dates for 40 and 70 days in advance, respectively. The results show that our method allows predicting the monsoon not only retrospectively, but also in the future: in 2016 and 2017 both of our forecasts were successful. Hence, we proved that such early prediction of the monsoon timing is possible even under the conditions of climate change.

### Recent Publications


1. Tony J, Subarna S, Syamkumar K S, Sudha G, Akshay S, et al. (2017) Experimental investigation on preconditioned rate induced tipping in a thermoacoustic system. Scientific Reports–Nature 7(1):5414.
2. Stolbova V, Surovyatkina E, Bookhagen B and Kurths J (2016) Tipping elements of the Indian monsoon: prediction of onset and withdrawal. Geophys. Res. Lett. 43:1–9.
3. Apala Majumdar, John Ockendon, Peter Howell and Elena Surovyatkina (2013) Transitions through critical temperatures in nematic liquid crystals. Phys. Rev. E. 88: 022501.
4. Surovyatkina E D , Kravtsov Yu A and Kurths J (2005) Fluctuation growth and saturation in nonlinear oscillator on the threshold of bifurcation of spontaneous symmetry breaking. Phys. Rev. E 72:046125.
5. Surovyatkina E D (2004) Phenomenon of prebifurcation rise and saturation of the correlation time. Physics Letters A 329(3):169–172.

### Biography

Elena Surovyatkina has her expertise in Theoretical Physics in the field of Theory of Critical Phenomena. She has contributed to the understanding of critical transitions with the new theory of nonlinear pre-bifurcation noise amplification and rate-depended phenomena. She discovered a new phenomenon of overcooling and overheating of critical temperatures in liquid crystals. Currently, her research is devoted to the spatially organized critical transitions in climate. The most significant contribution in climate dynamics is a new methodology of the earliest forecast of the Indian summer monsoon.

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Anahit V Aleksandryan et al., Environ Pollut Climate Change 2018, Volume 2
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## Dioxins and furans emissions: Characteristics and strength

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[2]Environmental Monitoring and Information Center—SNCO, Armenia

Open burning of waste at dumpsites is considered to be the easiest mode for wastes disposal, but is also a source of evident pollution and threat for human and environmental health. Polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans (PCDDs/PCDFs, or dioxins/furans) are unwanted by-products of combustion processes. Dioxins belong to persistent environmental pollutants (POPs) and they arise concerns because of highly toxic potential. The known toxicity and persistence of some congeners in the environment has emphasized the necessity to assess releases of those supertoxicants at open burning of wastes in some areas of Armenia. Dioxins formation upon wastes burning depends on composition and combustion conditions. In order to identify characteristics and strength of emission sources of POPs from wastes open burning in different *marzes* (provinces) of Armenia and to calculate dioxins emissions to air and soil UNEP methodological guidance was used. To quantify emissions the "emission factor" describing dioxins and furans entry into environment/media per unit of activity was used, such as toxic equivalent quotient (TEQ). TEQ indicates the potential toxicity of the particular substance itself as related to the most powerful poison among all dioxins—2,3,7,8- tetrachlorodibenzo-p-dioxin (TCDD). The sum of emission factors allows estimation of the total "dioxin" toxicity of the given source. The key research findings were as follows: emissions in air varied from 1.749 gTEQ/year (Ararat *marz*) to 9.382 gTEQ/year (Shirak *marz*), while emissions on land ranged from 0.061 gTEQ/year (Armavir *marz*) to 0.3128 gTEQ/year. Hence, efforts are required to reduce the current exposure.

### Biography

Anahit V Aleksandryan, graduated from Yerevan State University in 1978 with a Diploma in Biophysics. She defended her PhD thesis in Biology at St. Petersburg Institute of Continuing Medical Education in 1985 and then Doctoral Dissertation in Biology in 2011. Her main areas of expertise involve Industrial Toxicology, Ecology, and Hygiene. Since 1996, she is an Employee at the Ministry of Nature Protection of Republic of Armenia. Currently she is Head of Hazardous Substances and Waste Policy Division. She is the focal point of UNEP Stockholm Convention on POPs; UNEP Rotterdam Convention on PIC; Minamata Convention on Mercury; UNECE Convention on Transboundary Effects of Industrial Accidents; Strategic Approach to International Chemicals Management (SAICM) and Environment and Health Process (WHO).

