

Young Scientists Meeting on 'Air Quality, Water Resources, Energy and Climate Change'

Organised by The World Academy of Sciences, Central and South Asia Region Partner (TWAS CASAREP) and Divecha Centre for Climate Change (DCCC), Indian Institute of Science (IISc)

25 – 27 October, 2021

14:30 to 16:30 hrs (IST)

DETAILED PROGRAMME

Day 1, 25 October: Air Quality

Chair: Dr. H. Paramesh, Visiting Scientist, Divecha Centre for Climate Change, IISc

14:30 – 14:40	Welcome and Introduction
14:40 – 14:45	Introduction of Speakers of the Session
14:45 – 15:10	<p>Impact of Air Pollution and Climate Change on Health</p> <p>Speaker: Dr. H. Paramesh, Visiting Scientist, Divecha Centre for Climate Change, IISc</p> <p>Abstract: For human life to survive, air, water, and nutrition are essential. No one can survive without air (breathing) for 3 min, without water (drinking) for 3 days, or without food for 3 weeks. Air pollution, global warming and climate change are interrelated and have a tremendous impact on health directly and indirectly. Air pollution kills 6.5 million people per year globally. 70% of the disease caused by environment pollution are non-communicable diseases, 70% of which are from air pollution. The various chemicals from primary and secondary air pollutants have an impact from womb to tomb. The respiratory system takes the major brunt followed by cardio vascular, endocrine, central nervous system, kidney diseases, and stroke, cancer and behavioural changes.</p> <p>With current CO₂ level at 400-450 ppm and increased temperature 1.2-2.7°C, we are at a catastrophic phase, we need to reduce CO₂ (greenhouse gases) to 250 ppm and keep the temperature at 1.5-2°C by the end of the century. The measure we should take for the survival of living species at International, Local, Personal level will be highlighted.</p> <p>Each country should Think Locally, Act Locally and Propagate the results Globally.</p>
15:10 – 15:15	<i>Audience Q&A</i>
15:15 – 15:40	<p>Spatial and temporal variations of air quality in Almaty (Kazakhstan)</p> <p>Speaker: Dr. Aiyngul Kerimray, Postdoctoral Researcher, Center of Physical-chemical Methods of Research and Analysis, Al-Farabi Kazakh National University</p>



15:40 – 15:45	<p>Abstract: Almaty, the former capital and the largest urban center in Kazakhstan, is one of the most polluted cities in Kazakhstan. There were few scientific studies on air quality in the cities of Kazakhstan, and Almaty is not an exception. In this study, spatial and temporal patterns of PM₁₀, PM_{2.5}, NO₂, SO₂, and CO in Almaty, the largest city of Kazakhstan, are explored. Severe degradation of air quality was observed from the data that were used in this study. The maximum levels were observed in the winter, while the minimum levels in the summer. Winter-to-summer difference was more noticeable for PM_{2.5} than for other pollutants. The winter pollution peaks demonstrate the high contribution of large- and small-scale coal combustion for heating, which could be exacerbated with lower winds and possible more frequent thermal inversions.</p> <p><i>Audience Q&A</i></p>
15:45 – 16:10	<p>Air quality: Measurement-Prediction-Mitigation</p> <p>Speaker: Dr. B. S. Murthy, Scientist-F and Project Director, Metropolitan Air Quality Forecasting Program, Indian Institute of Tropical Meteorology-Pune (IITM-Pune)</p> <p>Abstract: Urban air pollution is a severe problem in India that affects economy and human health. Air quality is dependent on pollutant emission sources, local weather and long range transport. Emissions in an urban area are quantified by developing emission inventory of criteria pollutants. Winds, thermodynamics and criteria pollutants in atmospheric boundary layer (ABL) are simulated by chemistry transport models. Currently operational air quality models like SAFAR-Model are able to forecast particulate matter concentrations with reasonable accuracy. Long range transport of dust from arid regions, stubble burning and very stable conditions at times cause extreme pollution episodes, forecasting these events is challenging. The need of the hour is quantification of fractional contribution of various sources to the lead pollutant and finding feasible mitigation strategy. This can be accomplished either by multiple model runs (with and without emissions from a specific source) or by subjecting observed or model-predicted chemical composition of pollutants to source apportionment.</p> <p><i>Audience Q&A</i></p>
16:15 – 16:30	Open Discussion between Speakers and Audience

