



**“Regional (East) meet of Institutes of Repute associated with NCAP:  
Convergence of Knowledge, Institutional Capacity and Infrastructure Building”**

*Jointly organized  
by*



**Bihar State Pollution Control Board**

**&**



**National Knowledge Network (NKN), IIT Kanpur**

**24<sup>th</sup> & 25<sup>th</sup> March 2023**

**Venue: Hotel Chanakya, Patna**



**Prof. Ashok Kumar Ghosh**

Ph.D, Erasmus Mundus Fellow

Chairman



**Bihar State Pollution Control Board**

No.-24/CH

Dated: 17.03.2023



## **Foreword**

Breathing air doesn't describe presence of particulate or any gaseous substances that may cause ill health to mankind. With a view to address the issue of clean 'air for all', the Ministry of Environment, Forest & Climate Change (MoEF&CC), Government of India has launched National Clean Air Program (NCAP) in 2019 and action plan is being implemented in 131 cities towards reduction of Particulate Matters to the tune of 30% by 2025-26. The MoEF&CC created National Knowledge Network (NKN), who has identified both State Level Institute of Reputes (SloR) and Institute of Reputes (IoR) to work with respective States and Urban Local Bodies.

Understanding the atmospheric intrusion and extrusion of pollutants from surrounding areas, State Action Plan for Prevention & Control of Air Pollution has been prepared, which requires time bound implementation with active scientific support, cooperation, association of both SloR and IoR.

Of late, the MoEF&CC is in the process to converge all programs entrusted or implemented with support of Ministry of Power; Ministry of Agriculture & Farmer Welfare; Ministry of Housing & Urban Affairs; Ministry of Road, Transport & Highways; Ministry of Petroleum & Natural Gas; Department of Heavy Industries; Ministry of New & Renewable Energy in all 131 cities.

In addition to these, India being geographically diverse and each of the State has unique advantages and disadvantages with respect to natural environmental support system. Therefore, the task entrusted to SloR and IoR have increased manifolds, which requires immediate attention, review and up gradation with respect to deliverables of NCAP targets.

I am personally happy that the NKN Coordinator, Prof. S. N. Tripathi at Indian Institute of Technology took personal interest to organise this two-days "Regional (East) meet of Institutes of Repute associated with NCAP: Convergence of Knowledge, Institutional Capacity and Infrastructure Building" on 24<sup>th</sup> and 25<sup>th</sup> March, 2023 at Patna.

I understand and sincerely believe that this first ever program will deliberate, discuss, demonstrate in a better way for the Convergence of Knowledge, Institutional Capacity and Infrastructure Building in the region and the way forward from this program shall definitely add value at the national level.

(Ashok Kumar Ghosh)

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**Parivesh Bhawan, Patliputra Industrial Area, Patna - 800 010**

Phone No. : +91 612 2261776, (Direct) EPABX - 2261250 / 2262265, Fax: +91 612 2261050

E-mail : chairmanbspccb@gmail.com Website : <http://bspccb.bih.nic.in>

## **National Knowledge Network**

With the objective of timely improvement of air quality in cities across India, the Ministry of Environment Forests and Climate Change (MoEF&CC) launched National Clean Air Programme (NCAP) in 2018. NCAP is a long term, time-bound, national-level strategy to comprehensively tackle India's toxic air problem. The plan envisions a 20-30 percent reduction in Particulate Matter concentrations by 2024 over 2017 levels. The National Knowledge Network (NKN) has been formed under the aegis of NCAP with an objective to build local technical capacities in order to create a large institutional support structure for the national plan. The NKN will also equip identified Institutes of Repute (IoR) for supportive action towards achieving NCAP targets. This capacity expansion will not only aid the current programme but also to create adequate capacity in States/UTs to support future air quality management efforts. As it stands, the NKN has been conceptualised as an advisory group to the Central Pollution Control Board (CPCB) and shall function with the support of CPCB under NCAP. The NKN Secretariat is being hosted at Indian Institute of Technology Kanpur from 2022-2025 with Prof. Sachchida Nand Tripathi as National Coordinator.

## **Bihar State Pollution Control Board**

Bihar State Pollution Control Board (BSPCB) created under the provisions of Water (Prevention and Control of Pollution) Act 1974 and entrusted and mandated to discharge duties as defined in Air (Prevention and Control of Pollution) Act 1981. BSPCB is the State Nodal Agency for implementation of NCAP in identified Non-Attainment Cities (NACs) in the State.