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**Notes:**

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## On aerosol-chemistry-cloud-climate interactions and entanglements

**Rong-Ming Hu**[1], **C D O´Dowd**[1], **L Coleman**[1], **C Noone**[1], **T Grigas**[1], **S Bekki**[2], **O Boucher**[2] and **J-L Dufresne**[2]
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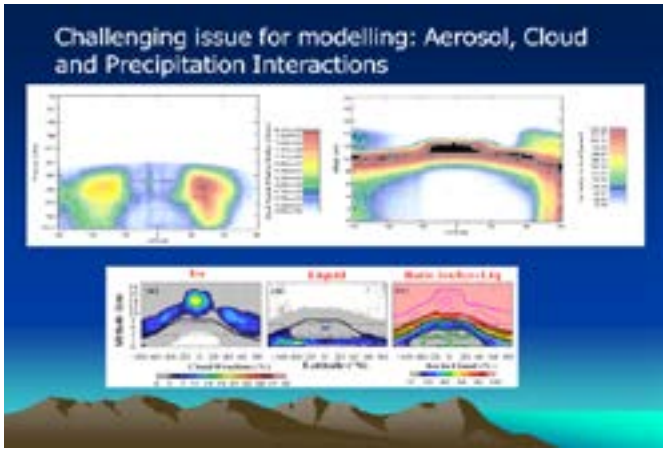
Aerosols and chemically reactive gases have important impacts on regional and global air quality and climate change. Despite decades of efforts, the model simulations of aerosols, chemically reactive gases and clouds are still uncertain due to the complex conundrum of aerosol-chemistry-cloud-climate interactions. The complicated entanglements and feedbacks among those atmospheric elements lead to a difficult and painstaking task for reducing the uncertainties in the future air quality and climate predictions. Nevertheless, the increasing demands for the accurate future air quality and climate information with high resolution require the high performance of multi-scale modelling. The Aerosol Chemistry Model Intercomparison Project (AerChemMIP) provides us a good opportunity to quantify the air quality and climate impacts of aerosols and chemically reactive gases. The project is designed to reduce the uncertainties in emissions, atmospheric compositions, radiative forcing and climate feedbacks, and improve the capabilities of model predictions. The outcomes of global model simulations will also be a benefit to improving the regional model simulations using the downscaling technique. With the amazing progress from ground-based, airborne and space-based measurements, we advocate an approach of integrating modelling and observation for model process studies, model validations and data assimilation. More *in situ* measurements and model improvements are necessary to better predict future air quality and climate change on multiple temporal and spatial scales.




### Recent Publications

1. Dhomse S, et al. (2018) Estimates of ozone return dates from chemistry climate model initiative simulations, atmospheric. Chemistry and Physics Discussions 1–40.
2. Shere K, et al. (2013) Trace gas/aerosol boundary concentrations and their impacts on continental-scale AQMEII modelingsub-regions. Atmos. Environ. 53:38–50.
3. Appel K W, et al. (2012) Examination of the community multiscale air quality(CMAQ) model performance over the North American and European domains. Atmos. Environ. 53: 142–155.
4. Hu R-M, et al. (2009) Light scattering and absorption properties of dust particles retrieved from satellite measurements. JSQRT 110:1698–1705.
5. Hu R-M, et al. (2009) New algorithms and their application for satellite remote sensing of surface PM2.5 and aerosol absorption. Journal of Aerosol Science 40(5):394–402.

Glen Gawarkiewicz, Environ Pollut Climate Change 2018, Volume 2
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# Recent shifts in continental shelf/slope oceanographic processes in the Northeastern United States

**Glen Gawarkiewicz**
Woods Hole Oceanographic Institution, USA

**Statement of the Problem:** The continental shelf and slope region of the Northeastern United States is rapidly warming (. Record warming of the continental shelf occurred in 2012 due to a northward shift in the atmospheric jet stream during winter and a corresponding reduction in heat loss from the ocean in winter. Warming of the continental shelf occurs from both atmospheric effects as well as ocean advection. How have oceanographic processes changed over the past ten years?

**Methodology & Theoretical Orientation:** A recent ocean observatory, the Ocean Observatories Initiative, Pioneer Array, is providing new data and insights into continental shelf and slope processes of New England. It has been in operation since 2014. In addition, a cooperative research program, the Commercial Fisheries Research Foundation/Woods Hole Oceanographic Institution, Shelf Research Fleet is providing vertical profiles of temperature and salinity across the continental shelf south of New England since November 2014.

**Findings:** Data from both the Pioneer Array and Shelf Research Fleet show that there have been significant exchange events at the shelfbreak (edge of continental shelf) in which waters of Gulf Stream origin are carried considerable distances across the continental shelf. A particularly dramatic event in December 2016/January 2017 resulted in a warm temperature anomaly of over 5°C, lasting over a month across most of the continental shelf. Several other significant ring intrusion events have been observed since 2014.

**Conclusion & Significance:** The ring intrusion event led to significant ecological effects, including the presence of warm water species over the continental shelf in January 2017. Further work is necessary to understand Gulf Stream motions and their impact on the continental shelf south of New England (Andres 2016).

