

Newsletter of the

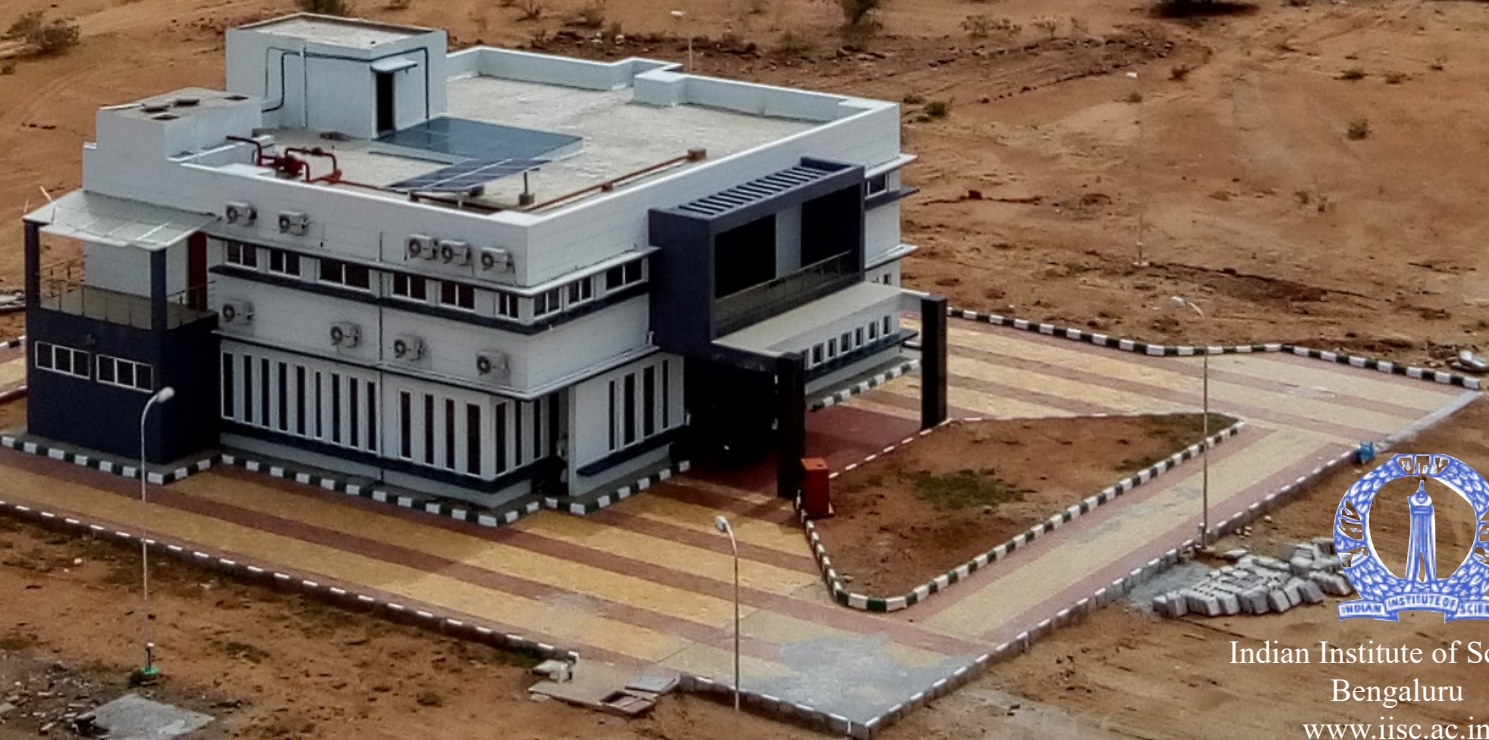
DIVECHA CENTRE FOR CLIMATE CHANGE

Future Earth: Best practices: Deliberating on a way forward

Connecting crop productivity, residue fires, and air quality: Northern India

Uttarakhand tragedy: Possible reasons

Workshop on climate change and remote sensing





CONTENTS

From the Chair News and Events:

- 1. Cryosphere under warm climate: Effects on water security**
- 2. Connecting crop productivity, residue fires, and air quality**
- 3. Uttarakhand Tragedy: Possible reasons**
- 4. Future Earth best practices: Deliberating on a way forward**
- 5. Training program on glacier studies and remote sensing**
- 6. Hindi quiz on environment and climate change**
- 7. Workshop on campus decarbonization**
- 8. COVID-19 Vaccines: Basics and FAQ's**
- 9. Environmental Issues in relation to developmental disability**
- 10. Prevention of congenital and acquired heart diseases**
- 11. Impact of environment in prevention and control of kidney diseases**
- 12. Measures needed to build fairer and healthier world for survival**

Research Highlights:

- 13. Impact of changes in discharge of Amazon on climate of the Atlantic Ocean**
- 14. How aerosols influence the optical wireless communication links**

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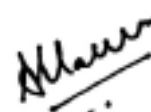
FROM THE CHAIR

Greetings!

For the past couple of months, India is reeling under the second wave of the COVID-19 pandemic with several states under full or partial lock-down to combat the virus. We do not know when the normalcy will be restored. We are carrying our outreach program through online platforms. We hope to get out of this grim situation soon.

The vision of the South Asia Centre of “Future Earth” established under the Divecha Centre hosts its South Asia office requires solutions-oriented research that responds to the challenges faced by the society due to global environmental change. The Centre is striving towards this by synergizing basic and applied research in frontier areas of emerging societal applications with close interactions with stakeholders. In a remarkable accomplishment in this directions, researchers of the Centre, jointly with academia have characterized the impact of suspended particles in the atmosphere on the propagation of optical communication signals through realistic atmospheres in the context of Free Space Optical Communication, an emerging field for huge-volume data transfer for terrestrial, ground to satellite and satellite to satellite communications. The results have global implications in this emerging field of communication and is an important aspect to be considered in the climate change perspective and technological advancement for sustainability.

The current global secretariat leadership model of Future Earth though allows rapid global coverage, but suffers from lack of coordination, geographic bias of the current hubs, and a lack of any direct leadership from the global south, thereby creating challenges for its maturity and transition into a truly global presence. Currently 4 of the 5 hubs are based in North America and Europe, which collectively represents only 15% of the global population. Critical decisions that affect the global operation of the organization are thus made without sufficient diversity of perspectives. In this context, the Divecha Centre for Climate Change (DCCC) has recently proposed to establish a “Future Earth Global Secretariat South Asia” in the spirit of enhancing and expanding the vision, reach and impact around the world. The Centre engages with various climate change national action plans and recommends various ecologically sustainable development suggestions to a wide range of ministries throughout India. The Centre engages with national and international programs, facilitates exchange and carries out capacity building and science-policy outreach activities. Its 18-member Governing Council, which comprises of ministers, bureaucrats, scientists and NGOs from SAARC countries, Myanmar and the Indian Ocean Island Countries, ensures that regional priorities are made part of the strategic development of “Future Earth” activities. The Centre will continue to work towards this endeavour to promote scientific cooperation between India and the neighbouring countries in “Future Earth” and related activities.



