حكومة رأس الخيمة
Government of Ras Al Khaimah

هيئة حماية البيئة والتنمية
Environment Protection & Development Authority

GLOBAL WARMING | ECOSYSTEM PRODUCTIVITY

4th International Conference
Ras Al Khaimah - UAE
3rd - 5th April 2017

CONFERENCE PROCEEDINGS

RAK ROCK

SR STEVIN ROCK

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Message

It is a pleasure that the Environment Protection and Development Authority-Ras Al Khaimah (EPDA-RAK) is organizing **the 4th International Conference on Global Warming: Ecosystem Productivity"** during April 3-5, 2017 in Ras Al Khaimah, United Arab Emirates.

Global warming is the most important environmental challenge facing humanity with adverse implications for ecosystem, natural resources, food production and health. Environment protection and development is an important factor for sustainable socio-economic growth. This goal can be achieved by adopting a multidirectional approach of encouraging and supporting the use of technological, educational, social and policy options at the global level.

I hope the deliberations of this conference would contribute to the understanding and advancement of the knowledge about the environmental and socio-economic impacts of global warming and their mitigation/adaptation measures.

Best wishes for the success of the conference.

H.H. Sheikh Saud Bin Saqr Al Qasimi
Member of Supreme Council of UAE and Ruler of Ras Al Khaimah

Message

It is a matter of immense pleasure that the Environment Protection and Development Authority-Ras Al Khaimah (EPDA-RAK) is organizing the **4th International Conference on Global Warming: Ecosystem Productivity"** during April 3-5, 2017 in Ras Al Khaimah, United Arab Emirates, under the patronage of **His Highness Sheikh Saud Bin Saqr Al Qasimi, Supreme Council Member of the UAE and Ruler of Ras Al Khaimah**.

Climate change resulting from global warming is causing serious environmental crises affecting the ecosystem and its productivity. Projected harmful impacts of climate change are loss of natural resources and biodiversity, environmental degradation, food insecurity, spread of diseases, sea level rise and submerged coastal habitat. To develop and implement the impacts mitigation and adaptation programmes, there is a need for international partnership in research and study of climate science, impacts and their preventive measures.

I hope this conference will provide an opportunity for regional and international participants to discuss and share their knowledge on the environmental and socio-economic issues of climate change and their solutions needed for our well-being and security.

I welcome all the delegates and participants to this conference and extend my greetings and thankfulness for making it successful.

H.H. Sheikh Mohammed Bin Saud Bin Saqr Al Qasimi

Crown Prince of Ras Al Khaimah and Chairman of EPDA-RAK

Message

The International Conference on Global Warming highlights the dedication of the UAE to reducing the impact of climate change on the local and global scale through active participation in international efforts to find innovative and sustainable solutions to this issue. Organized by the Environment Protection and Development Authority of Ras Al Khaimah since 2011, this key event that focuses on the impact of climate change on ecosystem productivity is of extreme importance to our country.

Our ecosystems face a variety of challenges due to population growth, economic development and changes in land use. The phenomenon of climate change and its manifestations in the form of extreme weather increase the pressure on the ecosystems of the country and the wider region. This prompts us to step up our efforts to enhance the resilience and adaptability of our ecosystems based on facts and scientific evidence and in line with the latest technological developments and best practices.

Our commitment to addressing climate change is deeply rooted in the UAE Vision 2021, and is today a central objective of all our economic, social and environmental policies and strategies at the federal and local levels. We are confident that, as with the previous editions, the discussions and outcomes of this conference will constitute a valuable contribution to our national efforts to reinforce our ecosystems and support the United Nations' sustainable development goals.

In closing, I must emphasize the crucial role our strategic partner, the Environment Protection and Development Authority of Ras Al Khaimah, plays in advancing the journey towards sustainability in the UAE to ensure a happier future for us and generations to come.

His Excellency Dr Thani bin Ahmed Al Zeyoudi

Minister of Climate Change and Environment

Message

It is a matter of pleasure and privilege that after the success of 1st, 2nd and 3rd International Conferences on "Global Warming" in the years 2011, 2013 and 2015, respectively, the Environment Protection and Development Authority-Ras Al Khaimah (EPDA-RAK) is organizing the **4th International Conference on Global Warming: Ecosystem Productivity**" during April 3-5, 2017 in Ras Al Khaimah, United Arab Emirates, under the patronage of **His Highness Sheikh Saud Bin Saqr Al Qasimi, Supreme Council Member of the UAE and Ruler of Ras Al Khaimah.**

Climate change caused by global warming has the potential to adversely impact natural ecosystem productivity and threaten all forms of life on earth. It is likely to increase fresh water scarcity and drought, heavy rainfall and flooding, threat to forests and biodiversity, decrease food production and cause health and disease problems. The impacts of Global Warming are further magnified when coupled with other anthropogenic factors like population growth and environmental pollution. The harmful impacts on marine ecosystem include sea level rise, eutrophication, toxic algal bloom and declining fish stock.

The conference will provide a forum for local and overseas experts and scholars to meet, discuss and share their research findings and the latest advancements in the understanding of the impacts of global warming on ecosystem productivity and their solutions.

I, on behalf of EPDA-RAK, welcome the distinguished delegates and eminent invitees, and express my gratefulness to them for making this conference successful.

I wish to express my heartfelt gratitude to His Highness for his patronage and support. I am grateful to H.H. Sheikh Mohammed Bin Saud Bin Saqr Al Qasimi for valuable guidance and encouragement.

Lastly, I acknowledge with appreciation the cooperation and support received from my office colleagues in organizing this conference.

Dr. Saif Mohamed Al Ghais
Executive Director
EPDA-RAK

ENVIRONMENT PROTECTION AND DEVELOPMENT AUTHORITY (EPDA)

Ras Al Khaimah's Environment Protection and Development Authority (EPDA) was formerly known as the Environment Protection and Industrial Development Commission (EPIDC), originally established in 1999. In March 2007, EPIDC was restructured and renamed through Local Emiri Law No (2) of 2007.

EPDA is Ras Al Khaimah's nominated body (Competent Authority) responsible for implementing Federal Law No. 24 of 1999 for the Protection and Development of the Environment in collaboration with the UAE's Federal Environment Agency, Ministry of Environment and Water and other concerned parties and stakeholders at international, federal and local level.

EPDA MAIN OBJECTIVES ARE:

1. Protect and develop the environment of Ras Al Khaimah, from the negative impacts of activities that may cause damages to human health, agricultural crops, wildlife, marine life, other natural resources and climate by implementing necessary policies, plans and actions.

2. Promote the sustainable development of the Emirate and propose the necessary regulations to link environmental concerns to the planning and development policy of the entire Emirate, by coordinating between the Authority and different private and governmental organizations.

IMPORTANT RESPONSIBILITIES OF EPDA ARE:

1. Conduct scientific studies and researches related to natural resources, pollution, human settlement, industrial and economic development.
2. Suggest and offer projects, technical solutions, recommendations and contingency plans to issues related to environment for all the sectors of the Emirate. Prepare laws, rules, regulations, systems and procedures. As well as in force and execute federal and local environment rules.
3. Inspect and evaluate industrial, agriculture, economic developmental projects that have direct and indirect effect o the environment.
4. Establish a benchmark laboratory in the emirate for the purpose of scientific research & technologies.
5. Work in cooperation and coordination with official and non official organizations and institutions inside and outside the country.

4th International Conference
Global Warming: Ecosystem Productivity
April 3 – 5, 2017

Organized by:	**Environment Protection & Development Authority- Ras Al Khaimah**
Venue:	**Al Hamra Convention Center, Ras Al Khaimah, UAE**

Sunday April 2, 2017

19:00	Welcome Reception and Get-together

Day 1, Monday April 3, 2017

09:00 - 10:45 — Inaugural Session

08:30 - 09:45	Registration
09:45 - 09:50	Recitation from the Holy Quran
09:50 - 10:00	Local Cultural Performance
10:00 - 10:10	**Welcome Speech** Dr. Saif M. Al Ghais, Executive Director, EPDA, UAE.
10:10 - 10:20	**Inaugural Address** H.E Dr. Thani Al Zeyoudi Minister , Climate Change & Environment, UAE.