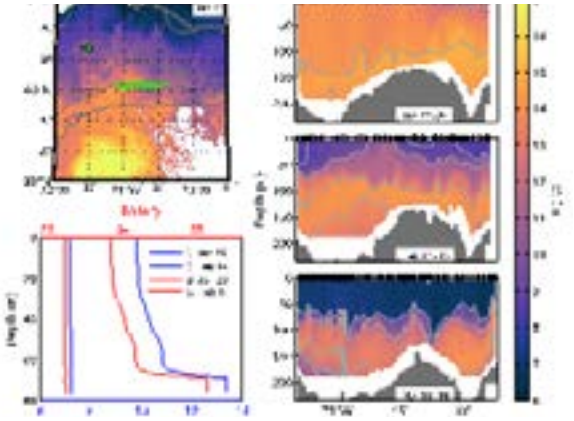

**Figure 1:** A map of sea surface temperature from January 2017 (upper left panel). Along slope setions of temperature from a glider of the Pioneer Array appear in the three panels to the right from January, February, and March 2017. The lower left panel shows temperature and salinity profiles from January and February 2017. The temperature of over 10 Degrees C was a 5 degree C warm anomaly compared to a recent climatology.

## Recent Publications

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2. Andres M (2016) On the recent destabilization of the Gulf Stream path downstream of Cape Hatteras. Geophysical Research Letters 43:9836–9842.

3. Chen K, Y Kwon and G Gawarkiewicz (2016) Interannual variability of winter spring temperature in the Middle Atlantic Bight: relative contributions of atmospheric and oceanic processes. Journal of Geophysical Research 121:4209–4227.
4. Pershing A, M Alexander, C Hernandez, L Kerr, A LeBris, et al. (2015) Slow adaptation in the face of ocean warming leads to collapse of Gulf of Maine cod fishery. Science 350:809–812.
5. Chen K, G Gawarkiewicz, S Lentz and J Bane (2014) Diagnosing the warming of the northeastern U.S. coastal ocean in 2012: a linkage between the atmospheric jet stream variability and ocean response. Journal of Geophysical Research 119:218–227.

**Biography**

Glen Gawarkiewicz is a Physical Oceanographer at the Woods Hole Oceanographic Institution. His research focuses on shelfbreak processes and the exchange of water masses between the continental shelf and the deep ocean. He has been involved in the planning and scientific direction for the Ocean Observatories Initiative, Pioneer Array. He works closely with the Commercial Fisheries Research Foundation of Rhode Island on collaborative research.

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**Notes:**

Hyun-Ah CHOI, Environ Pollut Climate Change 2018, Volume 2
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## International cooperation for DPRK's environmental restoration

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The Democratic People's Republic of Korea (DPRK) lacks both technical capacity and knowledge to survey environmental problems. Recently, the DPRK has been opening to certain international environmental issues such as biodiversity, wetland protection, sustainable forest management, and agroforestry. In this study, we analysed recent DPRK's international environmental cooperation for developing technical capacity. DPRK started projects with various international organisations including Centre for Agriculture and Bioscience International for building plant protection capacity, Swiss Agency for Development and Cooperation (SDC) in collaboration with World Agroforestry Centre in China for sloping land management and agroforestry, International Federation of Organic Agriculture Movements for building capacity for organic agriculture development and Hanns Seidel Foundation (HSF) for improvement of rural living conditions through healthy forests and biodiversity. The international cooperation projects have been successfully introduced in model sites throughout several provinces of DPRK. It also increases the political support and concern of the DPRK government. Especially, HSF's model site, Daedong-Gun, South Pyongan province in DPRK shows that the forest area in 2017 was increased and reduced their rate of loss, while in DPRK, severe forest fires have exacerbated the loss of forest. It appears the model site has a great possibility to prevent deforestation at local level. However, large scale restoration is required to restore the degraded land and environment in DPRK. To implement it on a larger scale, cooperation with international organizations and non-governmental organizations would be necessary.

### Biography

Hyun-Ah CHOI has completed her PhD from Korea University. She is currently a Reseacher at Hanns Seidel Foundation in Republic of Korea, based in Seoul, consulting NGOs, academic and public institutions in questions of unification and inter-Korean environment cooperation. She also works on sustainable development issues in the inner-Korean border area and from 2015 participates the survey as an Expert. Her research interests include international environment cooperation and ecosytem services assessment. Her publications include reserah articles in international journals like *Journal of Forestry Research, Sustaniablity, Advances in Space Research* and *Journal of Plant Biology.*

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**Notes:**

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# The political ecology of 'climate change' in Texas: A steep learning curve for West Texas wheat farmers