**Prof. Ashok Kumar Ghosh**  
Chairman, BSPCB

Dr. Ashok Kumar Ghosh is Chairman of Bihar State Pollution Control Board. He is also working as Professor and HoD, Research at Mahavir Cancer Institute and Research Centre, Patna. The main areas of his research are ground water quality and quantity. Dr. Ghosh has worked extensively on ground water arsenic contamination and its health impacts. He is PI of DST supported project INNOWATER. Dr. Ghosh is also working on International Project DELTAP supported by NWO Wotro of Netherlands, Project NUTRI-SAM supported by DST-UKIERI and Project FAR-Ganga supported by DST-NERC. He has active research collaborations with Technical University of Delft, The Netherlands, University of Manchester, UK and University of Salford, UK.



**Shri. S. Chandrasekar**  
Member Secretary, BSPCB

Shri. S. Chandrasekar serves as the Member Secretary of Bihar State Pollution Control Board and also as the Nodal Officer in coordinating the Climate Resilient and Low Carbon Development Pathway with UNEP and its partner organization. He is Indian Forest Service officer 2003 batch, holding bachelors in (Forestry), Advance Diploma in Forestry. He specializes in Forest and Wildlife Management, Zoo Management. Shri. Chandrasekar has been awarded for Excellent Service and Service Beyond Call of Duty and is the author of the book: "Butterflies - Flying Colours of Patna Zoo". He has served at various capacities managing the Valmiki Tiger Reserve Bihar, as Divisional Forest Officer, Rohtas Forest Division, Director Sanjay Gandhi Biological Park (Patna Zoo) and served as Nodal Officer, Forest PLUS 2.0 (USAID Project).



**Prof. Sachchida Nand Tripathi**  
Coordinator, NKN

Dr. Sachchida Nand Tripathi is a Higher Administrative Grade (Senior) Professor of Civil Engineering at IIT Kanpur. He is the recipient of Shanti Swarup Bhatnagar Award and the J C Bose National Fellowship. Prof. Tripathi holds the Arjun Dev Joneja Chair at IIT Kanpur. He is an elected fellow of the Indian National Science Academy (INSA), Indian National Academy of Engineering (INAE) and National Academy of Sciences of India (NASI) and recipient of the Distinguished Alumnus award of Banaras Hindu University. He was a Senior Fellow at NASA Goddard Space Flight Centre. He is also the Coordinator of the National Knowledge Network, formed under the National Clean Air Program and an expert member of Steering Committee and Monitoring Committee, National Clean Air Program and member of Executive Council, Climate Change Program, Department of Science and Technology. Prof. Tripathi received his Ph.D. (Environmental Engineering) from University of Reading, UK, M.Tech. (Environmental Engineering) from NIT-Allahabad (1995) and B.Tech. (Civil Engineering) from IIT-BHU. His Field of Specialization includes Climate Change, Air Quality and Nuclear Safety.