COFFEE BREAK
10:20 - 10:45

Session I: 10:45 - 13:05 — Natural resources

Chairman	**Dr. Joanne DeMark** Western Washington University, USA.
10:45 - 11:15	**KEYNOTE** **Effects of huge earthquake and tsunami on marine environments and subsequent recovery processes** **Dr. Kazuhiro Kogure**, Atmosphere & Ocean Research Institute, University of Tokyo, Japan.
11:15 - 11:35	**Climate change and biodiversity in Africa and MENA Region** **Dr. Moustafa Fouda**, Minister Advisor on Biodiversity, Cairo, Egypt.
11:35 - 11:55	**Global warming and its impact on plant diversity in Arabian Peninsula Saudi Arabia** **Dr. Ahmed H. Alfarhan**, Dept. of Botany& Microbiology, College of Science; King Saud University, Riyadh, KSA.
11:55 - 12:15	**Groundwater management under climate change in UAE** **Dr. Mohamed Mostafa Mohamed,** Department of Civil & Environmental Engineering, UAE University, UAE.
12:15 - 12:35	**Species number of vascular plants in Arabian Peninsula and climate change** **Dr. Sergey Venevsky,** Department for Earth System Science, Tsinghua University, Haidan, Beijing, China.

12:35 - 12:55	**Preliminary geoenvironmental investigations of Zakher Lake and its probable threat on the nearby district, Al Ain, United Arab Emirates** **Dr. Sabir Hussein,** Geology Department, UAE University, UAE.
12:55 - 13:05	**Discussion**

PRAYER & LUNCH BREAK
13:05 - 14:00

Session I: 14:00 - 16:10	**Agriculture and Food**
Chairman	**Dr. Ahmed H. Alfarhan** Dept of Botany & Microbiology, College of Science; King Saud University,Riyadh, KSA.
14:00 - 14:20	**Foraging behavior and migration of Socotra Cormorants in the eastern Arabian Gulf: indicators of high marine productivity and implications for conservation** **Dr. Sabir Bin Muzaffar,** Department of Biology, UAE University, UAE.
14:20 - 14:40	**Impacts of global warming on groundwater and food productivity- Case study of Punjab Pakistan** **Ghulam Zakir Hassan**, Irrigation Research Institute, Government of the Punjab, Pakistan.
14:40 - 15:00	**Ecosystem productivity and transformative change: Rethinking system leverage points.** **Dr. Joanne DeMark**, Western Washington University, USA.

COFFEE BREAK
15:00 - 15:10

15:10 - 15:30	**Impact of global warming on fisheries and aquaculture-technological innovations and advancements for mitigation impact due to fishing and aquaculture on global warming with special reference to climate resilient aquaculture.** **Dr. Madhusoodan Kurup,** Vice Chancellor, Shri Venkateshwara University,Uttrapradesh, India.
15:30 - 15:50	**Environmental factors and water microbial safety: Pathogens of concern, antimicrobial resistance and potential biocontrol strategy (Georgian study)** **Dr. Marina Tediashvili,** Head , Laboratory of Microbial Ecology, G. Eliava Institute of Bacteriophages, Microbiology & Virology, Tbilisi, Georgia.
15.50 - 16:00	**Discussion**

End of 1st Day Program

Day 2, Tuesday April 4, 2017	
08:00 - 09:00	Registration
Session II: 09:00 - 09:30	**Technological advances & Impact mitigation**
Chairman	**Dr. Moustafa Fouda**, Minister Advisor on Biodiversity, Cairo, Egypt.
09:00 - 09:30	**KEYNOTE** **Nanotechnology for sustainable global future** **Dr. Meyya Meyyappan**, Chief Scentisit, NASA Ames Research Center, USA.
09:30 - 09:50	**Biointegrity: The link between sustainability and ethical decision-making.** **Dr. Craig Dunn,** College of Business & Economics, Western Washington University, USA.
09:50 - 10:10	**Investigating the source of thermal anomalies in the northern United Arab Emirates (UAE) desert using geophysical methods.** **Dr. Khalid Al Bloushi,** Geology Department, UAE University, UAE.
10:10 - 10:30	**The role of husk in controlling seed dormancy and germination requirements of the genetic model brachypodium distachyon in the UAE.** **Dr. Ali El Keblawy**, Dept. of Applied Biology, College of Science, University of Sharjah, UAE.
10:30 - 10:50	**Microbial production of alkanes as drop in transportation fuels.** **Tabinda Shakeel**, International Centre for Genetic Engineering & Biotechnology, India**.**
10:50 - 11:05	**Sustaining logistics using information technology** **Haya Ahmed Alshalan**, Zayed University, Dubai, UAE.
11:05 - 11:15	**Discussion**
COFFEE BREAK 11:15 - 11:30	

Session III: 11:30 - 13:05	**Adaptation and Management**
Chairman	**Dr. Anwar Huq,** Department of Cell Biology & Molecular Genetics, University of Maryland, USA.
11:30 - 12:00	**KEYNOTE** **Climate change affects salmon throughout its life stage** **Dr. Bradly Smith**, Chair, Washington State Fish & Wildlife Commission, USA.
12:00 - 12:20	**Achieving costal sustainability: Policy options for the adaption of global climate changes in the Ropme sea area (RSA)** **Dr. Amr El-Sammak,** Professor of Marine Geology, Oceanography Department, Faculty of Science, Alexandria University, Egypt.
12:20 - 12:40	**Sea turtle sex ratios of turtles in a climate challenged environment, and what these might tell us** **Dr. Nicolas Pilcher,** Executive Director, Marine Research Foundation, Sabah, Malaysia.
12:40 - 12:55	**How vulnerable are hot regions when temperatures rise?** **Dr. David L. Thomson,** Department of Biology, College of Science, UAE University, UAE.
12:55 - 13:05	**Discussion**
PRAYER &LUNCH BREAK 13:05 - 13:30	

13:30 – 15:00	**Poster Session**
13:30 - 15:00	**Posters**
16:00 - 23:00	**Sightseeing- Dubai upon Reservation**
	End of 2nd Day Program

Day 3, Wednesday April 5, 2017	
08:00 - 09:00	Registration
Session IV: 09:00 - 12:05	**Ecosystem Resilience & Health and Diseases**
Chairman	**Dr. Amr El-Sammak,** Professor of Marine Geology, Oceanography Department, Alexandria University, Egypt.
09:00 - 09: 30	**KEYNOTE** **How human energy uses have influenced on climate and global change** **Dr. Joan O. Grimalt,** Professor, Institute of Environmental Assessment & Water Research, Barcelona, Spain.
09:30 - 09:50	**Climatic variability and dengue diseases dynamics in Bangladesh: Vector larval indices and risk for epidemics in Dhaka** **Dr. Giasuddin Ahsan,** School of Health & Life Sciences, North South University, Dhaka, Bangladesh.
09:50 - 10:10	**Proposing a resilient network of MPAs in Gulf waters of the UAE** **Daniel Mateos-Molina**, Emirates Wildlife Society - WWF, Abu Dhabi,UAE.
10:10 - 10:30	**Eye in the sky: Natural disasters and human health** **Dr. Antar Jutla,** Department of Civil & Environmental Engineering, West Virginia University, Morgantown, WV, USA.
10:30 - 10:50	**UAE climate change risks & resilience: A summary of risks to key sectors** **Nadia Rouchdy**, Emirates Wildlife Society- WWF ,Abu Dhabi , UAE.
	COFFEE BREAK 10:50 – 11:00
11:00 - 11:20	**Awareness of higher education institutes' students (University of Sharjah, UAE) about global warming and climate change** **Ismail M.K. Saadoun**, Department of Applied Biology, College of Sciences, University of Sharjah, UAE.
11:20 - 11:40	**Effects of maternal salinity on salinity and light requirements during germination of: Salsola drummondii a facultative halophyte of the Arabian deserts** **Attiat Elnaggar**, University of Sharjah, College of Science, Dept. Applied Biology, Sharjah, UAE.
11:40 - 11:55	**Risk assessment of heavy metals in bottom sediments in Ras Al Khaimah coastal area, United Arab Emirates.** **Mohammed Qadri,** Geology Department, College of Science, UAE University, UAE.
11:55 - 12:05	**Discussion**
	CLOSING SESSION 12:05 – 13:00
	PRAYER & LUNCH BREAK 13:00 - 14:30
	End of 3rd Day Program

About the Minister

His Excellency Dr. Thani Ahmed Al Zeyoudi was appointed as the Minister of Climate Change and Environment for the United Arab Emirates in February 2016. H.E. Dr. Al Zeyoudi is also the UAE Permanent Representative to the International Renewable Energy Agency (IRENA), and was the Director of the Department of Energy and Climate Change (DECC) within the Ministry of Foreign Affairs.

H.E. Dr. Al Zeyoudi first began his career as a reservoir engineer at the Abu Dhabi Marine Oil Company and then moved to Masdar, where we worked on advancing renewable energy technologies and solutions. H.E. Dr. Al Zeyoudi played a major role in the UAE's successful campaign in 2009 in host IRENA, the first international organization dedicated to renewable energy.

In 2015, Dr. Al Zeyoudi was awarded the first Gulf Cooperation Council Prize for Excellence in recognition of his pioneering efforts in renewable energy. He is a member of several committees, including the Emirates Green Development Council, as well as Audit and Selection Committees of Zayed Future Energy Prize.