**Sara E Alexander**
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We live in a world of climate uncertainty where farmers pursue a variety of means to diminish vulnerability, utilizing strategies to respond to and mitigate against the effects of climate change. Specific responses include seeking new knowledge and training, using particular agricultural technologies, relying on institutional resources, and turning to both personal and professional social networks. The traditional model of agriculture as "performance", ultimately affirms that risks, such as challenges associated with climate change, are entrenched within a structure of social, economic and biophysical mechanisms that are continuously being managed by farmers. Agricultural systems are correspondingly found in a setting of commonly-shared worldviews, social complexities, values, and cultural norms. In this landscape, the decisions farmers reach, entail meaning and direction that may be far more complex than an analysis focused solely on the more pragmatic economic principles and agricultural productivity standards. Rather, they comprise the farmer's intuitive reasoning and socialization in addition to his/her technical and resource management skills. The author will present findings from an ethnographic pilot study aimed to illuminate farmers' perspectives on changing weather patterns, climate change forecasts and their implications for viability of farming enterprises, all within the context of Texas wheat production. With focus on livelihoods and cultural values, risk management, and weather and climate change in terms of decision-making and wheat farming in west Texas, the study emphasizes what motivates farmers and how they themselves value those factors that contribute to their goals and aspirations, how farmers see themselves addressing climate risk in the context of a wide array of pressures, and how farmers respond to the communication of predictive information in light of their sense of place and self.

## Recent Publications

1. Yohannes H (2016) A review on the relationship between climate change and agriculture. Journal of Earth Science and Climatic Change 7(2):335–342.
2. Brugger Julie and Michael Crimmins (2013) The art of adaptation: living with climate change in the rural American Southwest. Global Environmental Change 23:1830–1840.
3. Gosling Simon N and Nigel W Arnell (2013) A global assessment of the impact of climate change on water scarcity. Climatic Change 134(3):371–385.
4. Buys Laurie, E Miller and K van Megen (2012) Conceptualizing climate change in rural Australia: community perceptions, attitudes and (in) actions. Regional Environmental Change 12:237–248.
5. Scherr Sara J, Seth Shames and Rachel Friedman (2012) From climate-smart agriculture to climate-smart landscapes. Agriculture and Food Security 1:12–26.

## Biography

Sara E Alexander, as an Applied Environmental Anthropologist, the majority of her research projects focus on the dynamics of human populations and environmental change, specifically climate change in most cases. A project she recently completed in several coastal communities in Belize, addresses the ways in which households respond to climate-related shocks. The research involved determining levels of vulnerability and devising a Resilience Index to examine specific responses and coping strategies to climate-related disturbances. In 2014, she conducted research in the western interior region of Belize to determine awareness and level of understanding of climate change on the part of those working in the tourism industry.

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# Managing agricultural water use with alternate wetting and drying (AWD): towards achieving Sustainable Development Goal 6

**Mohammad Alauddin**[1], **Md Abdur Rashid Sarker**[2] and **Zeenatul Islam**[2]
[1]The University of Queensland, Australia
[2]Rajshahi University, Bangladesh

Managing increasingly scarce irrigation water has become a major challenge to many countries in the face of changing climate and a rising population all over the world. United Nations' Sustainable Development Goal 6 emphasizes ensuring availability and sustainable water management. Target 6.4 emphasizes increasing water-use efficiency across all sectors and sustainable withdrawals and supply of freshwater to address water scarcity. Bangladesh government has incorporated the SDGs in its Seventh Five Year Plan (2016–2020) in which north western Bangladesh was identified as water scarce or drought-prone area. This is one of the three most climate vulnerable zones of the country that receives least rainfall and suffers from severe ground and surface water scarcity. Against this background, using farm-level survey data from rice growers and a probit model, this study aims to assess the economic effects of the use of alternative wetting and drying (AWD), a water saving technology, in Naogaon district of Bangladesh. Findings suggest that the use of AWD saves water, decreases production cost through reduced irrigation cost, and raises net benefit/gain significantly without reducing total rice production. Major policy implications include information dissemination about the use and benefit of AWD through farmers' training/workshops or through farm-level agricultural officers. Agricultural officers should also encourage farmers to use a recently developed method named "dry direct seeded technology" that has the potential to save 60% irrigation water for irrigated rice in the dry season.