## Programme Schedule

Day 1 – 24 March 2023, Friday		
09:00	Registration and Arrival of Guests / Dignitaries	
09:30 - 09:35	Welcome to Hon'ble Chief Guest with flowers	
09:35 - 09:45	Inauguration of Workshop and lighting of lamp	
09:45 - 09:50	<i>Welcome address by Prof. Ashok K. Ghosh</i> , Chairman, BSPCB	
09:50 - 09:55	<i>Objectives &amp; purpose by Prof. S. N. Tripathi</i> , Coordinator, NKN	
09:55 - 10:00	Address	<b>Shri N Jawahar Babu</b> , Principal Chief Conservator of Forests, Govt. Of Bihar
10:00 - 10:05		<b>Shri Balamurugan D</b> , Secretary, Rural Development, Govt. Of Bihar
10:05 - 10:10		<b>Shri Naresh Pal Gangwar</b> , Additional Secretary, MoEF&CC / <b>Shri Tanmay Kumar</b> , Chairman, CPCB
10:10 - 10:15		<b>Shri Arvind Kumar Chaudhary</b> , Principal Secretary, DoEF&CC, Govt. Of Bihar
10:15 - 10:20		Hon'ble Minister <b>Shri Tej Pratap Yadav</b> , DoEF&CC, Govt. Of Bihar
10:20 - 10:25		Vote of thanks - <b>Shri S. Chandrasekar</b> , Member Secretary, BSPCB
10:25 - 11:00		Group Photograph
11:00 - 11:30	<b>High Tea</b> Invitation by Shri S. Chandrasekar	
<b>11:30 – 13:15      Technical Session-I (Moderator: Prof. Ashok Kumar Ghosh)</b>		
11:30 - 11:50	<b>Theme 1:</b> How effective is Air Quality Management across Indian Cities with special reference to IGP and Eastern IGP <b>Keynote Speaker:</b> Prof. Sachchida Nand Tripathi <b>Title:</b> Nationwide Air Quality Monitoring Combining Sensors Plus Satellite Images with AI & ML	
11:50 - 12:00	Open Discussion	
12:00 - 12:15	<b>Theme 2:</b> Consideration of Geographical & Meteorological Impact in Performance Evaluation <b>Speaker 1:</b> Prof. Shubha Verma <b>Title:</b> The Bihar Pollution Pool: Is it realistic, persistent, manmade or natural?	
12:15 - 12:25	Open Discussion	
12:25 - 12:40	<b>Speaker 2:</b> Shri S Chandrashekar <b>Title:</b> Bihar: Agglomeration of Pollutants / Dusts – Meteorological factors at ground-preliminary observations	
12:40 - 12:50	Open Discussion	
12:50 – 13:05	<b>Speaker 3:</b> Shri Anand Shankar <b>Title:</b> Influence of meteorological factors on the concentration, transportation, and dispersion of particulate matter over Bihar, India	
13:05 – 13:15	Open Discussion	
13:15 - 14:30	<b>Lunch</b>	
<b>14:30 - 15:20      Technical Session-II (Moderator: Shri. R. Suresh)</b>		
14:30 - 14:45	<b>Theme 3:</b> Air Quality Measurement, Monitoring & Management <b>Speaker:</b> Dr. Kripa Ram <b>Title:</b> Factors influencing air pollution mitigation and management in India	
14:45 - 14:55	Open Discussion	
14:55 - 15:10	<b>Theme-4:</b> Trajectory analyses of pollutants & Health Impact studies <b>Speaker:</b> Dr. Ravindra Khaiwal <b>Title:</b> Community Engagement in the reduction of Air Pollution and Human Health Effects	
15:10 - 15:20	Open Discussion	
15:20 - 16:00	<b>High Tea</b>	
16:00 - 17:30	Round table & valedictory (Moderator: Prof. S.N.Tripathi)	
19:30	<b>Grand Dinner</b>	
Day 2 – 25 March 2023, Saturday		
10:00 - 13:30	CAAQMS at Rajgir & Nalanda visit	

## Technical Session – I

**Theme 1:** How effective is air quality management across Indian cities with special reference to IGP and Eastern IGP.

**Keynote Speaker:** Prof. Sachchida Nand Tripathi



Dr. Sachchida Nand Tripathi is a Higher Administrative Grade (Senior) Professor of Civil Engineering at IIT Kanpur. He is the recipient of Shanti Swarup Bhatnagar Award and the J C Bose National Fellowship. Prof. Tripathi holds the Arjun Dev Joneja Chair at IIT Kanpur. He is an elected fellow of the Indian National Science Academy (INSA), Indian National Academy of Engineering (INAE) and National Academy of Sciences of India (NASI) and recipient of the Distinguished Alumnus award of Banaras Hindu University. He was a Senior Fellow at NASA Goddard Space Flight Centre. He is also the Coordinator of the National

Knowledge Network, formed under the National Clean Air Program and an expert member of Steering Committee and Monitoring Committee, National Clean Air Program and member of Executive Council, Climate Change Program, Department of Science and Technology. Prof. Tripathi received his Ph.D. (Environmental Engineering) from University of Reading, UK, M.Tech. (Environmental Engineering) from NIT-Allahabad (1995) and B.Tech. (Civil Engineering) from IIT-BHU. His Field of Specialization: Climate Change, Air Quality and Nuclear Safety.

**Title:** Nationwide air quality monitoring combining sensors plus satellite images with AI & ML.

Air pollution primarily particulate matter, PM leads to the loss of 8 million human lives globally every year. In India it causes 1.8 million premature deaths annually. To combat Air pollution India launched the National Clean Air Program (NCAP) which is being implemented in 133 cities. One of the pillars of NCAP is monitoring and identification of pollution sources in order to plug them, however conventional technologies are expensive, imported and therefore not scalable. Sensors based air quality measurements have become popular due to their affordability and improved accuracy and precision. Evolution of indigenous development and challenges related to on-site and remote calibration of sensors will be presented. Rapid changes in satellite technology have made it possible to provide images at unprecedented resolution. Micro-satellite imagery retrieved aerosol products are widely used to estimate the spatial distribution of ground-level  $PM_{2.5}$ . Dense sensor network (1400 nodes) in the states of UP and Bihar will be integrated with micro-satellite imagery using a machine learning plus Artificial intelligence model to explore their potential in predicting  $PM_{2.5}$ . How ML & AI techniques can be leveraged to harness sensor and satellite-based measurements to provide neighbourhood scale air quality information enabling policy makers to take preventive measures in real time will be discussed here. Nano particles (<100 nm) can have disproportionate adverse health impacts. Some exciting results leading to mechanistic understanding of nanoparticles night time growth in atmosphere will also be shown.