S. K. Satheesh

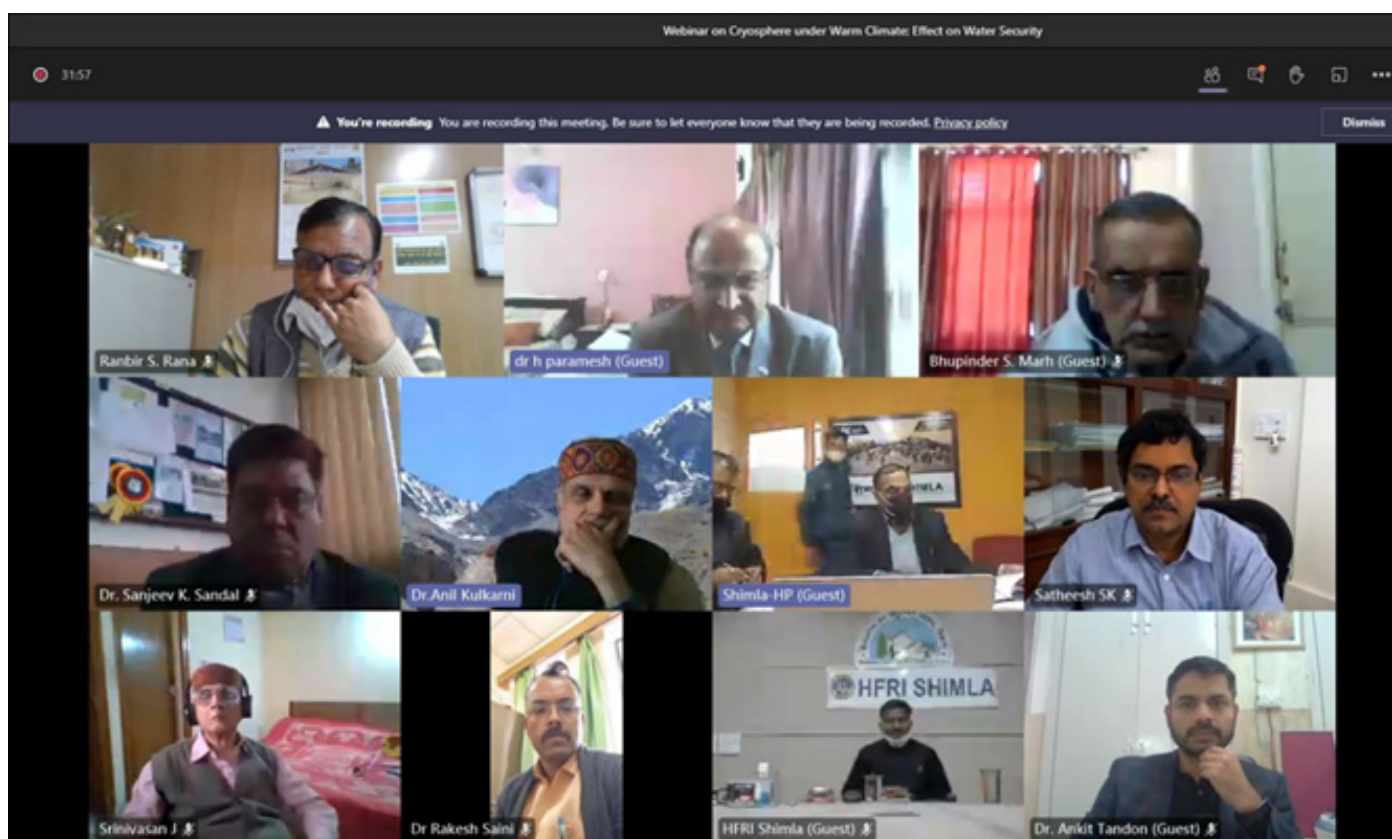
CRYOSPHERE UNDER WARM CLIMATE: EFFECTS ON WATER SECURITY

Divecha Centre for climate change and State Centre on Climate Change Himachal Pradesh jointly organized a webinar on February 1, 2021, to help the officials and policymakers to understand changing cryosphere under a warm climate. Around 170 officials participated in the program.

Mr. Kamlesh Kumar Pant, IAS, Principal Secretary of Government of Himachal Pradesh, and Prof. S. K. Satheesh, Chair, Divecha Centre for Climate Change, gave opening remarks. Mr. Kamlesh Kumar Pant provided a

comprehensive overview of the H.P state's geographical characteristics and importance of cryosphere for freshwater ecosystem services, hydropower, and impacts on mountain community. Prof. Satheesh highlighted the significance of cryosphere studies in the climate change scenario and also discussed the Cryosphere programs of Divecha Centre for Climate Change.

Dr. Anil V. Kulkarni, Distinguished Scientist, Divecha Centre for Climate Change, delivered a talk on "Water Security of Himachal Pradesh Under



Warm Climate". He described the current status and future changes of the glaciers in Himachal Pradesh. He presented observational and modelled results relating to Himalayan glaciers and their societal impacts, and the lecture followed by panel discussions.

The panelists answered numerous queries from participants on the societal implications of the changing cryosphere. Mr. Nishant Thakur, Joint Member Secretary, HIMCOSTE, proposed a vote of thanks.

CONNECTING CROP PRODUCTIVITY, RESIDUE FIRES, AND AIR QUALITY OVER NORTHERN INDIA

Divecha Centre for Climate Change organized a webinar on “Connecting Crop Productivity, Residue Fires, and Air Quality over Northern India” on 5 Feb 2021. Dr. Hiren Jethva, Universities Space Research Association, Columbia, Maryland, USA and NASA Goddard Space Flight Center, Greenbelt, Maryland, USA deliberated on agriculture burning and air quality over Northern India.

Northwestern India is known as the “breadbasket” of the country producing two-thirds of food grains, with wheat and

rice as the principal crops grown under the crop rotation system. Agricultural data from India indicates a 25% increase in the post-monsoon rice crop production in Punjab during 2002–2016. NASA’s A-train satellite sensors detect a consistent increase in the vegetation index (net 21%) and post-harvest agricultural fire activity (net ~60%) leading to nearly 43% increase in aerosol loading over the populous Indo-Gangetic Plain in northern India. The ground-level particulate matter (PM_{2.5}) downwind over New Delhi shows a concurrent



uptrend of net 60%. The effectiveness of a robust satellite-based relationship between vegetation index—a proxy for crop amounts, and post-harvest fires—a precursor of extreme air pollution events, has been further demonstrated in predicting the seasonal agricultural

burning. An efficient crop residue management system is critically needed towards eliminating open field burning to mitigate episodic hazardous air quality over northern India.

Crop residue burning over northwestern India is a serious concern leading to

poor air quality and affecting the health of millions living in one of the most densely populated regions of the world. The issue has received a great deal of attention after a consistent ranking of several major cities in the Indo-Gangetic Plain (IGP), including New Delhi, in the WHO reports having the poorest air quality related to particulate matter. A 15-year long record (2002–2016) of NASA's A-train satellite measurements have revealed a positive trend in the total fire activity and resulting aerosol loads over IGP. This study investigates the probable cause of rising agricultural fires and deteriorating air quality over the region.

Increasing agricultural fire activities imply greater availability of crop residue to burn, and the generation of waste is proportional to the crop production amounts. Dr. Hiren and his team verified this hypothesis by quantifying the link connecting the crop production followed by residue fires and air quality measures using a suite of satellite and ground observations. His study finds that rice production in the northwestern state of Punjab has increased by 25%, and so has the vegetation index (NDVI) with a net increase of 21% derived from the MODIS sensor onboard Aqua satellite during 2002–2016.



Particulate matter (PM) and trace gases emitted from the open field agricultural burning have a high potential to alter the radiation balance of Earth, trigger changes in atmospheric chemistry, and can severely affect local and regional air quality. The 2014 report of the World Health Organization (WHO)¹ states that 7 million deaths—one in eight of total global deaths were linked to air pollution in 2012 and confirmed that air pollution is the world's largest single environmental

health risk. Dr. Hiren concluded his talk by highlighting that using the long-term measurements from satellites and ground sensors, a strong connection between the increasing crop production and thus residue amounts, fire activity, and resulting particulate matter pollution over the entire breadth of IGP.