## Recent Publications

1. Islam Z, Alauddin M, Sarker M A R (2017) Determinants and implications of crop production loss: An empirical exploration using ordered probit analysis. Land Use Policy 67:527–536.
2. Kabir M J, Alauddin M and Crimp S (2017) Farm-level adaptation to climate change in Western Bangladesh: An analysis of adaptation dynamics, profitability and risks. Land Use Policy 64:212–224.
3. Alauddin M, Sarker M A R (2014) Climate change and farm-level adaptation decisions and strategies in drought-prone and groundwater-depleted areas of Bangladesh: an empirical investigation. Ecological Economics 106:204–213.
4. Alauddin M and Sharma B R (2013) Inter-district rice water productivity differences in Bangladesh: an empirical exploration and implications. Ecological Economics 93:210–218.
5. Alauddin M and Quiggin J (2008) Agricultural intensification, irrigation and the environment in South Asia: issues and policy options. Ecological Economics 65:111–124.

## Biography

Mohammad Alauddin is an Applied Economist who has published extensively in the area of Development, Environment and Climate Change. He has published in all the top journals in Development and Environment, including *Journal of Development Economics, Journal of Environmental Economics and Management, World Development, Ecological Economics* and *Land Use Policy, Agricultural Economics,* and *Environmental and Resource Economics.*

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## Waste, sustainability and money in controlling the carbon cycle and avoiding climate change

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A series of propositions are developed for controlling the carbon cycle by changing the way that we dispose our wastes. By defining contemporary biological carbon as neutral, fossil carbon as positive, and biochar as negative, an ideological framework can be easily developed for the creation of carbon negative societies. The capitalism vs. communism debate is revisited, but neither system addresses the waste problem, "linearity", the nature of money nor the need for sustainability or even what to do with waste (mostly carbon-based) which normally ends up in the air, water or landfill. Economics, as a mechanism for evaluating the movement of goods and services throughout society, in terms of energy expenditure and waste generation on a cyclical basis is a relatively unexplored field. Waste can be defined as associated with a negative cost and economic entropy. Entropy can be reversed by inputting energy into a system. A range of potential analogies for the development of global carbon neutrality can be discussed. These include cellular biology and ecology as viewpoints for generation of ATP (used as the currency of any cell, whether autotrophic or heterotrophic). For human society (a superorganism based on many municipal "cells") the development of a currency based on the "species" of alternative (electrical) energy, would be analogous to ATP. King Darius, used water dockets as currency in desert oases. By also referencing successful, premodern, economies, it may be possible to build an "alternative economy" based on wasteland, wastewater, waste-derived energy, wasted energy, etc., and most importantly, wasted people. This "second tier" economy would depend on the waste stream from the existing economy for its manufacturing, building materials, fertilizer, etc. and hence would complement the existing economy. Application of these simple ideas might also be appropriate in the building of a lunar base.

### Recent Publications

1. Comet, P.A. (2017). Academia Journal of Environmental Science 5(9): 151-160, September 2017 DOI: 10.15413/ajes.2017.0516, ISSN: 2315-778X
2. Wilkinson T (2010) The rise and fall of Ancient Egypt. Bloomsbury Publishing., London, New York & Berlin. ISBN 978 0 7475 9949 4 Comet,P.A.,(2016),http://article.sciencepublishinggroup.com/pdf/10.11648.j.ajep.s.20160 50301.13.pdf.
3. Fawzi M (2009). http://p2pfoundation.net/P2P_Energy _Economy.
4. Georgescu-Roegen N (1971) The entropy law and the economic process (Maxwellian demon quote, pg. 307; pg. 282). Cambridge, Massachusetts: Harvard University Press.

### Biography

Paul Alexander Comet has a MS in Geology from London University UK. &Ph.D from Bristol University UK. in Organic Geochemistry. He has extensive international experience in petroleum research & has published or coauthored some 50 papers. He was shipboard geochemist on ODP Leg 101 (Blake Bahama Plateau). He has worked at Core Labs. Singapore & Indonesia. Then at Texas A&M (GERG) where he was an associate research scientist working on mapping the Gulf of Mexico oils. His present interests include alternative energy, particularly as it relates to the waste stream, as well as the monetization of alternative energy for the building of a complementary "alternative society" for the disenfranchised. He has also worked at Sperry/Halliburton, where as a log analyst using XRF & XRD, on "unconventional reservoirs" he investigated some of the major oil producing basins of the USA.

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**Notes:**

Jaime Senabre, Environ Pollut Climate Change 2018, Volume 2
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# Forest fires and social perception of the landscape: A study with Spanish population