Day 2, 26 October: Water Resources

14:30 – 14:40	Welcome and Introduction of Speakers of the Session
14:40 – 15:05	<p>Solving India's Groundwater Problem</p> <p>Speaker: Dr. Veena Srinivasan, Senior Fellow - Centre for Environment and Development, and Director, Centre for Social and Environmental Innovation, ATREE Bengaluru</p> <p>Abstract: Groundwater depletion is a well acknowledged problem. On one hand free electricity and groundwater have raised millions out of poverty. On the other, there's a concern that groundwater depletion will severely impact India's food security. Moreover, as groundwater depletes, future generations of farmers will be left without any means to sustain themselves.</p>
15:05 – 15:10	<i>Audience Q&A</i>
15:10 – 15:35	<p>Climate change impacts on the water resources of the Hindu Kush Himalayan region</p> <p>Speaker: Dr. Santosh Nepal, Water and Climate Specialist (Water & Air), The International Centre for Integrated Mountain Development (ICIMOD), Kathmandu, Nepal</p> <p>Abstract: Climate change is affecting the water resources of the Himalayan rivers. Because of increasing temperature trends in the Himalayan region, the cryospheric systems are changing. Glaciers are retreating and precipitation patterns are changing. This has affected the hydrological regime of the major river systems. In the context of climate change, earlier onset of melting might cause a seasonal shifting in the magnitude and peak of water availability and changes in hydrological extremes and droughts are projected. Most of the studies also indicate that total water availability might increase, but there would be too much or too little water for different river basins and different seasons. These changes will have a serious impact on the water-dependent sectors such as agriculture, domestic uses, and hydropower and ultimately livelihoods of mountain communities.</p>
15:35 – 15:40	<i>Audience Q&A</i>
15:40 – 16:05	<p>Integrated Water Resource Management: Case Study Azerbaijan</p> <p>Speaker: Dr. Rashail Ismayilov, Head of Division, Azercu Open Joint Stock Company, Sukanal Scientific-Research and Design Institute, and Associate Professor, Department of Environmental Engineering, Baku State University</p>



<p>16:05 – 16:10</p>	<p>Abstract: There are threats to water security in the Republic of Azerbaijan as more than half of its territory is characterized by arid climate conditions. According to the forecast of the World Resource Institute, in 2025, Azerbaijan will be among the countries with the lowest indigenous water resources (972 m³/year) per capita. On the other hand, most of surface water resources (66.7%) accounts for the transboundary rivers and these waters become contaminated in the neighbouring countries, particularly in Armenia and Georgia and flow into the territory of Azerbaijan.</p> <p>Integrated Water Resources Management (IWRM) in Azerbaijan covers the following:</p> <ol style="list-style-type: none">1. Conducting IWRM upon co-ordination with river basins within catchment area;2. Planning and joint management of usage of water resources for the purpose of drinking, irrigating, obtaining energy and industry within catchment area;3. The same significance given to integration of social, economic and environmental factors in planning and management of water resources;4. Transparency in IWRM and in the course of making decision with participation of non-governmental and public organizations. <p>Depending on the water source and the type of water intake, all projects are implemented in accordance with modern standards and water treatment requirements. Suitable condition is being established to ensure achievement of fundamental changes in water supply system of Azerbaijan via provision of integrated management of water resources.</p> <p><i>Audience Q&A</i></p>
<p>16:10 – 16:30</p>	<p>Open Discussion between Speakers and Audience</p>

Day 3, 27 October: Energy and Climate Change

Chair: Dr. Dinesh Kumar Srivastava, Homi Bhabha Chair Professor at National Institute of Advanced Studies, Bengaluru