UTTARAKHAND TRAGEDY: POSSIBLE REASONS

Divecha Centre for Climate Change, under Rastrabhasha Samiti, hosted a Hindi webinar on 10 March 2021. Dr. Anil V. Kulkarni, Distinguished Scientist, Divecha Centre for Climate Change, IISc, delivered a Hindi talk on "Uttarakhand Tragedy: Possible reasons". The special invitees were from the Town Official Language Implementation Committee. Shri. Mohan Choudhury, Member

Secretary, Town official Language Implementation Committee (TOLIC) proposed a welcome to and introduced the speaker. Around 90 people attended the program.

Initially, Dr. Kulkarni gave a brief introduction to the state of the Himalayan cryosphere. He explained the Rishi Ganga valley's geographical location



and the events' sequence, which led to the loss of human life and damage to the Rishi Ganga and Topovan power projects. Dr. Kulkarni explained the various possible reasons for the formation of flash flood over glaciated terrain and its impacts on the ecosystem as a disaster. The available satellite data and field investigations suggest forming a deep fissure at the Trishul Peak's foothill.

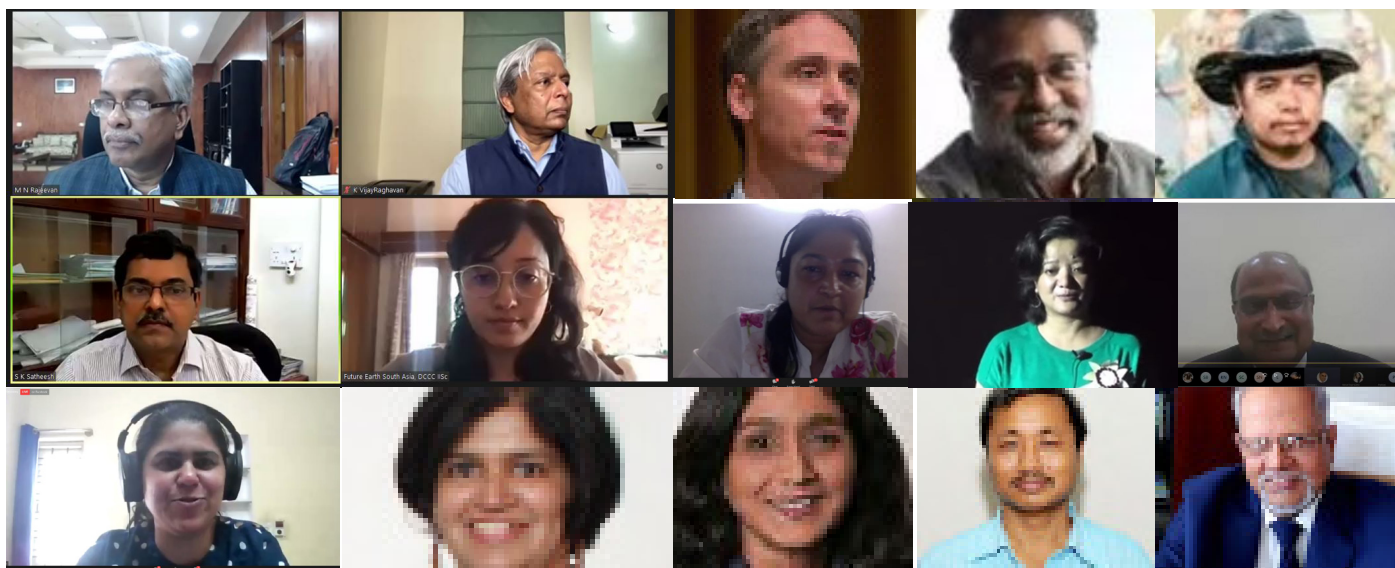
The fissure was expanded and leading to landslide and ice avalanched. The estimates on the volume of the hanging glacier and rockfall also discussed. Besides, Dr. Kulkarni also gave estimates of existing and potential glacier lakes and how further work needed to assess risks. Prof. Rajeev Ranjan, Chairperson, Official Language Unit, IISc, proposed a vote of thanks.

FUTURE EARTH BEST PRACTICES: DELIBERATING ON A WAY FORWARD

The Future Earth South Asia Regional Office, Divecha Centre for Climate Change, Indian Institute of Science, organized a webinar on “Best Practices: Deliberating on a Way Forward” on 11-12 Mar 2021.

The Inaugural session was opened by Prof. S. K. Satheesh, Director, Future Earth South Asia and Chair, Divecha Centre for Climate Change. Dr. Smriti Basnett, Co-director, Future Earth

South Asia, introduced the structure of Future Earth South Asia Regional Office and its various working group. Guest speaker, Dr. M. Rajeevan, Chair, National Committee, Future Earth India, and Secretary, Ministry of Earth Sciences, Government of India, discussed the effects of climate change especially on developing and least developed countries. Guest speaker, Dr. K. VijayaRaghavan, Principal Scientific Advisor to the Government of India,



Attendees of the Future Earth Webinar: First Row: Dr. M. N. Rajeevan, Dr. K. VijayaRaghavan, Dr. Josh Tewksbury, Mr. Jagadeesh Rao Puppala, Mr. Egam Basar
Second Row: Prof. S. K. Satheesh, Dr. Smriti Basnett, Ms. Kanupriya Harish, Ms. Priyadarshinee Shrestha, Dr. Paramesh
Third Row: Ms. Ulka Kelkar, Dr. Veena Srinivasan, Dr. Purnima Menon, Dr. Tapas Chakma, Dr. Ashok Ghosh

argued that sustainability is dependent on three components namely availability of green energy, change in nature of manufacturing and data analysis.

Mr. Jagadeesh Rao Puppala, Anchor and Curator, Foundation for Ecological Security (FES), shared his experiences with village commons (forests and

pastures community) in India. Mr. Egam Basar, Director, Arunachal Pradesh Horticulture Research and Development Mission (APHRDM), and Founder of EB-Project (Egam Basar Project), presented a case study of Integrated Springshed Development and Biodiversity Conservation at Soi Village (Arunachal Pradesh). This was followed by panel

discussions to bridge the gap between science, policy makers and practice.



On the second day, Ms. Kanupriya Harish, Executive Director, Jal Bhagirathi Foundation, Rajasthan, presented a case study in Thar Desert where her NGO implements projects to create water availability for distressed communities in Western Rajasthan. Each village has set up water associations to manage water storage, consumption, and sanitization. The project has reached 500 villages, 20000 water harvesting structures have been revived, 4000 million liters are being harvested each year. Ms. Priyadarshinee Shrestha, Team Lead, WWF India, Kanchendzonga Landscape, deliberated on the issues of nature conservation and zero waste management in mountain states. She highlighted on some mountain specific challenges faced in these states such as plastic strewn across mountainous terrain. She concluded her talk by laying out a road map for future of Indian Himalayan States.

In Session 2 on “Sustainable Agro-Ecology in the Indian Himalayan Region (IHR): Experiences, Challenges, and Solutions.” Ms. Binita Shah, Founder, Supa Agricultural Research Group (SARG), Uttarakhand, spoke about the challenges in agricultural systems in the mountains. She said that Agro Eco-diversity is the major building blocks of agricultural landscapes in the

mountains. She emphasized that food security was very crucial in these parts irrespective of quality. Ms. Seno Tsuhah, a community development worker in the North East Network (NEN) spoke about the practices of ecological farming and sustainable livelihoods in mountain regions. She said that bringing in farmers from different communities to form a network will promote Agro-ecology, strengthen biodiversity. She concluded her talk by highlighting on the pathways for building resilient future. Mr. Amba Jamir, Environmental lawyer spoke on traditional upland farming systems. He spoke on the institutional and cultural linkages to traditional farming. Resilience building along with long term sustainability of mountain farming is important.