**Jaime Senabre**
University of Alicante, Spain

Forest fires are a global environmental problem that burn millions of hectares every year throughout the planet, causing human and economic losses as well as significant degradation of the natural environment. In Southern Europe, with Spain and Portugal at the head, 70% of the continent's forest fires occur. The growing human population and continuous occupation of the territory, exercise a role of domination and submission of nature. For this and other reasons, we can't omit the involvement of humans in the probability of occurrence of fires in the world. At present, it seems obvious that we are experiencing a change of trend in aspects such as temperature and precipitation rates, something that, together with other environmental evidences, has been associated with global climate change. In this context and as it always did, fire plays a modulating role in the characteristics of the vegetation and the structure of the landscape. This last aspect is the one we focus on in this study. Some of our findings determine that 95.90%, of the Spanish population surveyed, consider that there is a representative and characteristic landscape in the area where they live. We have also found that the "recreational" value of landscape is greater than the "economic" value, an aspect that may be relevant when it comes to forest management and forest fires. On the other hand, we have been able to confirm the high concern of Spanish citizens for the threat posed by natural phenomena to the landscape of their community and, especially, the concern about the threat of forest fires on the landscape, where 80.34% of our sample has identified damage to the landscape due to the impact of forest fires. Studies on social perception are a good tool for planning and improving prevention and risk management, as well as for the development of environmental policies appropriate to each specific territory.

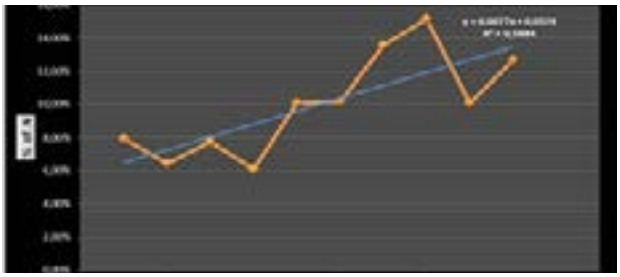

**Figure 1:** Perception of changes in the landscape due forest fires (Senabre, J.)

## Recent Publications

1. Senabre J (2018) Forest fires from the perspective of environmental psychology. Climate Change 4(13):58–68.
2. Senabre J (2017) Wildland fires, climate change and society. J. Earth Sci Clim. Change 8(10).
3. Senabre J (2016) Wildland fires and climate change. J. Earth Sci Clim. Change 7(5).

## Biography

Jaime Senabre is a Psychologist and Environmental Consultant as well as the Chief of Brigade in a Forest Fire Service with more than 20 years of experience. He collaborates with several companies and institutions in the area of training in Psychology in Emergencies and Human Resources. He is Professor at the University of Valencia for Master's in Intervention and Operational Coordination in Emergencies and Catastrophes and other postgraduate courses on emergencies. He is the Director and President of the International Scientific-Professional Committee of the National Symposium on Forest Fires (SINIF). He has lectured internationally and has been part of the organizing committee of several international congresses on Earth Sciences and Climate Change. He has published articles on forest fires, stress, psychosocial risks and emotional trauma, mainly in relation to emergency services and natural disasters. Currently, he is assigned to the research group on "Climate and Territorial Planning" (University of Alicante), where he researches on the social perception of forest fire risk and behavior in the event of possible disasters.

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# Development of sustainable aquaculture on the base of Sato-Umi to anticipate the environment and climate change in the coastal area of Indonesia

**Suhendar I Sachoemar, Tetsuo Yanagi** and **Ratu Siti Aliah**
[1]Agency for the Assessment and Application of Technology (BPPT), Indonesia
[2]International EMECS Center, Japan

Indonesia is the largest archipelago in the world. Its coastline is about 95.181 km with a sea area of 5.4 million km2. Indonesia has 1.2 million hectares (ha) of brackish water pond area, but only 37.5% of them are used for aquaculture activities. However, marine culture area is only used about 2% from the 4.5 million ha that is available. The low utilization of brackish water pond and marine culture area are generally caused by environmental damage due to the excessive exploitation by intensive aquaculture activities during the period of 1980s and climate change that caused sea level rise in the coastal area. In line with the growth of global paradigm in the face of the environmental and climate change as response to the global warming, it is time for Indonesia to implement the concept of management and utilization of natural resources, taking into account the balance and stability of the natural resources and the environment, such as in the concept of Sato-Umi. The integrated multi thropic aquaculture (IMTA) on the bases of bio-recycle system and Sato-Umi concept should be applied for sustainable aquaculture. An experiment of the IMTA in the brackish water pond as a closed system model (CSIMTA) has shown good performance in the production of multi species fisheries commodities as well as water quality stability. In the onshore area, developing of open system model of IMTA (OSIMTA) by combining seaweed culture and floating cage of multi species fisheries commodities also seem to have a good prospective to improve productivity of coastal area. In the future, developing aquaculture models using the bio-recycle system to reduce and minimize the inorganic and organic waste from the remaining feed, faeces and the other sources will be useful to maintain sustainable aquaculture in the coastal area.