14:30 – 14:40	Welcome and Introduction of Speakers of the Session
14:40 – 15:05	<p>Shades of Green Energy and Sustainability</p> <p>Speaker: Dr. Dinesh Kumar Srivastava, Homi Bhabha Chair Professor at National Institute of Advanced Studies, Bengaluru</p> <p>Abstract: We must immediately switch to renewable and green energies to avert the ongoing crisis of global warming and climate change. We discuss the advantages and disadvantages of renewable green energy options like biomass, hydro, solar, and wind. We argue that nuclear energy- should act as a cushion and provide a base load of 20-30% to combat the intermittency of the renewable sources. We further argue that an international grid deriving power from all the above sources can provide reliable and sustainable energy and minimize our dependence on scarce-material intensive batteries. This will also usher in a new era of international collaboration on research and development of energy options.</p>
15:05 – 15:10	<i>Audience Q&A</i>
15:10 – 15:35	<p>Abridging the Water-Energy-Food Nexus in Central Asia</p> <p>Speaker: Dr. Bahtiyor Eshchanov, Economist and Independent Consultant, Tashkent, Uzbekistan</p> <p>Abstract: Since the political transformation of the five newly emerged independent republics Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan in landlocked Central Asia, particularly the previously elaboration of hydraulic infrastructures and institutional management of the water resources have to be revisited to regain win-win situations. In the face of the ongoing climate change, the population growth, and the transboundary water resources that are unevenly distributed over the countries in Central Asia, the region need to find ways to live up to the aims of increasing food security by increasing water use efficiency of the irrigated crop production, sustain the hydro-based energy sectors without compromising the environment. Because upstream states are endowed with abundant water resources but minimal fossil reserves, they intend to realize their hydropower potential via building large-scale hydropower stations (HPS). However, this will occur at the expense of water access of the downstream countries Kazakhstan, Turkmenistan, and Uzbekistan, endowed with fossil fuel reserves but with ample water resources. The contribution of irrigated agricultural production to GDP is still high in these downstream countries. Irrigated crop production is the most important source of household livelihood. Therefore, the anticipated diminishing water reserves do not threaten the production capacity of agriculture (food, fiber, and feed) and drive conflicts.</p>



15:35 – 15:40	<p>Numerous national and international aspects impact the transboundary water-energy and food nexus in Central Asia. These are key to reaching the sustainable development goals which the UN will suggest to end hunger, achieve food security and improved nutrition, and promote sustainable agriculture" (SDG 2) as well as to ensure the availability and sustainable management of water and sanitation (SDG 6) and affordable, reliable, sustainable and modern energy for all (SDG 7). Several studies underline that the availability of water, which is already highly dependent on climatic conditions, is prone to climate change-related disasters. Also, these factors will be driving a further escalation of drought risks, hunger, and energy deficiency. Even though the country's rivalry is intense, it is argued that the availability of water and allowing a river water flow while considering the water needs for satisfying irrigated food and fiber production downstream has the most significant change of warranting peace and stability in the region, guaranteeing food security for downstream countries. When prevailing "energy-driving solutions," the decrease in agricultural outputs will lead to increased food prices, worsen the access to energy, further ecological deterioration, worsened consumption patterns, and increased social tensions, opposing the achievement of SGD 2030 targets.</p> <p><i>Audience Q&A</i></p>
15:40 – 16:05	<p>Climate Change and India's Energy Future</p> <p>Speaker: Dr. Tejal Kanikar, Associate Professor, School of Natural Sciences and Engineering, National Institute of Advanced Studies (NIAS), Bengaluru</p> <p>Abstract: Despite relatively low historical emissions, India has set itself ambitious green energy targets to be achieved in the near term. However, meeting these targets and going beyond them to a deeply decarbonized future will be challenging. A large proportion of the country's required infrastructure is yet to be built, reliable and affordable energy access for all is yet only an aspiration, and in many development indicators, India is still well below the global average and significantly below other the levels achieved in advanced economies. Amidst the general optimism about renewable energy, these challenges are often ignored. However, for any real progress towards achieving a sustainable and just future for all, it is necessary to acknowledge and address these urgently. In this context, this talk will explore India's energy landscape with relevant global comparisons. It will also discuss the potential directions for the country's energy sector in general, and its power sector in particular.</p> <p><i>Audience Q&A</i></p>
16:10 – 16:20	Open Discussion between Speakers and Audience
16:20 – 16:30	Concluding Remarks and Audience Feedback



YOUNG SCIENTISTS MEETING ON 'AIR QUALITY, WATER RESOURCES, ENERGY AND CLIMATE CHANGE'