In Session 3 on “The Air We Breathe; The Water We Drink: Health Risks associated with Air and Water Pollution.” Dr. H. Paramesh, visiting Professor, Divecha Centre for Climate Change spoke about health risks associated with air pollution. He shared recent study data on health impacts and number of people affected due to air pollution. According to this study 24,60,000 premature deaths are recorded in India on account of air pollution. He detailed the measures to be taken to mitigate air pollution. Dr. Ashok Ghosh, Chairman, Bihar State Pollution Control Board spoke about Arsenic

poisoning and health risks associated with it. Arsenic exposure is linked to cancer, heart, and developmental problems. He concluded by listing priorities that need to be addressed to answer arsenic issues, from ground to water to food chain to health impacts. Dr. Tapas Chakma, Scientist, National Institute for Research in Tribal Health spoke about Health Effects of Fluoride Contamination and ways to mitigate Fluorosis. He showed that about 66million people in the country are at risk. He highlighted the use of Cassia Tora as nutritional supplement for aid in reversal of fluorosis.

In Session 4 on “Turning Challenges into Opportunities: Working the Water-Energy-Food Nexus.” Dr. Purnima Menon, Senior Research Fellow from International Food Policy Research Institute (IFPRI), New Delhi, discussed the food and nutrition sector’s challenges. She highlighted that to handle India’s nutrition challenge, there is a basic need to formulate a policy that addresses poverty and social inequality. Dr. Veena Srinivasan, Senior Fellow and Director from Centre for Social and Environmental Innovation, Ashoka Trust for Research in Ecology & The



Environment (ATREE), Bengaluru, spoke about immense groundwater use in agriculture in India. There is a need to treat ground and surface water as an integrated resource. Surface water flows also get affected by heavy groundwater abstraction. Ms. Ulka Kelkar, Director, Climate Program, World Resources Institute - India, spoke about the energy

sector’s challenges. Ms. Ulka explained that agriculture accounts for 20-25% of total electricity consumption in India. Next, she highlighted the climate change aspects of the challenges being faced in the energy sector. She also discussed that agroforestry could help in carbon sequestration while providing healthy fruits for children having malnutrition.

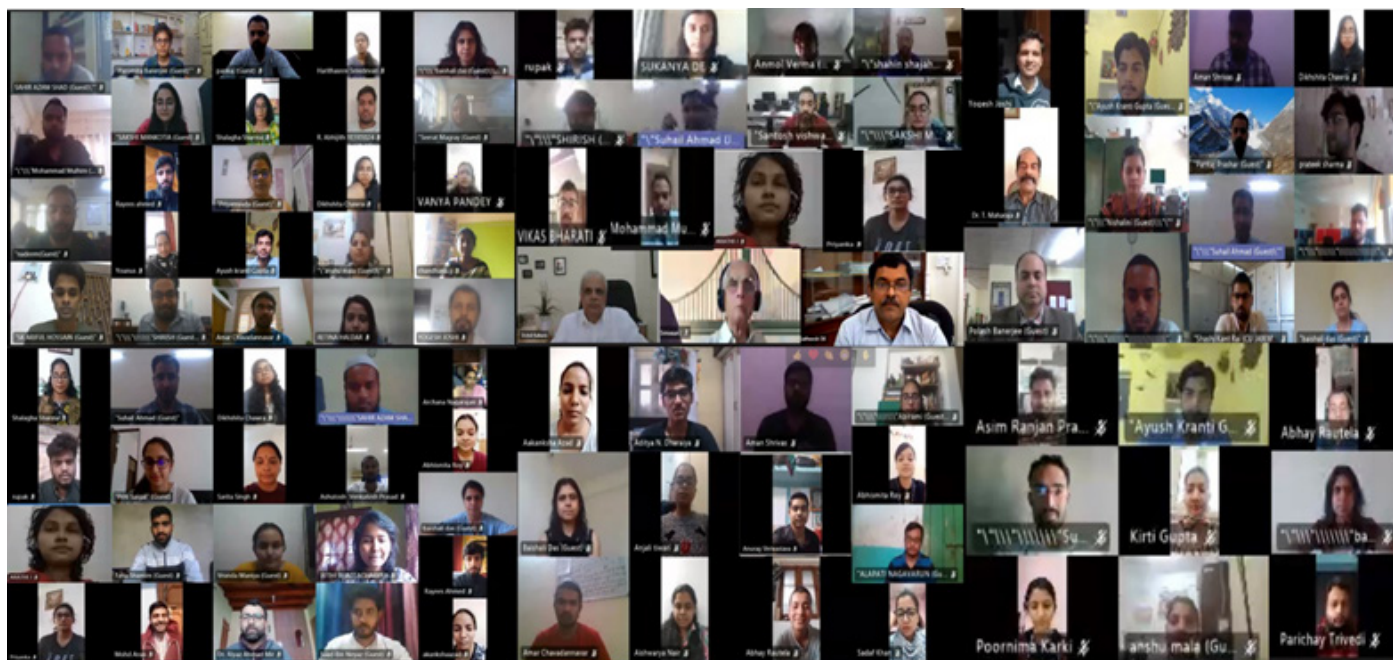
TRAINING PROGRAM ON GLACIER STUDIES AND REMOTE SENSING

A Training on “Glacier studies and Remote sensing” was organized by Divecha Centre for Climate Change, Indian Institute of Science, Bengaluru, from March 16 to 26, 2021. The DST-Centre for Excellence in Climate Change funded the program.

The program received an overwhelming response from the student community. We received 265 applications from

Indian students and three from foreign universities. Since the program organized online, we selected 230 applicants for the training, depending upon their educational qualification and research interest.

The participants were from all parts of India. Prof. S.K Satheesh, Chair, Divecha Centre for Climate Change, inaugurated the program. He described



the importance of glaciological training to create high-quality human resources. He thanked the glaciology team for organizing the program consistently for almost a decade.

The training covered numerous topics such as climate change, remote sensing, glaciology, remote sensing applications for snow monitoring, glacier studies, and mass balance. Besides, recent issues such as the Flash flood in Rishi Ganga valley also discussed. Highlights of the training were hands-on training on

various aspects of glacier studies. These specially designed practicals at Divecha Centre for Climate Change provide basic scientific idea behind glaciological research. Prof. J. Srinivasan and Dr. Anil V. Kulkarni, Distinguished Scientists at DCCC, delivered the lectures. Students and project associates conducted the practicals.

HINDI QUIZ ON ENVIRONMENT AND CLIMATE CHANGE

The Divecha Centre for Climate Change, IISc, along with the Official Language Unit of IISc, conducted the first online Hindi quiz on the topic, "Environment and Climate Change". The online event was for the Town Official Language Implementation Unit members (TOLIC) members from TOLIC 1 and 2, TOLIC PSUs and TOLIC banks and was held on 18 March 2021. Students from a few colleges from across the state of

Karnataka also participated.

The online quiz generated a lot of interest amongst TOLIC members from across Public Sector Units (PSUs), banks and the student community. In all over 180 participants registered for the quiz, with over 100 participants logging on to participate in the online. The quiz was conducted in Hindi, by Prof. J. Srinivasan, Distinguished Scientist, Divecha Centre



for Climate Change, IISc.