H. E. Dr. Al Zeyoudi holds a Bachelor's degree in Petroleum Engineering from the Tulsa University, an MBA from the New York Institute of Technology, MSc in Project Management from the British University in Dubai, and a PhD in Strategy, Programme & Project Management from SKEMA Business School in France, for which he received the Sheikh Rashid Award for Scientific Excellence for holders of doctorate degrees.

Keynotes

KEYNOTE

Dr. Bradley Smith

Chairman of Washington State Fish & Wildlife Commission
Washington, USA

bradley.smith@wwu.edu

Bradley Smith is the Chairman of the Washington State Fish and Wildlife Commission. He is the Dean emeritus of Huxley College of the Environment at Western Washington University.

Before assuming the dean position Brad served in the Administrators office of the USEPA during the Bush and Clinton administrations serving as the first director of The Office of Environmental Education and as the acting Associate Administrator of the USEPA.

Brad has been a Fulbright Scholar. NATO Fellow and is a Fellow of the Royal Institute of Environmental Science. He currently serves on the North Pacific Research Board. He earned his Ph.D from the University of Michigan.

KEYNOTE

Dr. Meyya Meyyappan

Chief Scientist
NASA Ames Research Center
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Meyya Meyyappan is Chief Scientist for Exploration Technology at NASA Ames Research Center in Moffett Field, CA. Until June 2006, he served as the Director of the Center for Nanotechnology. He is a founding member of the Interagency Working Group on Nanotechnology (IWGN) established by the Office of Science and Technology Policy (OSTP). The IWGN is responsible for putting together the National Nanotechnology Initiative.

Dr. Meyyappan has authored or co-authored over 340 articles in peer-reviewed journals and made over 250 Invited/Keynote/Plenary Talks in nanotechnology subjects across the world and over 200 seminars at universities. His research interests include carbon nanotubes, graphene, and various inorganic nanowires, their growth and characterization, and application development in chemical and biosensors, instrumentation, electronics and optoelectronics.

Dr. Meyyappan is a Fellow of the Institute of Electrical and Electronics Engineers (IEEE), Electrochemical Society (ECS), American Vacuum Society (AVS), Materials Research Society (MRS), Institute of Physics (IOP), American Institute of Chemical Engineers (AIChE), American Institute of Mechanical Engineers (ASME), National Academy of Inventors, and the California Council of Science and Technology. He is currently the IEEE Electron Devices Society (EDS) Distinguished Lecturer, and was the Distinguished Lecturer on Nanotechnology for both the IEEE Nanotechnology Council and ASME.

For his contributions and leadership in nanotechnology, he has received numerous awards including: a Presidential Meritorious Award; NASA's Outstanding Leadership Medal; Arthur Flemming Award given by the Arthur Flemming Foundation and the George Washington University; IEEE Judith Resnick Award; IEEE-USA Harry Diamond Award; AIChE Nanoscale Science and Engineering Forum Award; Distinguished Engineering Achievement Award by the Engineers' Council; Pioneer Award in Nanotechnology by the IEEE-NTC; Sir Monty Finniston Award by the Institution of Engineering and Technology (UK); Outstanding Engineering Achievement Merit Award by the Engineers' Council; IEEE-USA Professional Achievement Award; AVS Nanotechnology Recognition Award; IEEE Nuclear and Plasma Sciences Society Merit Award. For his sustained contributions to nanotechnology, he was inducted into the Silicon Valley Engineering Council Hall of Fame in 2009. He received an Honorary Doctorate in 2015 from the University of Witwatersrand, Johannesburg, South Africa for His scientific contributions.

For his educational contributions, he has received: Outstanding Recognition Award from the NASA Office of Education; the Engineer of the Year Award (2004) by the San Francisco Section of the American Institute of Aeronautics and Astronautics (AIAA); IEEE-EDS Education Award; IEEE-EAB (Educational Activities Board) Meritorious Achievement Award in Continuing Education.

KEYNOTE

Prof. Kazuhiro Kogure
University of Tokyo
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Prof. Kazuhiro Kogure graduated from the University of Tokyo in 1975 and joined Ocean Research Institute, the University of Tokyo (ORI UT) for his masters and Ph. D. courses in marine microbiology. He obtained Ph. D. in 1980 and continued his research in ORI UT as a post doctoral fellow. In 1982, he moved the Prof. Rita R. Colwell's laboratory, the University of Maryland, USA, where he spent one year as a post doctoral fellow. He returned to Division of Marine Microbiology, ORI UT in 1983 as an assistant professor. He was then promoted as an associate professor in 1993, and as professor in 2002. After consolidation with Center for Climate System Research, the University of Tokyo, ORI UT became as Atmosphere and Ocean Research Institute (AORI UT) in 2010. Since then, he has been in Center for Earth Surface System Dynamics in AORI UT. He has been the director of the center since 2015. He has also been an visiting professor at Ocean University of China since 2015.

Dr. Kogure is a marine microbial ecologist. His recent interests are, first biomass, community structure and function of marine microorganisms. He has accomplished research in the coastal and off-shore environments in the northwest Pacific, Second interest is research on proteorhodopsin, which is light-driven proton pump distributing widely among surface dwelling prokaryotic organisms. His group found new types of rhodopsins that function as sodium pump and chloride pump. Third, after Great East Japan Earthquake (GEJE) that hit northern part of Japan on March 11, 2011, he initiated project, called "Tohoku Ecosystem-Associated Marine Sciences" (TEAMS). He has been a leader of approximately 200 scientists in the fields of physics, chemistry, biology and modelling.

KEYNOTE

Prof. Joan O. Grimalt
Professor, Institute of Environmental Assessment and Water Research
Barcelona, Spain
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Joan O. Grimalt is Research Professor of the Spanish Council for Scientific Research (CSIC). Director of the Institute of Environmental Assessment and Water Research (IDAEA) in Barcelona and of the Center for Research and Development (CID) also in Barcelona. Chemist and Chemical engineer. He is also board member of the International Panel on Chemical Pollution (IPCP).

Environmental Organic Geochemist. His scientific career has been devoted to the study of natural and anthropogenic compounds as markers of natural evolution, climate change and of the health status of ecosystems and organisms (including humans). This approach has not been restricted to a specific topic. He has made contributions to different fields such as paleoceanography, marine biogeochemistry, atmospheric processes, high mountain research and effects of organic pollutants in organisms, including humans. To date he has published more than 650 papers on these topics that have received about 18000 citations (H index = 68). He has supervised 45 PhD Thesis to completion which obtained the top qualifications.

He discovered the first intercontinental transfer of pollutants between North America and Europe, involving the transport of polybromodiphenyl ethers (Atmos. Chem. Phys. 14, 4441, 2014). The accumulation of these compounds in Andean mountains was also described for the first time (Environ. Sci. Technol. 38, 5386, 2005).

Paleoceanography. He pioneered the use of C37 alkenones for the description of sea surface temperatures during abrupt climate changes in the last 500 000 years (Science 306, 1762, 2004; 317, 502-507, 2007; Quat, Sci. Rev. 99, 122-134, 2014). These studies allowed to identifying abrupt cold and warm transitions showing that warm events are sometimes stronger than the abrupt cooling periods. He observed that these SST

transitions could be directly related to the strength of the Atlantic meridional overturning circulation during the last glacial period (Nature Geosciences 6, 208, 2013).

He also pioneered the development of paleomarkers of wind intensity (Paleoceanography 21, PA4215, 2006) and changes in deep sea flow strength (Earth Planet. Sci. Let. 183, 417, 2000; Science 317, 502-507, 2007).

Oceanography. He identified the role of dense shelf water cascading through submarine canyons in the transfer of organohalogen compounds to open marine waters (Environ. Sci. Technol. 46, 2624, 2012; Progr. Oceanogr. 118, 235, 2013). This transport mode was observed to be much more efficient than the regular sedimentation processes for the transfer of these compounds to the sedimentary environment. He also pioneered the identification of the transformation of polybromodiphenyl ethers upon transport in association with the marine sediments (Env. Poll. 168, 87, 2012).

Human Toxicicity. He pioneered the identification of lactation as key process for the incorporation of polybromodiphenyl ethers into children in the first years of live (Environ. Sci. Technol. 41, 4097, 2007; Env. Int. 37, 152, 2011). He also identified for the first time the prenatal exposure of children to polychlorostyrenes (J. Chromatogr. A 1216, 5045, 2009). He found an inverse correlation between age and venous concentrations of polybromodiphenyl ethers in general population (Env. Int. 65, 107, 2014). He also identified what are the transformation processes of organohalogen compounds in the transfer from mother to fetus (Env. Int. 65, 107, 2014). He identified for the first time that mothers not gaining weight during pregnancy as indicated in the recommendations of the Institute of Medicine transfer a higher burden of organohalogen compounds to their newborns (Env. Health. Perspect. 122, 873, 2014).