ORGANISED BY
THE WORLD ACADEMY OF SCIENCES, CENTRAL AND SOUTH ASIA REGION
PARTNER (TWAS CASAREP) AND DIVECHA CENTRE FOR CLIMATE CHANGE
(DCCC), INDIAN INSTITUTE OF SCIENCE (IISc)

**25 - 27 OCTOBER, 14:30 TO 16:30 IST
ON ZOOM**

 <https://bit.ly/3vuMjO4>

DAY 1 AIR QUALITY 25 OCTOBER

Dr. H. Paramesh

VISITING SCIENTIST, DCCC, IISc

IMPACTS OF AIR
POLLUTION AND CLIMATE
CHANGE ON HEALTH



Dr. Aiymgul Kerimray

POSTDOCTORAL
RESEARCHER AL-FARABI
KAZAKH NATIONAL
UNIVERSITY

SPATIAL AND TEMPORAL
VARIATIONS OF AIR
QUALITY IN ALMATY
(KAZAKHSTAN)



Dr. B. S. Murthy

SCIENTIST-F AND PROJECT
DIRECTOR, INDIAN INSTITUTE
OF TROPICAL
METEOROLOGY-PUNE
(IITM-PUNE)

AIR QUALITY:
MEASUREMENT-PREDICTI
ON-MITIGATION



DAY 2 WATER RESOURCES 26 OCTOBER

Dr. Veena Srini- vasan

SENIOR FELLOW & DIRECTOR,
ATREE BENGALURU

SOLVING INDIA'S
GROUNDWATER PROBLEM



Dr. Santosh Nepal

WATER AND CLIMATE
SPECIALIST
ICIMOD, KATHMANDU, NEPAL

CLIMATE CHANGE
IMPACTS ON THE WATER
RESOURCES OF THE
HINDU KUSH
HIMALAYAN REGION



Dr. Rashail Ismayilov

HEAD OF DIVISION,
SURANAL SCIENTIFIC-RE-
SEARCH AND DESIGN
INSTITUTE, AND
ASSOCIATE PROFESSOR,
BAKU STATE UNIVERSITY

INTEGRATED WATER
RESOURCE
MANAGEMENT: CASE
STUDY AZERBAIJAN



DAY 3 ENERGY & CLIMATE CHANGE 27 OCTOBER

Dr. Dinesh Kumar Srivastava

HOMI BHABHA CHAIR
PROFESSOR AT NIAS,
BENGALURU

SHADES OF GREEN
ENERGY AND
SUSTAINABILITY



Dr. Bahtiyor Eshchanov

ACADEMY MANAGER, PWC
TASHKENT, UZBEKISTAN

BRIDGING THE
WATER-ENERGY-FOOD
NEXUS IN CENTRAL
ASIA



Dr. Tejal Kanikar

ASSOCIATE PROFESSOR,
NIAS, BENGALURU

CLIMATE CHANGE
AND INDIA'S ENERGY
FUTURE





PROFILES OF SPEAKERS

DAY 1 - AIR QUALITY

25TH OCTOBER



Dr. H. Paramesh, Visiting Scientist, Divecha Centre for Climate Change, Indian Institute of Science

Rtd Prof Dr H Paramesh is a pediatric pulmonologist and environmentalist. He is the Founding Member and Past Chairman of the Respiratory Chapter of the Indian Academy of Pediatrics (IAP), the Founder Life Patron of the Respiratory Chapter of Karnataka, the Founder President of IAP's Environment Chapter and Allergy and Immunology Chapter, the Founder President of the Indian Medical Association of Bangalore East, and he is also the Founder Member and Adviser of the Thalassemia Society of Bangalore. He is the past National President of the Indian Academy of Allergy and a past National President of the Pediatric Association of India. He is currently a Visiting Professor at the Divecha Centre for Climate Change, Indian Institute of Science, and is a Visiting Professor in universities in countries including the USA, Canada, Italy, Nepal and the UK. He leads the health-related initiatives of Future Earth South Asia and is the National President of the COMHAD India chapter. He is a member of the WHO-NGO Climate-Health Working Group, Geneva, and is an Adviser to the WHO, UNICEF, COMHAD and Alliance for Global Health, Geneva. Dr Paramesh has been invited to present over 665 scientific papers and talks, has received 43 oration awards, written chapters in 42 textbooks and has 88 publications in national and international journals. He has also received numerous local, state, national and international awards for his work in environment and health.