The participants of the environment and climate change quiz were very enthusiastic and knowledgeable, with the participants answering every question that the quiz master had on the subject. Various questions from the causes for the sea level rise to causes for the melting Arctic ice were answered by the participants. Official Language Unit, IISc was gracious to announce a cash prize of Rs.500/- for every correct answer. There were 25 questions in all, and the prizes

were shared equally by college students and TOLIC members.

Thanks to the efforts of Prof. J. Srinivasan, Ms. V. Thilagam (Official Language Unit, IISc) and Prof. R. Ranjan, Chairperson Official Language Unit, IISc, the online quiz was a grand success. Prof. S. K. Sateesh, Chairman, Divecha Centre for Climate Change was the guest of honor for the event, and he congratulated and announced the names of the prize winners.

WORKSHOP ON CAMPUS DECARBONIZATION

The Global Alliance of Universities on Climate (GAUC) was launched in January 2019 at the Annual Meeting of the World Economic Forum in Davos, Switzerland. The GAUC now has 13 member institutions from nine countries. The GAUC is intended to provide a mechanism for exchange and cooperation, specifically to lead efforts from global higher education to examine the technical, social, psychological, institutional and economic issues of climate change and how practical action can be implemented. The member institutions of the GAUC are committed to the initiation and support of actions which are required to respond to the

global challenge of climate change.

A campus decarbonization workshop was hosted online by GAUC and University of Tokyo on 11 March 2021. During this workshop Prof. S.K. Satheesh, Chairman, DCCC discussed the plans at Indian Institute of Science to reduce the carbon emissions on campus. He showed that carbon emissions at IISc campus was around 5 tonnes per capita and indicated that the use of solar power and electrical vehicles will be used to reduce the carbon footprint.



The poster features a green background with a hexagonal pattern on the left. The GAUC logo is at the top right. The main title 'CAMPUS DECARBONIZATION WORKSHOP' is in large, bold, white letters. Below it, 'PRESENTED BY' is followed by the University of Tokyo logo and name in Japanese and English. The event details '11 MARCH 2021' and '20:00~23:00 JST / 11:00~14:00 GMT' are listed in the bottom left.

GAUC
Global Alliance of
Universities on Climate

**ZOOM
WEBINAR**

11 MARCH 2021

20:00~23:00 JST
11:00~14:00 GMT

**CAMPUS
DECARBONIZATION
WORKSHOP**

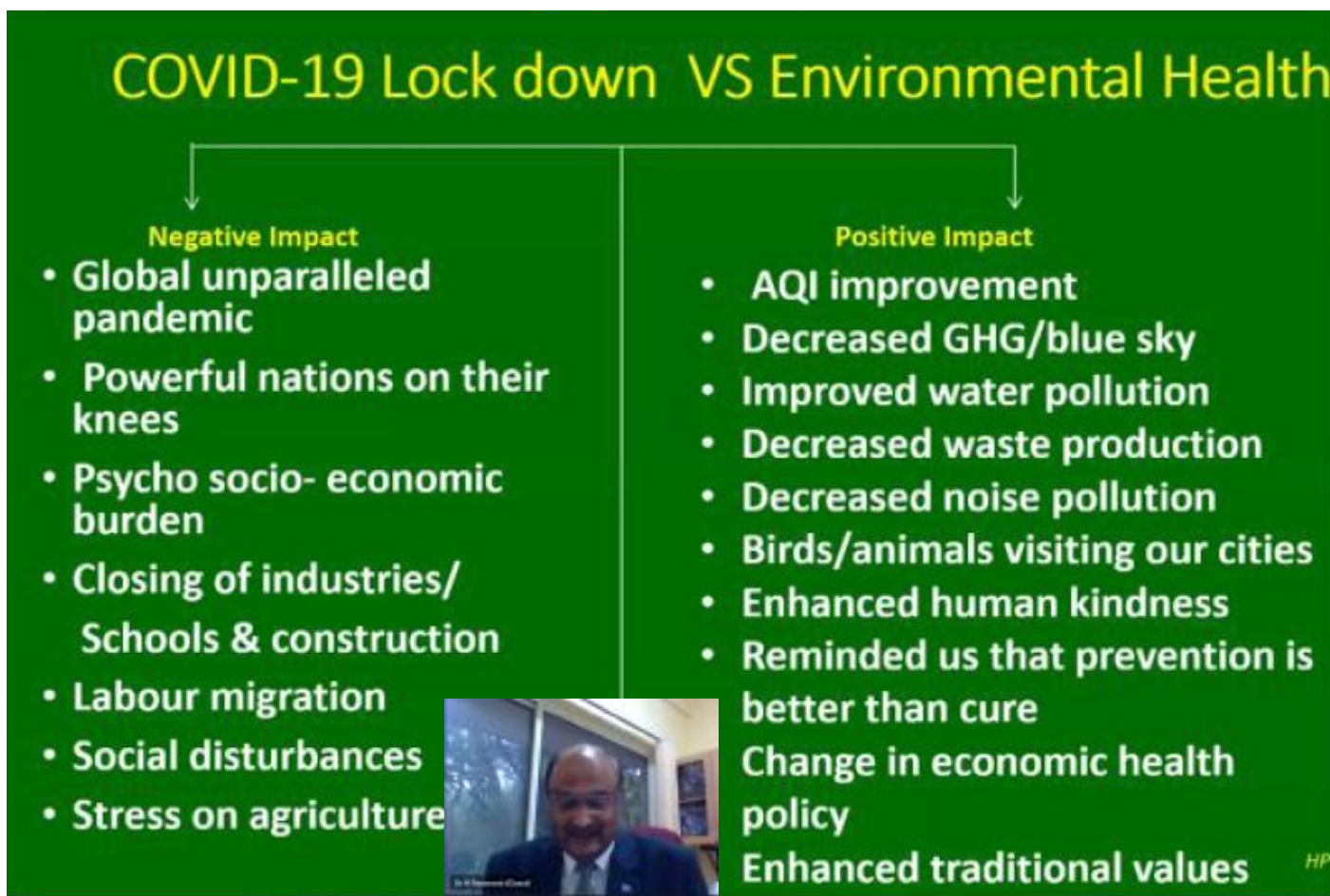
PRESENTED BY

 **東京大学**
THE UNIVERSITY OF TOKYO

COVID-19 VACCINES: BASICS AND FAQ's

Divecha Centre for Climate Change organized a webinar on "COVID-19 VACCINES: BASICS AND FAQ's" by Dr. Paramesh, Visiting Professor, Divecha Centre for Climate Change, IISc on 1 Feb 2021. Covid-19 virus pandemic is the most serious disastrous viral infection for the past century. Vaccines can prevent infectious diseases when most people in the community are vaccinated the spread of the disease is limited. Dr. Paramesh highlighted on the different vaccines used in India and its side effects.

Vaccines are being developed using different technologies. Normal vaccine development takes over 8 to 10 years by sequential steps. Immunogens are used to develop viral vaccines. In order to accelerate Covid19 vaccine development all the steps are done in parallel without compromising the usual safety, efficiency and monitoring mechanism and long term follow up after marketing. There are 7 methods in preparing the viral vaccine with variable advantage and disadvantages. In India



we produced 2 vaccine Covishield and CoVaxin which have clearance from authorities and used on Covid worriers. Balancing of cells in a human body is important to attain immunity. There are many COVID-19 vaccines being developed because it is not yet known

which is the most effective and safe. Different vaccination types may be needed for different population groups. On 28 May 2020 WHO announced the launch of a coordinated international, concurrent randomized controlled phase III of different vaccine candidates.