ABSTRACTS

Climate change affects salmon throughout its life stage

Dr. Bradley Smith

Chair, Washington State Fish & Wildlife Commission, USA.

ABSTRACT

Climate change affects salmon throughout its life stages. Historically, warm periods in the coastal ocean of Washington state have coincided with relatively low abundances of salmon, while cooler ocean periods have coincided with relatively high salmon numbers.

Salmon productivity in the Pacific Northwest is clearly sensitive to climate-related changes in stream, estuary, and ocean conditions. In the past century, most Pacific Northwest salmon populations have fared best in periods having high precipitation, deep mountain snowpack, cool air and water temperatures, cool coastal ocean temperatures, and abundant north-t0-south "upwelling" winds in spring and summer. Rising stream temperatures will likely reduce the quality and extant of freshwater salmon habitat. The duration of periods that cause thermal stress and migration barriers to salmon is projected to at least double and perhaps quadruple by the 2080's for the Pacific Northwest. The combined effects of warming stream temperatures and altered stream flows will very likely reduce the reproductive success of many salmon populations in Washington watersheds. Studies suggest that one third of the current habitat for either the endangered or threatened Northwest salmon species will no longer be suitable for them by the end of this century as key temperature thresholds are exceeded.

Brad Smith is the Chairman of the Washington State Fish and Wildlife Commission. He is the Dean emeritus of Huxley College of the Environment at Western Washington University. Before assuming the dean position Brad served in the Administrators office of the USEPA during the Bush and Clinton administrations serving as the first director of The Office of Environmental Education and as the acting Associate Administrator of the USEPA. Brad has been a Fulbright Scholar. NATO Fellow and is a Fellow of the Royal Institute of Environmental Science. He currently serves on the North Pacific Research Board. He earned his Ph.D from the University of Michigan.

Nanotechnology for Sustainable Global Future

Meyya Meyyappan
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ABSTRACT

The technology of the small has been advancing rapidly across all disciplines in terms of materials, synthesis, devices, systems and architecture. Even commercial products have started becoming available beyond academic research and publications. The promise extends to all economic sectors without exception. In this talk, examples of the impact of nanotechnology will be given in the areas of alternative energy sources and their impact on reducing the dependence on fossil fuels, environmental monitoring and remediation, smart soil and agriculture, food and water quality monitoring and ensuring the safety of these supply chains and related topics.

Effects of huge earthquake and tsunami on marine Environments and subsequent recovery processes

Kazuhiro Kogure
Center for Earth Surface System Dynamics
Atmosphere and Ocean Research Institute, University of Tokyo

ABSTRACT

Marine environments offer us various ecosystem services, such as natural resources, climate stability, transportation, unique cultures, recreation, and so on. Among them, food sources may be the most important one for human beings. A considerable part of marine living organisms spend their whole life or part of their life time in coastal environments. However, coastal environments are vulnerable to various natural or anthropogenic disturbances. One very serious case is an earthquake. On March 11, 2011, huge earthquake (GEJE: Great East Japan Earthquake) and subsequent tsunami hit Tohoku area or northern part of Japan. Because Tohoku area is close to one of the world four major fishing grounds, fishery has been the major industry in the area. In January 2012, we started 10 years project called TEAMS (Tohoku Ecosystem-Associated Marine Sciences (http://www.i-teams.jp/e/index.html). The aim was to conduct long-term research in the area for observing how ecosystem changed or resumed since then by using latest technologies. Recent data showed that the recovery process depends on the ecosystems. For example, pelagic system recovered rather quickly, whereas benthic ecosystems show slow processes. Some environments like seagrass beds were damaged so seriously and virtually disappeared. Some of our monitoring data are sent to fishery people to improve the fishing efficiency. Our scientific knowledge obtained and also activities to local communities will be described and their implication will be discussed.

HOW HUMAN ENERGY USES HAVE INFLUENCED ON CLIMATE AND GLOBAL CHANGE?

Joan O. Grimalt
Institute of Environmental Assessment and Water Research (IDAEA-CSIC).
Barcelona. Catalonia. Spain

ABSTRACT

The technical and economic progress of humans has resulted in a significant CO2 increase in in the atmosphere. In the last 150 years the concentration has risen about 120 parts per million (ppm) due to human activity that is greater than the natural concentration increase associated to the change from ice ages to interglacial periods (90 ppm) . In addition, to the current level (400 ppm) is higher than observed in all ages of the interglacials (280 ppm) and glacials (190 ppm) of the last 800,000 years. The planet is in totally unexpected conditions concerning the natural evolution.

With a probability of 95% the average temperature of the recent years is higher than that observed in the last 2000 years. This increase (currently 0.9ºC) has generated widespread ice melting in the mountains but has also led to ice loss in areas of the northern and southern poles. Due to this continental ice melting and the temperature rise of the water bodies, the sea level has risen in the order of 30 cm in the twentieth century.

However, we are only at the beginning of the process. The International Panel on Climate Change in its latest report in 2007 predicted by the end of the century CO2 levels between 500 and 950 parts per million that will produce additional temperature increases (compared to the 1980-1999 interval) and increases between 1.1ºC and 6.4ºC, and additional sea level increases between 18 and 59 cm.

The interpretation of the climate and environmental consequences of these processes is difficult. One main challenge is passing from general to particular predictions focused in a particular space and time. We will examine what are the main aspects of the climate changes observed to date and will show the sources of information and data supporting the observations. The presentation will be structured around three questions: what is happening? why it is happening? and why it is happening now?

Climate Change and Biodiversity in Africa and MENA Region

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ABSTRACT

Climate change and biodiversity in Africa and MENA region is reviewed. Climate change and its impacts on ecosystem and people will likely to be the biggest threat to biodiversity conservation. It poses serious risks to lives and livelihoods of poor farmers who are the most vulnerable population. Egypt has witnessed the main events that took place on planet earth where geological ages, prehistoric and historic eras as well as the present times are presented. Adaptation and mitigation measures are being undertaken particularly in protected areas in Egypt. Future activities are suggested. In conclusion, the current information and expertise available in Africa and MENA region can contribute to the creation of a regional hub, such as Bibliotheca Alexandrina.

Keywords: climate change, biodiversity, Africa, MENA Region, Protected Areas, Egypt

Global warming and its impact on Plant diversity in Arabian Peninsula -Saudi Arabia

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ABSTRACT

Scientists throughout the world are becoming increasingly concerned over the impact of global warming and its effect on biodiversity. Desertification due to global warming and low precipitation is considered as the main impact which often leads to loss or alternation of plant diversity. The effect of global warming can be seen in several habitats of Arabia where arid lands become more and more dry and hotter. The impacts on plant diversity are reflected in three main areas, such as a change in phytogeographical divisions, a transformation in vegetation zonation and the presence of alien or ruderal plants on vegetation rich areas. Species are extending their distributions from one chorological unit to another or disappearing from the entire unit. Excessive heat may change the normal phenotypic plasticity of plants which force them to change their distribution range and affect the phenological events/life cycles of species. Climate change will also result in the extinctions of several species or forced plants, such as Acacias, to move to higher elevations to the level of *Juniperus* habitats or to other climax vegetation zones. Although the conservationists in Arabia are keen on the protection of plant life through maintaining and restoring native ecosystems, the conservation of flora has received less attention in Arabia than fauna. However, the establishments of protected areas across Arabia and the creation of botanic gardens such as the new initiative like King Abdulla international Botanic Gardens in Riyadh will, hopefully, boost the ongoing initiatives in safeguarding the ailing plant wealth of this part of the world.

Groundwater Management Under Climate Change in UAE

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ABSTRACT

The main conventional source of freshwater in the Emirate of Abu Dhabi is Groundwater. Its share to the total freshwater supply in the Emirate is about 80%. Other unconventional sources of freshwater in the Emirate are desalination plants (17%) and treated wastewater reuse (3%). The current share of groundwater is estimated based on the estimated water demand in the Emirate and available production of the desalination plants. The sustainable yield of a groundwater aquifer, however, depends mainly on how fast this aquifer is replenished. Yet, the continuously increasing demand puts more pressure on this already scarce source and threatens its quality. Quantification of groundwater recharge is, therefore, a prerequisite for efficient and sustainable groundwater resources management; especially in arid regions. Consequently, groundwater recharge from the ephemeral Wadis and subsurface flow from mountainous valley beds play an important role in water management and planning. Although, both surface and groundwater resources in UAE are scarce; the anticipated climate change impacts could make these resources even scarcer. As such, the main aim of this paper is to assess the potential impacts of future climate variability and changes on groundwater recharge in the eastern region of UAE. Outcomes of this study will help to accurately estimate current and future sustainable extraction rates, assess groundwater availability, and identify pathways and velocity of groundwater flow. This will serve as an initial step towards assessing future impacts on water management in the Emirate.