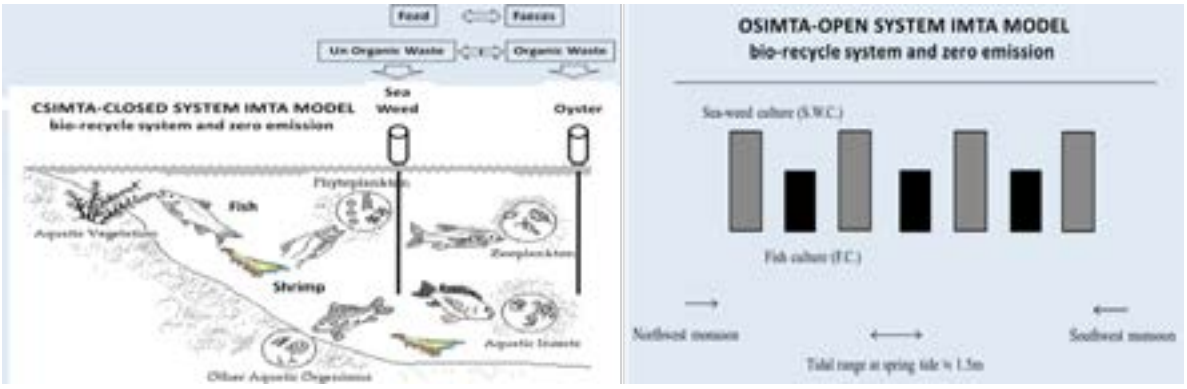


**Figure 1:** Sustainable Integrated Multi Tropic Aquaculture (IMTA) Model of Close and Open System

## Recent Publications

1. Suhendar I Sachoemar, Agung Riyadi and Wage Komarawidjaja (2017) Water productivity and fish abundance variability in the southern coastal area of Kalimantan revealed by satellite data. Jurnal Hidrosfir Indonesia. 13(1):55–60.
2. Ratu Siti Aliah and Suhendar I Sachoemar (2016) Water quality at fish farming area of Hurun Bay, Lampung. Journal Hidrosfir Indonesia 12(3):125–130.
3. Agung Riyadi and Suhendar I Sachoemar (2015) Coastal water productivity variability within Java region revealed by satellite data. Jurnal Teknologi Lingkungan 16(2):65–70.

4. Ratu Siti Aliah and Suhendar I Sachoemar (2015) Evaluation the environmental of Batam mariculture area. Jurnal Hidrosfir Indonesia 11(2):85–90.
5. S I Sachoemar, T Yanagi and R S Aliah (2014) Sustainable aquaculture to improve productivity and water quality of marginal brackish water pond. Journal of Coastal Marine Science 37(1):1–8.

**Biography**

Suhendar I Sachoemar is Professor of Coastal and Fisheries Resources Management at Center of Agriculture Production Technology. Currently, he serves as Director of Center for Development, Education and Training of Agency for the Assessment and Application of Technology (BPPT) in Jakarta, Indonesia. Also, serves as a National Group Leader of Physical Oceanography Group of Japan Society for the Promotion of Science (JSPS), Asian Core Program to establish research and education network on coastal marine science in Southeast Asia and is the Head of Indonesian Research Society of BPPT. His research activities are focused on the assessment of coastal and fisheries resources management using Satellite Oceanography, Field Observation as well as Fisheries Oceanography and Hydro-Oceanography Dynamic study. At the moment, he is doing a research of Sato-Umi concept application for developing sustainable aquaculture model within Indonesian coastal area collaborate with North Pacific Marine Science Organization (PICES). He is also engaged in creating a new strain of fish to support national food security, increasing fisheries productivity of the aquaculture and national fisheries techno park program. He is active in various national and international scientific meeting and dissemination of research result related on the sustainable fisheries resources and coastal management.

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**Notes:**

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# The energy-water-health nexus under climate change in the United Arab Emirates—impacts and implications

**William W Dougherty**
Climate Change Research Group, USA

Climate change poses serious energy, water and health challenges for the United Arab Emirates (UAE). While closely interconnected, the development of sustainable energy, water and health policies has typically been viewed as independent, sector-specific planning challenges. However, changing demographics, a rapidly growing economy, increasing reliance on desalination, and worsening air quality—all taking place as climate change unfolds— suggest a need for a more integrated approach to risk management. Accounting for the interactions between an "energy-water-health nexus" is one way to ensure that development strategies are considered within a framework that addresses the range of potential tradeoffs, risks, and synergies. To address the energy-water-health nexus under a changing climate, research activities were undertaken as part of the Local, National, and Regional, Climate Change Programme (LNRCCP) of the Abu Dhabi Global Environmental Data Initiative (AGEDI). Climate change modeling at the regional spatial scale (Arabian Peninsula; Arabian Gulf) was first carried out to establish the atmospheric and marine physical conditions that will underlie energy, water, and health challenges in the future. The results of this modeling were then used as inputs to an analysis of policies that aim to account for the linkages across the energy-water nexus in one hand and the energy-health nexus on the other. The results show that climate change will render an extreme hyper-arid climate even more so, while the waters of the Arabian Gulf will experience heightened salinity, changing circulation patterns, and higher temperatures under intensifying desalination activities. The analysis of the energy-water nexus shows that a range of water/energy efficiency and renewable energy measures can lead to significant reductions in energy use and annual greenhouse gas emissions, while coming at negative societal cost. The analysis of the energy-health nexus shows that the gradual introduction of energy efficiency and renewable energy measures can lead to substantial decreases in premature mortality and health care facility visits in urban areas.