Different vaccines require different storage temperatures, storage, and transportation methods. The vaccine vials must be discarded if there is discoloration or the vial is thawed. All health care workers are at a higher risk of infection of COVID-19 despite precautions. Hence these workers along with front line workers were prioritized for taking the vaccine.

Dr. Paramesh advised the participants to

receive the complete vaccine course to get protection as it will limit the spread of the disease to the close contacts such as family members, co-workers, and friends. He also laid out the reactions or side effects caused by the Covishield and CoVaxin vaccines. Dr. Paramesh concluded his talk by emphasizing some important precautionary measures one has to take always to prevent oneself and others from catching the infection.

How to protect ourselves & others

9 important COVID-19 prevention measures



01 Stay home and self-isolate if you feel unwell, even with mild symptoms



02 Clean hands frequently with soap & water for 40 seconds or with alcohol-based hand rub



03 Cover your nose and mouth with a disposable tissue or flexed elbow when you cough or sneeze



04 Avoid touching your eyes, nose and mouth



05 Maintain a minimum physical distance of at least 1 metre from others



06 Stay away from crowds and avoid poorly ventilated indoor spaces



07 Use a fabric mask where physical distancing of at least 1 metre is not possible



08 Use a medical / surgical mask if you may be at higher risk (age, medical conditions)



09 Regularly clean & disinfect frequently touched surfaces

ENVIRONMENTAL ISSUES IN RELATION TO DEVELOPMENTAL DISABILITY

Dr. Satish Girimaji, Dean Behaviour Sciences, NIMHANS, Bengaluru addressed the members of Divecha Centre for Climate Change IISc., COMHAD and Lakeside Education Trust on “Environmental Issues in Relation to Developmental Disability: Causes and Prevention” on 1 January 2021. It was chaired by Prof. M.S Mahadevaiah, Developmental Neurologist KIMS Bengaluru.

The newborn brain weighs 350G and reaches 1300-1400G in adult. 75% growth occurs at 1 year and 90% at 2yrs

of age. It has nearly 100 billion nerve cells. Even though it is 2% of the body weight it consumes 20% of total Oxygen. The factors which affect the early Neuro developmental disorders are from genetic variants and environmental pollution from toxins, nutritional deficiencies, infections, injury, hypoxia and ischemia, leading to lifelong impairments in functioning such as Intellectual disability; Autism; Specific language impairment; Specific Learning impairment and Cerebral Palsy.

The measures to mitigate in prevention during pre and perinatal period are:-

14:26:13

Request control Show participants Dismiss

Recording has started. This meeting is being recorded. By joining, you are giving consent for this meeting to be recorded.

What are neurodevelopmental disorders (NDD's)?

- A heterogeneous group of disorders
- Present with impairments in one or more areas of development
 - motor, cognitive, social, language / communication
- As a result of aberrant or atypical growth, maturation and development of brain
 - neurogenesis, neuronal differentiation, neuronal migration, axon guidance, synapse formation, synaptic pruning and refinement

• OTHER PROBLEMS OF GROWTH AND DEVELOPMENT (BIRTH)

- Major congenital anomalies – eg., sensory impairments, CHD....

mamatha g (Guest)

Prachi Rath

Dr. Uday Boudhan

Dr. Uday Boudhan

Dr. Uday Boudhan

Ankit Swamy

4:56 PM 1/21/2021

- Improve nutritional status of girl child and pregnant woman
- Avoid pregnancy before 18yrs and after 35yrs
- Use of iodized salt and folic acid supplementation
- Avoid exposure to physical and chemical teratogenic agents
- Care of high-risk pregnancies


- Optimum newborn care
- Postnatally:
- Regular immunization
 - Proper nutrition from traditional
 - Providing safe secure, stimulating environment
 - Early detection and intervention of developmental delays

ENVIRONMENTAL ISSUES IN THE PREVENTION OF THE CONGENITAL AND ACQUIRED HEART DISEASES

Padmashri Dr. C.N. Manjunath, Director of Jayadeva Institute of Cardiovascular Sciences and Research, Bengaluru, addressed the members of DCCC IISc., COMHAD and Lakeside Education Trust on 25 February 2021. It was chaired by Dr. A.C Sriram, Chairman Mallige Education Institutes. The topic was “Environmental Issues in the prevention of the Congenital and Acquired Heart Diseases”.

The epigenetic changes and environmental pollution including nutrition contribute for the congenital heart defects. SO₂, CO₂, and Heavy metals like Lead, and Mercury cause epigenetic changes along with NO_x, CO, Pesticides and maternal obesity. The maternal smoking increases 10-48% chances of CHD. The incidence of CHD is 0.8% more in premature babies.

Air pollution – particulate matter, sulfur dioxide, organic solvents




- SO₂, CO, heavy metals like lead, mercury are known to cause epigenetic alteration leading to CHD
- RVOTO, PS, AS, d-TGA, - due to organic solvents: (OR 2.1, 95% CI 1.1 to 3.8)

Ngwezi DP, Hornberger LK, Serrano-Lomelin J, Nielsen CC, Fruitman D, Osornio-Vargas A. Industrial developmental toxicants and congenital heart disease in urban and rural populations. *Challenges*. 2018; 9:26. Gilboa SM, Desrosiers TA, Lawson C, Lupattelli M, et al. Association between maternal occupational exposure to organic solvents and congenital heart defects, National Birth Defects Prevention Study, 1997–2002. *Occup Environ Med*. 2012; 69:628–635.

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Challenges. 2018; 9:26. Gilboa SM, Desrosiers TA, Lawson C, Lupattelli M, et al. Association between maternal occupational exposure to organic solvents and congenital heart defects, National Birth Defects Prevention Study, 1997–2002. *Occup Environ Med*. 2012; 69:628–635.



Satheesh SK EP DS Chanchal K YP Dr.Manjunath (Guest)

It is interesting to note that totally breast-feeding mothers who are on polished rice diet have deficiency of thiamine (B1) and their infants between 1-6 months developed breathing difficulty from pulmonary hypertension, 97% of them were saved by supplementary thiamine and mothers were encouraged to use thiamine rich food and unpolished rice.

There is decline in the Rheumatic heart disease from 60's to 80's due to steady improvement of living conditions, change

in the virulence pattern of streptococcus germ and introduction of antibiotics.

Heart attacks are increased in younger age. Sitting more than 6 hours a day decreases life span in man by 20% and in women by 40%. Smoking one cigarette reduces your life span by 11 minutes and watching TV for one hour by 22 minutes. One can expect good health to all with clean air; safe drinking water; unadulterated food and tackling malnutrition with regular skeletal muscle exercises.

IMPACT OF ENVIRONMENT AND CLIMATE CHANGE IN PREVENTION OF KIDNEY DISEASES

Dr. Ajit K. Huilgol, Director and Chief Transplant Surgeon, Karnataka Nephrology and Transplant Institute, Columbia Asia Hospitals, Bengaluru and Mysore, delivered a talk on the “Impact of environment and climate change in the prevention and control of kidney diseases” during World Kidney Day on 25 March 2021. This talk was organized by Divecha Centre for Climate change and Lakeside education trust.