Keywords: Water management, Groundwater recharge, climate change, UAE

Species number of vascular plants in Arabian Peninsula and climate change

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ABSTRACT

A simple approach is suggested to project potential changes in the species number of vascular plants for biodiversity hotspots in Arabian Peninsula. We use the current (recent past) relationship between plant diversity and geographic variation in the climate, as well as elevation range, to project changes in regional species richness (at 100 km x 100 km resolution), concentrating on six climate scenarios for 2020, 2050 and 2080. Hotspots of biodiversity in Arabian Peninsula were sorted by their size and investigated at each time slice. First, we calculated areas where more than 5% of vascular plant species were lost and named this "area with negative changes". Areas where more than 5% were gained we named as "area with positive changes". The areas where more than 20% of species were lost and more than 20% of species were gained were named this "area with large negative changes" and "area with large positive changes" consequently.

The results show a general although moderate increase in vascular plant diversity in Arabian Peninsula.

IMPACTS OF GLOBAL WARMING ON GROUNDWATER AND FOOD PRODUCTIVITY-CASE STUDY OF PUNJAB PAKISTAN

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ABSTRACT

Climatic changes have become globally a challenge due to their impacts on humans, ecosystems and natural resources. Global warming has been identified as the root cause of adverse impacts on water resources like glacial melting, sea level rising, higher evaporation rates, unpredictable precipitation/stream flows which ultimately result in droughts and floods. Economy of Pakistan is agri-based which puts it as the 8th largest food producing country where irrigated agriculture contributes more than 90% of food production. Pakistan is 4th largest user of groundwater after India, USA and China and almost 40-50 irrigation water requirements are met from groundwater due to uncertainties in surface water flows. In Punjab province about 1.2 million tubewells are pumping groundwater which has put the aquifer under stress. Droughts in some areas have increased the frequency of water shortage and led to more pressure on groundwater. While 40% irrigated food grains production is dependent on groundwater. About 3000 observation wells have been installed by the Punjab Irrigation deptt to monitor the groundwater potential. Results have indicated that climatic changes coupled with other factors like cropping intensities, unplanned pumpage, lack of awareness are causing deterioration of aquifer. Some remedial measures have been proposed in the paper.

Key Words: Groundwater, global warming, Punjab, aquifer, Pakistan

Ecosystem Productivity and Transformative Change: Rethinking System Leverage Points

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ABSTRACT

How do we know we are pursuing the right research agendas and the most relevant policies to be exceptionally productive in tackling climate change? What guides us in our decisions? Are we addressing "the root causes of unsustainability" (Abson et. al., 2017)? These are core questions.

Donella Meadows (1999), in her writings and studies on systems thinking, posited that leverage points are those places for intervention in systems, and that leverage points can differ in valence, from weak to strong. Environmental and sustainability studies suggest that often interventions chosen to favorably impact sustainability are the easier, more obvious sites for intervening, but actually afford weaker leverage, versus the opportunities for larger or transformative change. We revisit the categories of leverage described by Meadows (1999), discuss a couple of research examples (Abson et. al, 2017, Nguyen & Bosch, 2013) that illustrate thinking differently about leverage. How will we think where and how to address the bio-system or organizational system where we hope to favorably change? We briefly take time to discuss developing our abilities to intervene in the less obvious, perhaps even counter-intuitive, access points in the systems where we research, teach or work, to add new lenses to see our work.

Impact of global warming on fisheries and aquaculture- Technological innovations and advancements for mitigating impact due to fishing and aquaculture on global warming with special reference to climate resilient aquaculture

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ABSTRACT

The global fisheries and aquaculture supports the livelihoods of nearly 820 million people (12% of the world population), directly or indirectly, providing more than 2.9 billion people of their animal protein needs.Climate change is projected to impact broadly across ecosystems, societies and economies, increasing pressure on all livelihoods and food supplies. Climate change induced temperature variations are bound to have an impact on spatial distribution of species specific aquaculture activities and increase the susceptibility of diseases among farmed organisms. Aquaculture sector would be severely affected for want of quality fish meal due to reduction in fish sources and also the quality of food produced. Fisheries and aquaculture has also been contributing, although in a small scale, to the global warming. This includes clearing nearly 5% of the world's mangrove forest for shrimp farming, increased carbon emission during fishing activities, inefficient energy management in fishing and intensive aquaculture systems, overfishing, pollution etc. The present paper discusses about the various technological innovations and advancements available for mitigating the impact of fishing and aquaculture on global warming with special reference to climate resilient aquaculture. The key for sustainability lies in adopting Ecosystem based Approach to Fisheries and Aquaculture (EAF/EAA) and Climate Smart Aquaculture (CAS). Fishing and aquaculture consume around 2% of the glbal diesel consumption and therefore green fishing and aquaculture technologies need to be popularized for the reduction of energy used in fisheries. Reducing dependency on fish meal by introduction of biotechnologically tailored vegetable protein, improving supplementary feeding,microbial conversion of waste feed in culture system as microbial protein applying Biofloc technology, utilizing available resources as in IMTA, augmenting continuous nutrient supply through bioturbation, utilizing microbes for bioremediation, developing disease resistant broods through marker-assisted gene selection techniques, transgenic manipulations and improved cryopreservation of gametes and embryos are some of the recent developments to adapt to climate issues.Technical innovation will also provide some adaptation options, such as the breeding of saline resistant aquaculture species to confront sea level rise, the development of storm resistant fish farming systems, use of closed circulation systems, resorting to energy efficient fishing through use of high speed gears,optimizing engine capacity,use of solar power for fish handling and preservation on board and use of alternate fuel in fishing vessels can considerably reducing carbon foot print emphasizing on green fishing.

Environmental factors and water microbial safety: pathogens of concern, antimicrobial resistance and potential biocontrol strategy (Georgian study)

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ABSTRACT

Drinking and recreational water safety issues gain great importance for South Caucasus region. The natural processes in the last decade demonstrated the increased possibility of emergence of water borne infections, including the areas non- endemic for a particular pathogen. The occurrence and spread of water-borne infections caused by *Vibrio* and *Aeromonas* , *E.coli* , *Shigella* , *Salmonella*, *Campylobacter* etc is of particular interest for the countries with mild subtropical climate, like Georgia.

Our studies in the Black Sea coastal zone and in several inland reservoirs in Georgia aimed at gaining the knowledge about the natural abundance and diversity of bacterial pathogens, also spread of antibiotic resistance genes, in relation to the changing environment. The studies have shown the seasonally elevated microbial pollution level in studied water bodies. The profiles of microbial communities were changing depending on the sampling time and location, also type of the water reservoir (fresh, brackish or marine). High abundance of a number of autochtonous bacteria, including various *Vibrio* species*, Aeromonas spp.* and Acinetobacter spp, also pseudomonads and bacilli was demonstrated. The strong positive correlation was registered between water temperature and numbers of clinically important *Vibrio* species such as *V. cholerae and V. parahemolyticus.* Epidemic serotypes of *V. cholerae* were detected during the warm seasons in the majority of freshwater and marine sampling stations in Georgia, indicating the possible public health threat.

Detection of AMR determinants in studied water bodies showed presence of resistance genes to aminoglycosides, beta-lactams, quinolones, sulphonamides, tetracyclines and macrolides, majority attributed to intrinsically resistant aquatic bacteria such as *Acinetobacter spp., Aeromonas spp.,* and *Pseudomonas spp.*.The beta-lactam resistance was defined as the most prevalent in water reservoirs. The AMR genes were detected in majority of water bacterial isolates, including *V. cholerae*.

Considering the possibility of further worsening of environmental conditions (elevated temperature, drought, heavy rainfalls etc.) and also enforced anthropogenic impact in the region we may expect triggering of decline in water microbial quality and safety, also related to introduction of non-indigenous microflora. Thus, a timely evaluation of microbial parameters and AMR genes with focus on detection of pathogenic species in recreation and drinking water reservoirs is of special importance. Considering increasing antibiotic resistance among water borne pathogens the search for ecologically safe alternative biocontrol means such as bacteriophages is much sought after.

Biointegrity: The Link between Sustainability and Ethical Decision-making

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ABSTRACT

Biointegrity explores the way(s) in which the complexity and adaptability of natural systems can prove instructive in terms of how humans live an ethically-integrated life—or in short, a life of integrity. Building on the notion of learning from nature, and extending on the concept of biomimicry, we explore in very short order how the logic of systems ecology can assist in crafting a life worth living. With this foundation, the framework for making decisions using an ethical pluralism framework is highlighted, with traditional tenets, such as utilitarianism, virtue, liberty, and principles, to those more recently centered - caring, land ethic and justice. How do we tell good from bad, right from wrong, fair from unfair? We look at the following illustrative examples to clarify: avoiding all appearance of impropriety, putting the collective good over private gain, living one's life with humility, and avoiding self-deception.