Dr. Aiyngul Kerimray, Country Expert for Kazakhstan, EU4Energy Programme; and Postdoctoral Researcher, Center of Physical-chemical Methods of Research and Analysis, Al-Farabi Kazakh National University

Dr Aiyngul Kerimray has MSc degree in Environmental and Energy Engineering at Sheffield University (UK) (2008) and PhD in Science and Technology at Nazarbayev University (2014-2018). She finished her postdoctoral study in 2021 at Al-Farabi Kazakh National University. For the last 10 years she worked as a researcher at research institutes in Kazakhstan. She worked as a consultant at International Energy Agency, United Nations Development Programme, World Bank on various topics related to air pollution, climate change, energy transition. She authored/co-authored research articles in the top peer-reviewed scientific journals (e.g. Science of the Total Environment, Journal of Environmental Management etc.).



Dr. B. S. Murthy, Scientist-F and Project Director, Metropolitan Air Quality Forecasting Program, Indian Institute of Tropical Meteorology-Pune (IITM-Pune)

Dr B S Murthy, Sc-F is presently the Project Director of Metropolitan Air Quality Forecasting program at IITM, Pune. His research interests are Aerosols & Air pollution, Atmospheric Boundary Layer & Convection. He has been with IITM for about 25 years and has published more than 50 peer-reviewed research papers. He has also mentored students of various levels. Currently he is leading SAFAR/ MAPAN air quality networks of India, providing air quality forecasts to metropolitan cities, is deeply involved with various related field campaigns including continuous profiling of atmospheric boundary layer. He is also part of multiple international collaborations such as Indo-UK, APHH (air pollution & Human Health).



PROFILES OF SPEAKERS

DAY 2 - WATER RESOURCES

26TH OCTOBER



Dr. Veena Srinivasan, Senior Fellow, Ashoka Trust for Research in Ecology and the Environment (ATREE), Bangalore; and Director, Centre for Social and Environmental Innovation (CSEI) at ATREE

Dr. Veena Srinivasan has a track record of formulating and guiding major interdisciplinary research, innovation, and capacity building projects in the area of climate change and water, water security, citizen science. Veena has won several awards for her research including the 2015 Jim Dooge Award for best paper in the journal Hydrology and Earth System Science from the European Geophysical Union, the 2012 Water Resources Research Editor's Choice Award from the American Geophysical Union. She has been the Chair holder of the prestigious Prins Claus Chair in Netherlands from 2018-2020. Veena serves on the Editorial Boards of Journal of Hydrology and Ecology, Economy and Society. She has served as a resource person for National Water Mission, India and on the drafting committee for the thematic group on Agriculture, Water, and Food Security of the Science, Technology and Information Policy (STIP) 2020. She serves on the Strategic Advisory Group of the task force for Monitoring SDG6 by UN-Water and is a Steering Committee member of the Forum for Policy Dialogue on Water Conflicts in India. Veena received her PhD from Stanford University's Emmet Interdisciplinary Program in Environment and Resources (E-IPER). Veena holds a Masters in Energy and Environmental Studies from Boston University and a B-Tech in Engineering Physics from the Indian Institute of Technology, Bombay.



Dr. Santosh Nepal, Group Leader 'Climate Change and Hydrology,' International Centre for Integrated Mountain Development (ICIMOD), Kathmandu, Nepal

Dr. Santosh Nepal has been working with the International Centre for Integrated Mountain Development (ICIMOD) since December 2012 as Group Leader for 'Climate change and Hydrology'. He is responsible for designing and implementing research activities on climate change and water resources in the Himalayan region. In the last 15 years, Dr. Nepal has contributed to scientific advancement in Himalayan hydrology, climate change, disaster risk reduction and a better understanding of upstream-downstream linkages of land and water management of various scales. These collaborations have resulted in important scientific publications. He also contributed to the IPCC Special Report on Ocean and Cryosphere in the changing world and AR6. Dr. Nepal has a PhD degree in mountain hydrology and climate change from the Friedrich Schiller University of Jena, Germany in 2012. Dr. Nepal has work experience in various fields in the last 17 years in national NGOs, a consultancy with the World Bank, and international organizations.