He argued that an increase in external

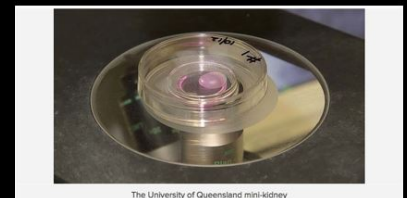
temperature increases the internal core body temperature, resulting in dehydration and results in blood becoming more concentrated. A sudden increase in body temperature, as in heatstroke, can cause increased risk of heat-induced inflammatory injury to the kidney. The combination of heat stress and dehydration plays a significant role in the formation of kidney stones. The neglect of proper hydration, and poor sanitary facilities, especially for women in the poor and developing countries, can

CLONING OF KIDNEYS

3D PRINTING OF KIDNEYS



KIDNEYS FROM STEM CELLS



lead to recurrent urinary tract infections.

Recurrent heat and dehydration can eventually result in chronic kidney disease. There has been a large increase in chronic kidney disease during the past three decades. As global warming continues unabated, the demand for kidney dialysis, including hemodialysis

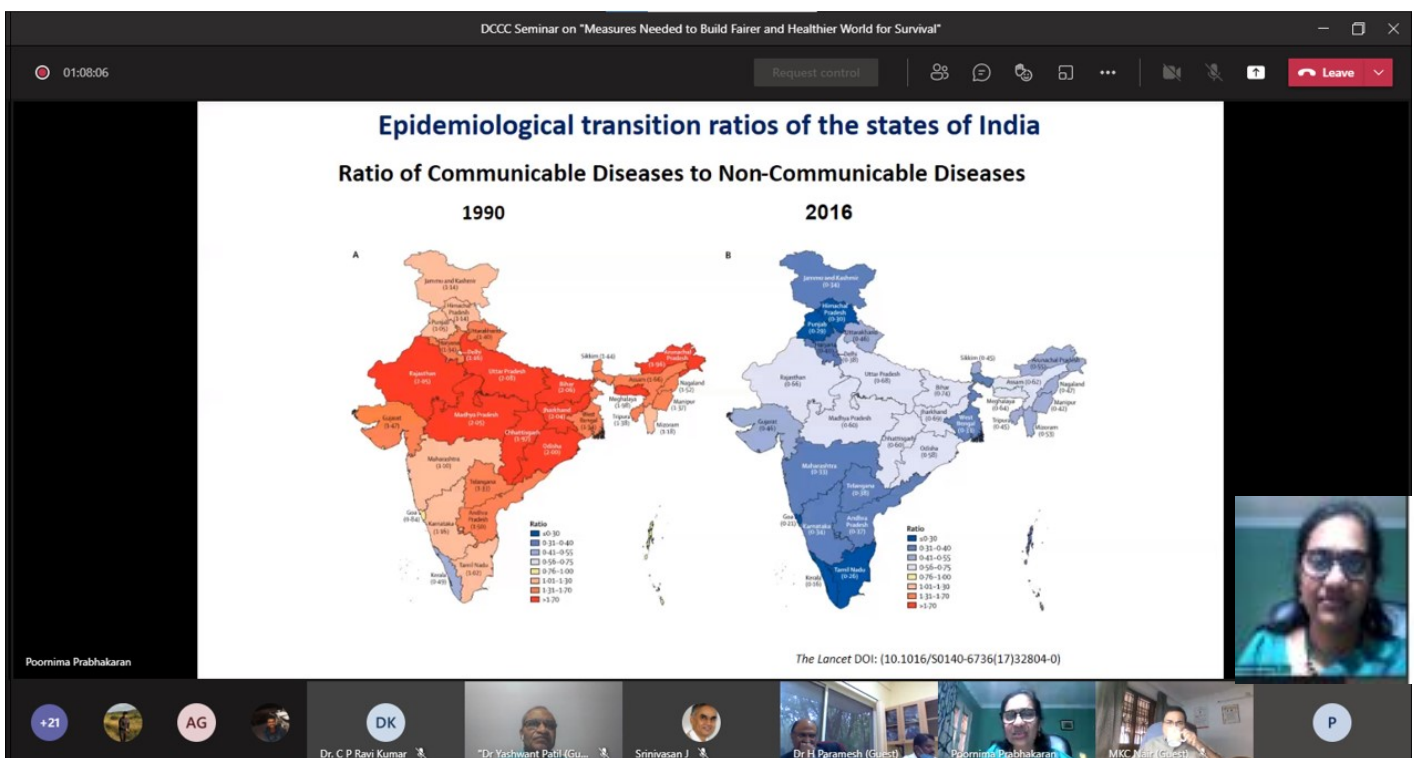
as well as peritoneal dialysis, produces vast amounts of waste which contribute to greenhouse gas emissions and global warming. Hence, there is a pressing need to address the issues of resource use and carbon emissions during kidney care delivery.

MEASURES NEEDED TO BUILD FAIRER AND HEALTHIER WORLD FOR SURVIVAL

On the occasion of the Earth day on 22nd April, 2021, Divecha Centre for Climate Change organized a talk on “Measures Needed to Build Fairer and Healthier World for Survival” by Dr. Poornima Prabhakaran, Deputy Director, Centre for Environmental Health, Public Health Foundation of India.

In this talk, Dr. Prabhakaran highlighted the gaps in public health infrastructure, healthcare delivery and governance in dealing with the present pandemic. India Air pollution is a major contributor to the mortality and morbidity in

India. In India, outdoor and indoor air pollution contributed to over 1.67 million annual deaths from stroke, heart attack, diabetes, lung cancer, chronic lung diseases and neonatal diseases in 2019. The progress on air pollution mitigation and control has, however, been limited, India is urbanizing and the chronic health conditions associated with urban living are on the rise. Air pollution and climate change are closely linked and both directly and indirectly impact human health, highlighting the co-benefits of addressing both these issues in tandem. Those who interact



with greenspaces enjoy better health but many city development projects often eliminate existing urban green spaces. Around 20% of deaths were attributable to modifiable environmental risk factors, thus pointing to the potential for prevention, intervention, and remedial action to promote health and prevent disease.

The theme of the Earth day this year is “Restore our Earth”. Dr. Prabhakaran suggested various ways to mitigate environmental pollution and climate change to ensure that future generations enjoy better health.

RESEARCH HIGHLIGHTS



THE IMPACT OF CHANGES IN DISCHARGE OF AMAZON ON THE CLIMATE OF THE ATLANTIC OCEAN

The Amazon river has a profound impact on global climate because it discharges around 6600 cubic kilometre of water per annum into the Atlantic Ocean. Global warming will alter the precipitation pattern in South America and hence will alter the amount of water discharged into the Atlantic Ocean. How will the variations in the discharge of the Amazon river alter the regional climate in the Atlantic Ocean?

Prof. Vinayachandran and Ravi Nanjundiah at Divecha Centre for Climate Change and doctoral student Jahfer Sharif at Centre for Atmospheric and Oceanic Sciences, Indian Institute of Science examined this issue through simulations in a coupled ocean-atmosphere model. They simulated the impact under two extreme scenarios. The first one was a complete shutdown of the discharge into

the Atlantic Ocean and the second was doubling the discharge of Amazon river into the Atlantic Ocean.

Their simulations showed that the discharge of water from the Amazon into the Atlantic Ocean has a major impact on the location of the tropical rain band in the tropical Atlantic Ocean during July and August. When there is no discharge of water into the Atlantic the rainfall band (called Inter-tropical Convergence zone or ITCZ) moves northward in July and if the discharge is doubled the rainfall band moves southward in August. The movement of this tropical rainband will lead to changes in rainfall pattern in West Africa.