Overall, what is a life of integrity and how do we embody this in our science, productivity efforts, educational settings and teaching/learning relationships, in business, and living our lives?

Keywords: Biointegrity, biomimicry, systems ecology, ethical pluralism, complexity

Investigating the source of thermal anomalies in the northern United Arab Emirates (UAE) desert using geophysical methods

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ABSTRACT

We conducted geophysical surveys to investigate the source of thermal anomalies and to delineate any potential water transport pathways from the recharge zones in the Oman Mountains to the location of the temporal thermal anomalies within the desert plain of the United Arab Emirates (UAE). In the visible region of the spectrum of both

ASTER and MODIS satellite images, the desert plain of the UAE appears as a bare sandy surface. However, detailed examination of these images in the thermal bands reveal cooler thermal anomalies within the desert plain following major rainfall events. This anomaly has a cooler surface of approximately 20 ºC lower than the surroundings with a lifespan of several days. It has been hypothesized that moist surfaces, following rainfall events in an arid hot desert could be an indirect indication of locations with groundwater accumulation. Two regional fault zones, Dibba (DFZ) (NE-SW) and Hatta (HFZ)(NWSE) were traced from ASTER satellite images and SRTM (~90 m) elevation data, but it remained unclear whether they extend into the thermal anomaly area.

Audiomagnetotelluric (AMT) and ground magnetic data were acquired to verify the possible extension of these fault zones into the thermal anomaly area. AMT data were acquired along profiles positioned perpendicular to the DFZ and HFZ trends and over a 3-D survey grid covering the anomaly area. The ground magnetic survey delineated the extension of both fault zones into the gravel plains area but not into the anomaly area probably due to the thicker sand cover. 2D AMT apparent resistivity sections show a low resistivity structure coincident with the thermal anomalies that parallel the DFZ trend. A conductive structure over the thermal anomaly area, coincident with the extension of the HFZ, was characterized from AMT 2-D inversions. The results suggest that the DFZ and HFZ extend from the recharge areas in the mountain into the desert plains. The results also suggest that these faults play a vital role in transmitting infiltrated rainwater from the Oman Mountains into the desert plain of the UAE where freshwater accumulates after rainfall events causing the thermal anomalies.

The role of husk in controlling seed dormancy and germination requirements of the genetic model *Brachypodium distachyon* in the UAE

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ABSTRACT

Brachypodium distachyon is a temperate wild grass species that has been used as a genetic model plant and its genome is completely sequenced. It is phylogenetically close to economically important crops, like wheat and barley, and several potential biofuel grasses. This makes it a base for the development of these crops. Fortunately, *B. distachyon* is present in few places in the UAE, but not in any of the other Arab Gulf countries. As this species is facing harsher conditions in the UAE (higher temperature, scarcity of water and shorter day-length during seed development), it could provide the opportunity for defining some stress tolerance genes that could lead to genetically design varieties of wheat that could be cultivated in the Arab Gulf climate. In this study we assessed the role of husk (hull or chaff; a cover that surrounds the grain) on controlling germination and dormancy of *B.* Husked and de-husked seeds were germinated in both light and dark conditions at different temperatures. The result showed that husked seeds germinated significantly greater in light and lower temperatures, compared to dark and higher temperatures. De-husking seeds resulted in almost germination inhibition. Interestingly, husk also enhanced the root and shoot growth of seedlings, compared to its absence. However, treatment of de-husked seeds with different growth regulators resulted in insignificance increase, compared to the control; the exception was nitrate and kinetin. Seeds of *Brachypodium* tolerated up to -0.8 MPa PEG and 200 mM NaCl, indicating that it could be considered as drought tolerant and moderate tolerance to salinity.

Key words: Dormancy, drought tolerance, growth regulators, husk, model plant; salinity tolerance,

Microbial production of alkanes as drop in transportation fuels

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ABSTRACT

Photosynthetic microbes have the ability to out-produce plant-based production platforms, both in terms of efficiency of solar conversion, and usage of available land. The discovery of native pathways for renewable biosynthesis of alkanes from cyanobacteria has paved the way for industrial production of drop-in biofuels employing engineered microorganisms. To identify cyanobacterial species capable of alkane biosynthesis, a diverse group of fresh water and marine cyanobacterial isolates were screened for their ability to produce alkanes and alkenes. A higher prevalence of heptadecane was observed in case of fresh water isolates while marine species predominantly produced pentadecane. Culturing these strains under different media conditions showed no obvious impact on alkane chain length indicating that hydrocarbon chain length was not influenced by growth environment but was rather an inherent property of these strains. Analysis of fatty acid content of these cells revealed the presence of a higher percentage of C16 chain length fatty acids in marine strains while a higher proportion of C18 fatty acids was observed in fresh water strains which correlated with the chain lengths of alkanes produced in marine and fresh water strains, suggesting the partial involvement of fatty acid biosynthesis pathway leading to this heterogeneity. The phylogenetic characterization of these strains indicated a close association between alkane chain length and the cyanobacterial habitat. These findings can be employed for chain specific hydrocarbon production to suit different fuel needs. The improvement in the level of alkane production by engineering these enzymes in other host platforms needs to be explored further.

Keywords: Alkanes, cyanobacteria

Sustaining Logistics Using Information Technology

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ABSTRACT

Green information technologies represent a method of greening many sectors such as manufacturing, economy, and entire organizations in terms of performances, processes, and practices. Yet, logistics stands remarkably among those sectors by highly contributing to the gross domestic product (GDP) of countries. This paper aims at providing a critical review of various case studies of sustainable logistics and the role of IT in it, but with a high focus on the return of IT from greening logistics. The purpose of this review is to 1) relate information technology to greening and sustaining logistics, and 2) to address key economic and environmental impacts of information technology in greening logistics.

Keywords: Green, logistics, environmental impact.

ACHIEVING COASTAL SUSTAINABILITY: POLICY OPTIONS FOR THE ADAPATION OF GLOBAL CLIMATE CHANGES IN THE ROPME SEA AREA (RSA).

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ABSTRACT

Coastal Zones are the link between land and sea and are unique area, having divers in species, habitats and ecosystems. They are environmentally sensitive and economically valuable. RSA is faced with major environmental challenges. Among these challenges are the conservation and sustainable use of marine and coastal resources. Large tracts of the coastal area are prone to sea-level rise which threatens large areas with inundation and seawater intrusion. The drivers of environmental changes in the region are linked to mainly to the demography and status of economy which affect many aspects of environment and human wellbeing. The coastal and marine environments in RSA are facing common types of threats due to the pressures resulting from the implementation of national development plans, including urbanization of coastal zones, tourism, land-use and reclamation, maritime and oil traffic, rapid industrialization and overfishing. Among the issues and challenges for RSA are depletion of living resources, integrated coastal zone management, management of marine protected areas, coastal zone degradation, marine pollution and gaps in information and knowledge. Since the main economic activities and population centers are in the coastal zone, thus, sea level rise is a real risk in the form of coastal region inundation and increasing the salinity of aquifers and soil. UAE, Bahrain, Qatar and Kuwait are the countries with high vulnerability to sea level rise risk.

The suggested policies cluster around integration of management tools in order to achieve the Sustainable Development Goals (SDG) stated and approved during the COP21 and COP22. RSA countries should confirm their commitments to SDG through continued support of integrated management of the coastal and marine environment. To this end, policy implementation tools such as strategic social and environmental impact assessment shall be considered during projects planning. Lost or degraded marine and coastal environment can be offset by establishing engineered artificial reefs, which could enhance re-stocking of depleted commercial fish and shellfish. Development and improvement of management systems for marine protected areas and regional networking are essentially important for conservation of biodiversity in the region. Global Climate Change exerts additional impacts on coastal and marine environment of the region. Regional adaptation strategy for climate change should be developed. Significant warming of seawater is due to the input of warm water from seawater desalination activities may cause coral mortality, loss of biodiversity, depletion of fishery, invasion of alien species and other environmental stresses. The region has a very high potential for transferability of several policies to ensure sustainable development of coastal and marine environment in the RSA region.

A conceptual approach and mitigation strategies for coastal planning and management showing the present situation and response options for managing approach was proposed based on the system analysis approach, including the environmental and socio-economic factors. It is concluded that the sustainability scenario is the most recommended scenario for the adaptation and sustainably managing the RSA coastal environment from the consequences of Global Climate Changes.