## Recent Publications

1. Schile L, Kauffman J, Crooks S, Fourqurean J, Campbell J, et al. (2018) Limits on carbon sequestration in arid blue carbon ecosystems. Ecological Applications 27(3): 859–874.
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3. Haidera M, Alhakimi S, Noaman A, Al Kebsi A, Noaman A, et al. (2011) Adapting to climate change-water scarcity for Yemen's vulnerable communities. Local Environment 16(5):473–488.
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## Biography

William W Dougherty has worked over the past 20 years on a wide variety of climate change related issues, with an emphasis on greenhouse gas mitigation and adaptation to climate change. He has assisted governments in the development of national GHG mitigation and adaptation strategies, led vulnerability assessments, formulated project documents, analyzed energy efficiency and renewable energy options for achieving emission reductions, and contributed to the development of methodological approaches, training programs and software tools that are used throughout the world. He has been invited as a Speaker or Expert Participant in meetings of the World Bank, United Nations Department of Economic and Social Affairs, the United Nations Development Programme, the African Development Bank, the World Future Energy Summit, and the United Nations Environment Programme. He has worked throughout North Africa, Sub-Saharan Africa, and the Middle East in support of national government agencies, multi-lateral organizations, and development banks. He has authored or co-authored over 100 research reports.

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## Steady shrinking of the Dead Sea as a result of climate change in the Eastern Mediterranean

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**Statement of the Problem:** The coastal area of the hypersaline terminal lake of the Dead Sea is a unique area of dry land of the lowest elevation on Earth (-420 m a.s.l.). The Dead Sea has been drying up over the last four decades: the water level has dropped at the rate of approximately 1 m year. The Dead Sea drying up is due to climate change in the Eastern Mediterranean, which is expressed by the lack of water inflow from the Jordan river, a decreasing tendency in rainfall over the last 40 years and increasing evaporation. Climate change in the Eastern Mediterranean is accompanied by a positive feedback loop between the shrinking of the Dead Sea and the increasing trend in Dead Sea surface temperature (SST) of 0.6°C per decade. This causes increasing evaporation and the continuing disappearance of the Dead Sea.

**Methodology & Theoretical Orientation:** To estimate the effect of climate change in the Eastern Mediterranean on the Dead Sea, we analyzed yearly data of Dead Sea water levels based on available measurements from 1992 until the present. Several factors could influence the observed Dead Sea water level drop, such as long-term changes in evaporation, in SST, in solar radiation and in near-surface wind. To estimate long-term trends in SST, satellite MODIS data were used.

**Conclusion & Significance:** We found that there is a positive feedback loop between Dead Sea shrinking and increasing SST. Additional heating of Dead Sea surface water (as a result of Dead Sea shrinking) is leading to an increase in water evaporation, consequently, to some additional decrease in Dead Sea water levels, eventually to subsequent shrinking of the Dead Sea water area. This positive feedback loop leads to acceleration in the Dead Sea water level drop causing a continuing hazard to this hypersaline lake.

### Recent Publications

1. Kishcha P, Pinker R, Gertman I, Starobinets B and Alpert P (2018) Observations of positive sea surface temperature trends in the steadily shrinking Dead Sea. Natural Hazards and Earth System Sciences Discussion 2018:1–15.
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### Biography

Pavel Kishcha graduated from Lomonosov Moscow State University in 1979 with an MSc in Physics, and received PhD in Geophysics from the Institute of Terrestrial Magnetism, Ionosphere and Radio Wave Propagation (IZMIRAN), Russian Academy of Sciences, Moscow, in 1985. Currently, he is a Senior Research Scientist at the Porter School of Environment and Earth Sciences of Tel-Aviv University (TAU). His research interests include investigation of heating in the uppermost layer of the Dead Sea and long-term trends in Dead Sea surface temperature based on satellite measurements; aerosol physics and aerosol numerical modeling in the atmosphere; aerosol spatial distributions and trends based on satellite and ground-based aerosol measurements. He has been producing daily operational numerical predictions of desert dust storms over the Sahara desert and adjacent regions since 2006. He is the Author of over 50 peer-reviewed publications.

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