Reference: S. Jahfer, P. N. Vinayachandran and Ravi S. Nanjundiah, Environmental Research Letters, 15, May 2020

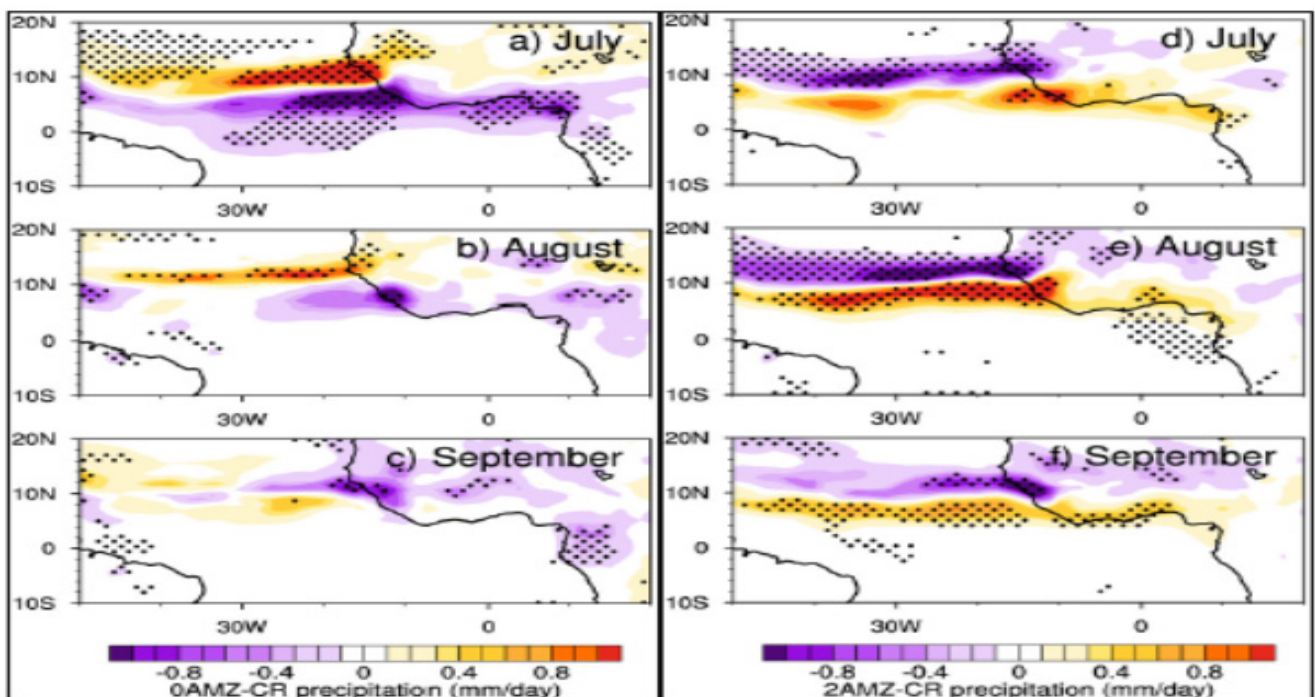


Figure: The impact of no discharge from the Amazon river on rainfall is shown in the left figure while the effect of doubling the discharge from Amazon is shown in the right figure.

HOW AEROSOLS INFLUENCE THE OPTICAL WIRELESS COMMUNICATION LINKS

The ever-increasing demand for faster internet demands may cause regime shift from existing Radio Frequency technology to higher bandwidth light-based telecommunication systems like optical wireless communication, where more data can be transmitted with lesser power. Optical pulses propagating through the atmosphere experience scattering and absorption losses imparted by gas molecules and aerosols and intensity fluctuations induced by atmospheric turbulence. Moreover, they are subjected to an increase in their pulse widths, as different wavelength components travel at different velocities. This leads to interference (overlapping of pulses) and sets a maximum limit to the reliable data transfer rate. While the absorption and scattering losses can be easily modelled and compensated, it is difficult to model the turbulent fluctuations.

A recent study using balloon and satellite observations along with radiative transfer computations show that, over and above these losses, aerosol-induced atmospheric heating leads to an additional broadening in

optical pulses by modifying the turbulent fluctuations. A higher absorption of solar radiation by aerosols can lead to more pulse broadening. Narrow pulses, due to their wider frequency spectra, are more vulnerable to such aerosol effects while the broader pulses are more resilient. This enhanced pulse broadening due to aerosols will reduce the anticipated performance and ultimately set limits on improving the efficiency of terrestrial as well as ground-to-satellite links.

Reference: K. Sunilkumar, N. Anand, S. K. Satheesh, K. Krishna Moorthy, G. Ilavazhagan, Enhanced optical pulse broadening in free-space optical links due to the radiative effects of atmospheric aerosols, Optics Express, 2021, <https://doi.org/10.1364/OE.409794>

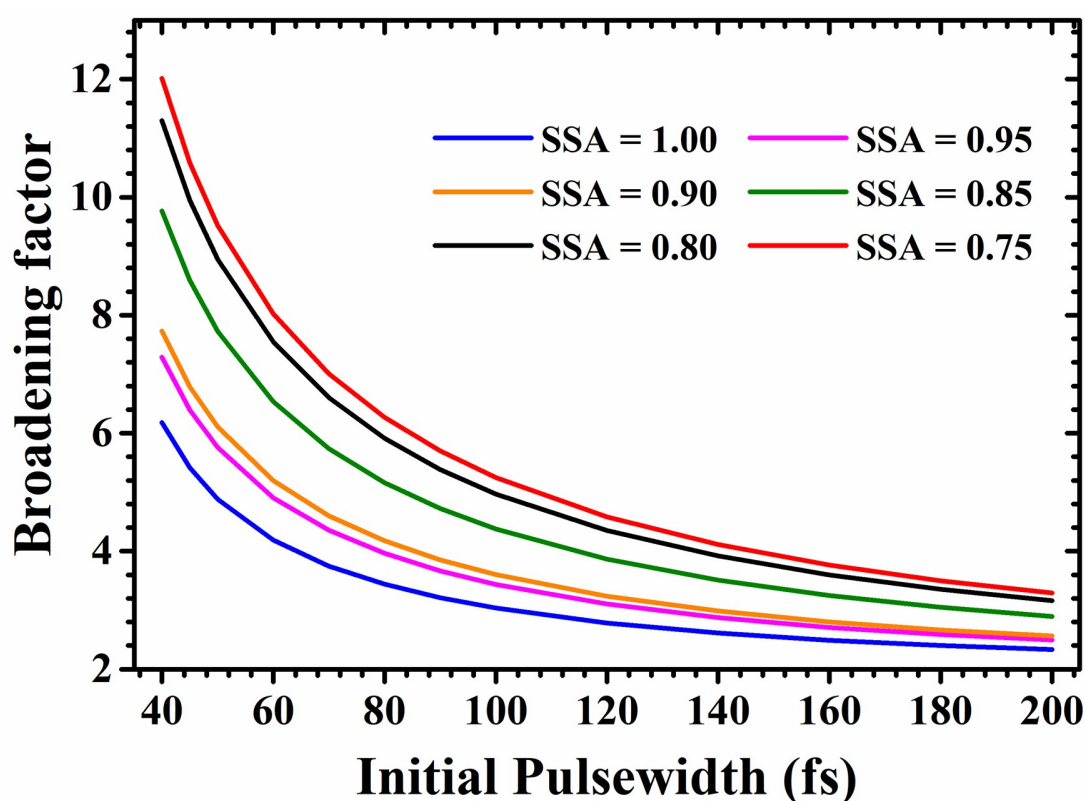


Fig. Variation in optical pulse broadening factor (ratio of received to input pulse widths) for different initial pulse widths and aerosol single scattering albedo (SSA). SSA is a ratio of absorption by the aerosol to the sum of absorption and scattering.