Sea turtle sex ratios of turtles in a climate challenged environment, and what these might tell us

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ABSTRACT

The Arabian/Persian Gulf is home to sea turtles surviving at extreme thermal limits. The combination of living under extreme climatic conditions and increasing anthropogenic impacts potentially undermine their survival prospects. But simultaneously, these climate extremes offer a living laboratory for understanding impacts of global climate change on marine species and allow us to speculate on potential evolutionary adaptations to climate in sea turtles.

Until recently we had no information on sex ratios in the wild or on the dynamics of turtle populations with regard to population structure and sex ratios. Given the environmental and habitat alteration pressures these turtles are subjected to, filling these aspects of turtle biology is critical so that we are best equipped to inform management agencies of targeted conservation needs and options.

We investigated sea turtle stocks in nearshore waters of Qatar and Qeshm, using laparoscopy to ascertain population structure and gender ratios of populations in the wild. We found coastal waters were home to mostly juvenile turtles, and that no adults remained outside of the nesting season. We found a notable male bias in juvenile hawksbills and only a slight female bias in greens. Given extreme high temperatures experienced during the nesting season in the Gulf, we suggest that turtles may have evolutionary adaptations that enable shifts in pivotal temperatures over evolutionary timescales, allowing them to cope to some extent with changes in climate patterns. We caution, however, that turtles may not have the ability to keep track with current *rates* of climate change.

Keywords: sea turtles, sex ratio, climate change, adaptation

How vulnerable are hot regions when temperatures rise?

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ABSTRACT

Temperatures are rising throughout the world, but the environmental impacts in hot regions have often been down-played because the temperature increases here are smaller than in cooler northern regions. Less than 1% of all research on climate impacts has been done in the Tropics, but here we present evidence from a range of studies which show that small temperature increases in regions which are already too hot can have much more negative impacts than large temperature increases in regions which are still too cold. We show that rising temperatures in non-tropical regions tend to have positive rather than negative effects on vital rates, and we show that several tropical species are already living at/above their optimal temperatures where the effects of warming are then negative. By reviewing several hundred published estimates of Upper Critical Temperatures (T_{cmax}) across a wide range of species, we demonstrate that virtually all organisms die out somewhere between 30'C and 50'C. Only a very small select group of organisms are able to withstand the maximum summer temperatures typical of the UAE, and temperature increases of 2-3'C this century would take this region beyond the current limits of thermal tolerance for almost all of them.

Keywords: Hot regions, climate impacts, environmental change, UAE

Preliminary Geoenvironmental investigations of Zakher Lake and Its Probable Threat on the Nearby District, Al Ain, United Arab Emirates

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ABSTRACT

Last twenty years, Al Ain city perceived a serious development in the field of infrastructure, industrial, agricultural and touristic purposes. These intensive expansions were rely on the water supply that manly coming up from surface and groundwater sources. As a result of this intensive water usage some surface water ponds and lakes were appeared in Al Mubazara, Al Ain Al faydi and Zakher province. Al Mubazara and Al Ain Alfaydi ponds have been used for landscaping and touristic purposes. Zakher Lake relatively appears since 2003 and has been taken variable spatial and vertical distribution. It lies at the western side of Jabal Hafit Mountain with about 12 km distance. The lake has already its' own habitat such as birds, plants, insects, fishes etc. This study aims to highlight the possible contamination of the lake that may be linked to the different types of the dumped water and its possible impact on its' surrounding areas. The physiochemical parameters such as pH, temperature and Electric Conductivity (EC) and Total Dissolved Solid (TDS) were measured in-situ. Major cationic and anionic components as well as some minor and trace elements in water and soil samples were analyzed in the laboratory. The initial results reveal that the lake is heavily polluted by discharge of the industrial wastes, irrigation and sewage water sources. High concentration levels of the major elements were compared with the national drinking water standard for Na, Ca, Mg and K in water samples. Relatively, the soil samples reflect the similar response, but Ca ion acquired the highest concentration among Mg, Na and K. On the other hand, the trace elements concentration in the water samples reveal values more than the national drinking and US Irrigation Standard limits for Fe, Pb and Al. The soil results indicate high concentration only for Fe, Al, Cr, Ni and Mn. Thus, the lake provides very risky geoenvironmental condition for health and its' water is not safe to use even for irrigation purposes. It is recommended that the lake and its' surrounding areas should be restricted and the government should develop strong laws to prevent the dumping of contaminated water to the lake to mitigate the environmental hazards.

Keywords: Surface water, lakes, pollution, environment

Climatic Variability and Dengue Diseases Dynamics in Bangladesh: Vector Larval Indices and Risk for Epidemics in Dhaka

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ABSTRACT

Dengue fever (DF) and dengue hemorrhagic fever (DHF) are now endemic in Bangladesh with outbreaks occurring frequently in recent years. Since the outbreak of dengue in 2000, the disease has become major public health concern. The study objective is to investigate the characteristics of larval abundance and determine its associated risk to dengue. Research has been conducted on the dengue disease by North South University, Bangladesh in collaborative with University of Manitoba, Canada, and funded by IDRC.

An entomological survey was conducted in 721 households among 12 randomly selected wards of Dhaka city during August-September 2013. A total of 1908 larvae and pupae of mosquitoes (*Ae. aegypti*=1557; *Ae. albopictus*=175) were collected in 144 positive containers among 105 positive houses. The density of *Ae.aegypti* mosquitoes was higher than *Ae. Albopictus*. The highest and lowest relative frequency was observed in plastic drums (118/293; 37.25%) and clay pots (12.96%) at indoors and in metal pans, buckets, plastic bags (0.34 %), aluminum pots, glass bottles, and metal cans (0.33%) at outside households. Infested items were water tank and tires (66.67%), broken toilet parts and money plant tubs (50%) tires, ceramic pots, aluminum pots, metal drums (100%), tin/metal cans (66.67%), earthen jars (60%), cement pots, broken toilet parts (50%) and flower tubs & trays (37%). These were key indoor and outdoor containers used as breeding places for dengue vector.

The mean *Aedes* larval house and container indices were 14.56 (range 5.1 to 21.67) and 24.24 (range 12.24 to 45.95) respectively. The mean Breteau indices were 19.97 (range 5.71 to 31.48). The significant factors associated with the *Ae. Aegypti* were water type (p=0.00), vegetation (p=0.00) and shade (0.01). Based on the level of vector commotion in sampled households, the cases of DF or DHF occurred during 201. This speculation is supported by the dengue morbidity data from the federal Government of Bangladesh. The study suggests that to reduce the availability of selected, highly prolific container could have significant impact on dengue epidemics in Dhaka city.

Keywords: Dengue, dengue hemorrhagic fever, epidemics, ecology, Dhaka, Bangladesh

Proposing a resilient network of MPAs in Gulf Waters of the UAE

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ABSTRACT

Ecosystem resilience is dependent on adequate protection and rebuilding of biodiversity in the face of pressures such as overfishing or climate change. Well-planned marine protected areas networks provide important spatial links needed to maintain ecosystem processes and connectivity, as well as improve resilience by spreading risk in the case of localized disasters, climate change, failures in management or other hazards, and thus help to ensure the long-term sustainability of populations better than single sites. We aim to support the establishment of a connected and ecologically representative network of Marine Protected Areas (MPAs) in the Gulf waters of the UAE, considering the human uses and impacts of climate change; and identify high biodiversity areas which may need urgent conservation action but not necessary a strict protection framework. The geographical scope of the project covers the UAE Gulf waters. To achieve the goals, the project will compile existing information on ecological and human uses from stakeholders, provide a coarse-medium resolution marine and coastal habitat map for the UAE Northern Gulf Emirates, and we will use a decision support tool (MARXAN) through a participatory process. This tool is the most widely used decision support software for conservation planning globally. This software maximises conservation interests while minimizing negative economic, social or cultural impacts. MARXAN is based on a systematic conservation planning approach, which is transparent, inclusive, defensible and repetitive, allowing spatial visualizations of effective solutions and ensuring efficiency to meet conservation targets.