Dr. Rashail Ismayilov, Head of Division, "Sukanal" Scientific-Research and Design Institute, "Azersu" Open Joint Stock Company; and Associate Professor, Department of Environmental Engineering, Baku State University, Azerbaijan.

Dr. Rashail Ismayilov heads the "Sukanal" Scientific-Research Design Institute at the Azersu Open Joint Stock Company of Azerbaijan, and is also an Associate Professor at the Department of Environmental Engineering of Baku State University, where he teaches courses on ecological monitoring, water supply and environmental protection, environmental management, urban environment and infrastructure, hydrology, ecological flow and ecology of urban environment. His research areas include geography, environmental management, hydrometeorology, climate change, ecology and environment, hydro-ecology, hydrogeology, water engineering, water resources management and water supply. He has worked on various projects including Development of a Bilingual Atlas of Kahrizes in Azerbaijan, pressure & impact analysis of the transitional and coastal water bodies in the Kura river delta including the eastern part of the Kura-Aras river basin in Azerbaijan, Advancing IWRM Across the Kura River Basin, and Increasing public control over water and air quality in the cities of Baku and Sumgait. He has worked as an instructor in Azerbaijan University of Architecture and Construction, Qafqar University and Khazak University, and works as a Scientific Supervisor for the Ministry of Emergency Situations of the Republic of Azerbaijan. Dr. Ismayilov completed his Bachelors in Geography and Masters in Hydrometeorology from Baku State University, following which he completed his PhD in Hydrology from the Institute of Geography of the National Academy of Sciences of Azerbaijan.



PROFILES OF SPEAKERS

DAY 3 - ENERGY AND CLIMATE CHANGE

27TH OCTOBER



Dr. Dinesh Kumar Srivastava, Homi Bhabha Chair Professor, National Institute of Advanced Studies (NIAS), Bengaluru

Dinesh Kumar Srivastava is Homi Bhabha Chair Professor at National Institute of Advanced Studies, Bengaluru. He worked in the Department of Atomic Energy during 1970-2016, from where retired as Distinguished Scientist and Director of the Variable Energy Cyclotron, Kolkata. After 3 years there as DAE Raja Ramanna Fellow, he moved to Bengaluru. He is a Fellow of National Academy of Sciences, India, and Indian National Science Academy. He has held visiting positions at universities in USA, Germany, Canada, and South Africa. He is author of about 170 papers on physics of quark gluon plasma and low energy nuclear physics, and 11 books.



Dr. Bahtiyor Eshchanov, Economist and Independent Consultant, Tashkent, Uzbekistan

Dr. Bahtiyor Eshchanov is an economist with training in sustainable technology, monitoring and evaluation, and public administration and university management. He has over 10 years of research and work experience in the energy and agriculture sectors, as well as in water resources management. His projects include Preparation of a policy brief on energy sector issues in Uzbekistan for the Berlin Economics Team, Qualitative survey on recruitment processes and practices in temporary seasonal agriculture in Uzbekistan with a focus on cotton for the International Labour Organisation, Development of green mortgage schemes for a UNDP – Qishloq Qurilish Loyiha, Biogas development from agricultural wastes in the Aral Sea Zone for Biomass Suisse/REPIC fund, and Capacity building for economic forecasting and planning at national and local levels for Institute for Forecasting and Macroeconomic Research and UNDP. He has nearly 30 publications on issues related to water, energy and food, particularly in Central Asia. Dr. Eshchanov completed his Bachelors in Economics and Masters in Macroeconomics from the Urgench State University in 2002 and 2004 respectively, following which he completed an MSc in Sustainable Technology from the Royal Institute of Technology. He received his PhD in Applied Economics from Vrije Universiteit Brussel in 2013.



Dr. Tejal Kanitkar, Associate Professor, School of Natural Sciences and Engineering, National Institute of Advanced Studies (NIAS), Bengaluru

Tejal Kanitkar is currently an Associate Professor in the School of Natural Sciences and Engineering at the National Institute of Advanced Studies, Bengaluru. She is a mechanical engineer by training and has worked on various aspects of energy planning and climate change mitigation, for over 15 years. Her work involves the integration on perspectives from the natural sciences, engineering, and social sciences, to understand the interconnected aspects of energy production, environmental constraints, and economic and social development, with a perspective that prioritizes equity in the era of acute environmental crises such as climate change.