National Conference on 'Impact of Climate Change on Air Quality, Biodiversity and Agriculture'

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Air pollution and climate change stimulate each other through complex interactions in the atmosphere. Rapid increase in green house gases alter the energy balance between the atmosphere and the Earth's surface which, in turn, can lead to increase in temperature consequently change the chemical composition of the atmosphere. Since some air pollutants clearly increase warming, there is considerable interest in understanding the co-benefits of managing air pollution and climate change. Air pollutants are relatively short-lived, particularly compared with long-lived greenhouse gases, such as carbon dioxide (CO_2), and measures to control air pollutants could have an effect on climate change in the short term [1]. Therefore, evaluation of ambient air quality is required to verify the effectiveness of the control measures implemented, and for early detection of potentially harmful changes in atmospheric composition [2]. Global warming together with hazardous chemicals and fine particulate matter emitted into the atmosphere have contributed to weather extremes and threat to public health. Air pollution and climate change can lead to devastating impacts on the Indian monsoon dynamics, causing extreme weather events in India. Analysis of archived temperature data of India indicates rise in the surface air temperature [3,4].

Climate change threatens human health and well-being in many ways, including through more extreme weather events and wildfire, poor air quality, and diseases transmitted by insects, food, and water. Extreme weather events often lead to mortalities and a variety of health impacts on vulnerable populations, including impacts on mental health, such as anxiety and post-traumatic stress disorder [5]. Urbanization and industrialization contribute to emission of particulate matter, carbon monoxide, and other compounds, which can significantly reduce air quality [6]. Smoke exposure increases respiratory and cardiovascular related hospitalizations, emergency room visits and medication for asthma, bronchitis, chest pain, and other ailments." It has been associated with hundreds of thousands of deaths globally each year [7,8].

Indian national agencies manage air quality monitoring networks which provide important observation data that can be augmented with satellite data and model results to better assessemment of air quality and recent developments in the earth observation systems. The regional-scale observations, analyses and modeling results can be synthesized from the combination of global observations provided by models and national observations within India. Currently, these data are not approachable to their full potential and mostly limited to the particular research community in India. The opportunity to find, access and understand air quality data from different sources for examining, processing, overlaying and displaying would offer an added dimension to the air quality management processes.

Understanding the impacts of vegetation biodiversity on air quality and air quality on vegetation biodiversity is essential for sustaining healthy and diverse ecosystems, and for improving air quality and consequently human health. The impacts of vegetation on air quality depend in part on species and other aspects of plant biodiversity. The total amount of particulate matter less than 2.5 microns ($PM_{2.5}$) removed annually by trees in 10 US cities in 2010 varied from 4.7 t in Syracuse to 64.5 t in Atlanta [4]. Health impacts included the reduction of more than 670 000 incidences of acute respiratory symptoms, 430 000 incidences of asthma exacerbation and 200 000 days of school loss [9].

India is very much dependent on agriculture. Agricultural production determines the livelihood security as well as economic development of the country. Reduction in crop yield and consequently the economic losses caused air pollutants have major social, economic and environmental consequences. Sulphur dioxide, nitrogen oxides, ozone and suspended particulate matter are some of the important air pollutants causing yield loss in crops. Soybean and wheat crops are sensitive to ozone. Air pollution risk assessment of Indian crops will bring together experts and specialists on air pollution, to discuss the likely impacts of air pollution on agricultural production. It will help the decision makers to formulate necessary policy options to reduce the vulnerability of crops to air pollution [10].

Identifying the importance of climate chamge, air quality, human health, biodiversity, ecology and agriculture in India, a National Conference on 'Impact of Climate Change on Air Quality, Biodiversity and Agriculture' was held at Amity University Rajasthan, Jaipur during October 13-15, 2016. The objective of this conference was to bring together some key scientists and stakeholders from nation to discuss impact of climate change on air quality, health, biodiversity and agriculture and develop a research strategy for mitigation of impacts at the regional and global scale. The deliberations were categorized on the basis of Indian scenario under the following broad research themes:

1. Climate Change and Air Quality
2. Role of Climate Extremes in Changing the Climate
3. Air Quality, Climate Change, and Human Health
4. Air Quality System and Model Application

5. Impact of changing air quality on Biodiversity
6. Climate Change and Community Ecology
7. Air Quality and Agriculture

Total 18 presentations were made by eminent scientists from IITs, DU, ICAR, Amity University and other reputed academic and research institutions in India. Discussions after each session followed by separate panel discussions on each of the above mentioned themes where the respective chairperson highlighted the significant scientific findings and initiated discussion from the participants. In that manner, the conference had provided adequate opportunity for interaction among scientists and students. Finally, theme-wise recommendations were approved after discussion and modifications on impact of air quality and climate change on human health, weather extremes in changing climate, impact of changing air quality on biodiversity and community ecology for considering in further action plan.

It was observed that adequate emphasis has been given in India on research related to climate change. The Amity University Rajasthan, Jaipur has been successfully promoting and conducting effective activities and research on some of the selected topics discussed at the conference. However, there are a number of important issues which cannot be easily attended by the existing research facilities in the field of air quality measurements, weather and climate specially in Rajasthan, India. There is a critical need to establish a 'Centre of climate science and environment' in Rajasthan to help facilitate international collaboration in conducting research on the interactions among climate change, air quality, extreme events, biodiversity, ecology and human health. Government agencies like Department of Science and Technology, the Ministry of Earth Sciences, Government of India are expected to provide funds to set up the center. Proposed center will encourage and foster collaborative development of solutions to pressing issues in changing the climate which affect air quality and extreme weather, biodiversity, ecology and health.

The proposed Centre will focus on the following aspects:

1. Understanding about air quality- climate change complexity due to emission sources and meteorological conditions that contribute to global air quality affect

2. Impact of climate change on Biodiversity, ecosystem, agriculture and public health.

As these issues have been realized and identified, it is essential to develop an integrated modelling system with the inclusion of aerosols to better reproduce the observed rainfall distribution over India. And, conduct collaborated studies for better understanding the complexity of climate change, air pollution, health and other relted issues.

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