Eye in the sky: Natural disasters and Human Health

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ABSTRACT

Changes in frequency and magnitude of natural disasters is likely to have substantial impact on the ecological niches of infectious pathogens. An estimate derived from the International Disaster Database suggests that about 270 million people are affected, annually, by natural disasters. Assessment of economic losses by continent, from 1960 to 2014, shows that Asia and the Americas suffer heavy monetary losses from natural disasters. Similarly, a disproportionate number within the human population is affected in Asia, followed by Africa. Floods are perhaps one of the largest subgroups amongst all the disasters. Overall, an increasing trend can be observed in the total number of natural disasters post 1960, arising from enhanced anthropogenic activities, e.g., rapid urbanization, deforestation, environmental degradation. The challenge is to understand and decipher impacts of natural disasters on human health, particularly in regions that lack access to safe water and sanitation facilities. These vulnerable regions are at increased risk of infection since human population is generally not prepared or adapted to extreme natural events. In addition, lack of public health surveillance system limits retrospective analysis on association of related pathogens with environmental processes. We argue that with the advent of new high spectral and spatial resolution data, earth observation systems should be seamlessly integrated in a decision support mechanism when a region suffers a natural disaster. We will focus on diarrheal diseases, which remain a serious global public health threat. Although association of several diarrheal diseases, e.g., cholera, shigellosis etc., with climatic processes has been documented, the global human population remains at heightened risk of outbreak of diseases after natural disasters, such as earthquakes, floods or droughts. One of the key observations is the identification of an inherent feedback loop that includes societal structure, prevailing climatic processes, and spatio-temporal seasonal variability of natural disasters. A framework will be discussed that has potential to be used to assess the impact of natural disasters with response to outbreak of diarrheal infections, providing assessment of short -and long-term influence of climatic processes on disease outbreaks.

UAE Climate Change Risks & Resilience: A summary of risks to key sectors

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ABSTRACT

Global and regional climate change is a reality; it is occurring now and is driven by increasing carbon dioxide, which is increasing global temperatures. 2016 is now the warmest year on record[2], beating the previous records set in 2015 and 2014. But even powerful global headlines of record breaking extreme weather events, flooding and heat-waves often fail to resonate with policy makers and the public as they don't highlight the risks that a changing climate poses to our society, environment and economy.

The UAE has always endured harsh environmental conditions, successfully thriving in the face of scarce water supplies and intense heat. However, the scale of impacts expected from climate change may exceed the coping capacities of sectors and consequences will be felt across the national economy, ecosystems, biodiversity, and society, and more.

Achieving economic diversification and overall wellbeing of the population will be slowed down by climate change impacts if left unmanaged. A golden opportunity now exists for the country to take a leading role to make the goals of the Paris Agreement truly meaningful.

In March, EWS-WWF will launch a report that distils the wealth of scientific research carried out on climate change impacts the UAE and the region to paint a compelling picture of how climate change has, and will, impact the country across 12 of its sectors. These critical insights aim to encourage increased action toward achieving the Paris Agreement, boost momentum in identifying robust adaptation solutions and in taking advantage of opportunities.

Risk Assessment of heavy metals in Bottom sediments in Ras AlKhaimah coastal area, United Arab Emirates.

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ABSTRACT

The aim of the present study is evaluate the contamination levels of heavy metals (Mn, Zn, Cu, Pb, Co, Cr, Ni, V, Fe, As, Sb, Cd and Mo) in bottom sediments at Ras Al-Khaimah coasts. In this study, the contamination of heavy metals were measured, using inductively coupled plasma spectroscopy (ICP-MS) analysis for 15 samples collected at different stations in Ras Al-Khaimah area. The concentrations (ppm dry weight with except of Fe as weight present) of these heavy metals ranged around 0.17-0.64 for Mo, 1.38-6.61 for Cu, 2.23-5.73 for Pb, 2.10-18.70 for Zn, 4.80-52.00 for Ni, 0.90- 4.20 for Co, 34.00 -312.00 for Mn, 0.090-0.78-for Fe, 0.20-4.20 for As, 0.11-0.32 for Cd, 3.00 -25.00 for V, 13.00-145.00 for Cr and 0.10 - 0.29 for Sb. It was observed that the concentrations of metals slightly depend on sit locations.

The risk of heavy metals is major environmental problem. The levels of heavy metals enrichments in the bottom sediments sampled from the Ras Al-Khaimah coasts were determined using contamination indices: the contamination factor (CF), geo-accumulation index (Igeo), and pollution load index (PLI). The obtained data for the geo-accumulation index revealed that sampled sediments are unpolluted for all the most elements while the levels of Cd indicated a moderate contamination. A different profile was given by the data of the contamination and enrichment factors. The data indicated that the most heavy metal in the study samples under permissible level to low level of contamination (Mo, Cu, Pb, Zn, Co, Fe, Mn, V and Sb) and some other elements show moderate to considerable level of contamination (As, Cd, Ni and Cr). The pollution load index showed low values (unpolluted) in all studied samples, ranging between 0.16 and 0.75. Geochemical analysis showed significant heavy metal concentration in bottom sediments indicating a clear pattern of anthropogenic impact on Ras Al Khaimah area.

Effects of maternal salinity on salinity and light requirements during germination of: Salsola drummondii a facultative halophyte of the Arabian deserts

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ABSTRACT

Salinity is currently a major environmental stress that reduces crop productivity world-wide. Excessive amounts of salts in soil severely reduced seed germination and further seedling growth. Several studies have assessed the effects of salinity, light and temperature of incubation on germination behavior of halophytes, but none has assessed the effect of maternal habitats on these factors. Here, we assessed the effect of maternal habitat on salinity tolerance and light and temperature requirements during germination of Salsola drummondii, which is facultative halophyte (i.e., grow very well in both saline and non-saline habitats). Seeds from both saline and non-saline habitats were germinated in different levels of salinity in both light and darkness at three different temperatures. Germination decreased with the increase in temperature and was greater in darkness than in light. Further, germination decreased with the increase in NaCl concentration; still around 23% germinated in 1000 mM NaCl. The overall germination of seeds from non-saline habitat was significantly greater than that of seeds from saline habitats in salinities from 0 - 800 mM NaCl, but the reverse was true in the highest salinity (1000 NaCl). This trend was obvious at moderate and higher temperatures, but there was no difference in seed germination between the two maternal habitats in 1000 mM NaCl at the lowest temperature. When non-germinated seeds were transferred from NaCl solutions to distilled water, the overall recovery was significantly greater for seeds of non-saline, compared to those of saline habitat. Recovery was significantly greater in seeds incubated in light, than in darkness and for seeds incubated at lower and moderate temperatures than at higher temperatures. The results are interpreted in the light of a possible role of gibberellic acids that could be developed in seeds of non-saline habitats, but abscisic acid developed in seeds developed in saline habitats.

Key words: Maternal habitats; Facultative halophyte; Seed germination; salinity; Germination recovery

Awareness of Higher Education Institutes' Students (University of Sharjah, UAE) about Global Warming and Climate Change

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ABSTRACT

To insure that the curriculum of the Department of Applied Biology (DAB) at University of Sharjah (UoS) is constantly updated and relevant to the needs and to prepare our students for rewarding careers in future, an environment biotechnology course (1450436) as a compulsory requirement has been offered for the last 6 academic years (2011/2012—2016/2017) with an average 70 registered students per year. Topics in this course covers environmental monitoring, sewage treatment, pollution control of domestic, agricultural, and industrial wastes, bioremediation and clean technology, energy and biofules, mineral resource recovery, and agrobiotechnology. To assess students, different activities are usually applied as exams, lab work, projects in the form of oral presentations, team work library projects about the subject matters of the course. During the academic years 2011/2012 to 2016/2017 a total of 27 presentations were presented in which 9 of them (30%) were focused on topics related to global warming. The main interest of students focused on reasons behind global warming, impact of global warming (human nutrition and hunger, desertification, appearance of new climate zones), the alternative and renewable energy sources such as biofuels, microbial fuel cells and hydrogen fuel production through the use of algae and seaweeds to reduce global warming. These issues and other new technologies such as installation of mega mirrors to reflect the sun rays, and injection of CO_2 into storing tanks in the ground will be discussed in the meeting.

Keywords: Biotechnology, Climate, Environment, Renewable energy.

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Company Profiles

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We are one of the 27 companies forming part of the UAE based RMB Group, with a Group turnover of over AED 2 Billion. Utico are a reputed private Utility Developer, Investor and Owner of Water and Power plants in UAE and globally, having expertise in related technologies including transmission and distribution with billing and collection services. Utico is the largest private utility provider in the UAE and the region.

Utico serves a population of about 150,000 and over 650 industries, 2 sea ports and several hotels and golf courses etc..

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Utico is certified by several institutions and was the first Utility in the Middle East to obtain ISO50000 certification. It also has various Quality Certifications such as ISO -9001 : 2008, ISO 14001 & OHSAS – 18001.

For more details on the Group you may visit the website www.rmb-group.com; www.ghantootgroup.com; & www.uticome.com.

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Millennium Company Profile

Millennium Lubricant refinery is a modern solvent cracking plant for base oil located at Ras Al khaimah U.A.E. At MRL we used ecofriendly technologies, the refinery is owned by Millennium Group of companies since 1962.

Millennium Lubricant refinery LLC Oil Refining Company (MRL) was established in 2013 to take over the responsibilities of refining operations from used black oil. This covers the black used used engine oil, supply of recycle oil and products. MRLs main objective is to develop the refining industry in the UAE which started with the inauguration of Ras Al Khaimah UAE in 2013 in a land of 20,000 s.q. meters

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