**Theme 2:** Consideration of geographical and meteorological impact on performance evaluation.

**Speaker 1:** Prof. Shubha Verma



Dr Shubha Verma is Professor in Civil Engineering Department at IIT-Kharagpur. She is Ph.D. from Indian Institute of Technology, Bombay, Masters in Technology Environmental Engineering and Management, Indian Institute of Technology, Kanpur and Bachelor of Engineering, Civil Engineering Govt. Engineering College, Ujjain. Her research work mainly involves mathematical applications to solve Environmental pollution problems, specifically due to aerosols and air pollution. She along with her team conduct aerosol simulations of physical, chemical,

optical, and radiative properties and their transport and distribution to examine the complex unresolved issues related to aerosols-air pollution climate health interactions. Dr. Shubha is contributing as "Institute of Repute" for Haldia city (West Bengal). This includes providing technical partnership and assistance to the urban local body (Haldia city) and state pollution control board (West Bengal) for the National Clean Air Program (NCAP). At present Dr. Subha and her team are developing emission mapping of various atmospheric pollutants at a resolution of 1 km x 1 km for Haldia city. The emission maps aid to gain information on emission hot-spots to apply and plan effective control measures.

**Title:** The Bihar Pollution Pool: Is it realistic, persistent, manmade or natural?

A large wintertime increase in atmospheric pollutants is observed over the Indo-Gangetic plain (IGP) from the ground-, satellite-based, and modelling studies. One of the most striking features is the presence of especially high columnar aerosol loading (measured as aerosol optical depth) in the eastern part of the IGP, largely within the Indian state of Bihar, referred to as "the Bihar pollution pool." This aerosol loading is typically large during the winter month of December and is found to be slightly larger than that over the eastern IGP megacity (Kolkata). The topographical elevation decreases from the northern IGP towards the eastern IGP, with the maximum elevation observed on the northward side due to the Himalayan mountains. The prevailing meteorological conditions with low temperature, weak wind speed, the downdraft of the air mass, and a narrow planetary boundary layer height (PBLH), besides the presence of the Himalayan mountains northward, inhibit the dispersion of aerosol pollutants and favour their confinement over the IGP. The transboundary movement of atmospheric pollutants over the IGP from the modelling studies shows the outflow of pollutants from the upper northern IGP towards the eastern IGP. It has been inferred that the pollutants outflow along the IGP aids in pooling the pollutants on the eastern side of Bihar, accounting for its narrowing plain, thereby slowing the transport from the Bihar pollution pool into the further eastern side (e.g., West Bengal and the Bay of Bengal).

Furthermore, the region of Bihar also comprises a large population density (mostly rural) and therefore enhanced black carbon emission strength during winter, specifically from biofuel combustion, e.g., fuelwood and crop waste for residential cooking and heating. Aerosol size distribution spectra obtained over eastern India indicate signatures of primary contribution related to anthropogenic pollutants, including sulphates, other water-soluble constituents, and soot during December and January, but with a relatively strong influence from mineral constituents during November and February. Analysis of the 7-day back trajectories indicate wintertime aerosols in eastern India to be contributed from air mass mostly originating in the IGP at the surface but that originating from far-off regions at higher heights.

In the above context, the talk will present an assessment of the extent of the realistic and persistent feature of the so-called "Bihar Pollution Pool." The relevance of this pollution pool from the inter-regional transport, geographical features, and the governing meteorology, including local emissions, will be shown.

**Speaker 2: Shri S Chandrashekar**



Shri. Chandrasekar serves as the Member Secretary of Bihar State Pollution Control Board and also as the Nodal Officer in coordinating the Climate Resilient and Low Carbon Development Pathway with UNEP and its partner organization. He is Indian Forest Service officer 2003 batch, holding bachelors in (Forestry), Advance Diploma in Forestry. He specializes in Forest and Wildlife Management Zoo Management. Shri. Chandrasekar has been awarded with Awarded for Excellent Service and Service Beyond Call of Duty and is the author of the book: "Butterflies - Flying Colours of Patna Zoo". He has served at various capacities managing the Valmiki Tiger Reserve, Bihar, Divisional Forest

Officer, Rohtas Forest Division, Director, Sanjay Gandhi Biological Park (Patna Zoo), Served as Nodal Officer, Forest PLUS 2.0 (USAID Project). Presently serving.

**Title:** Bihar: Agglomeration of Pollutants / Dusts – Meteorological factors at ground-preliminary observations.

The Bihar State Pollution Control Board has extended CAAQMS in 25 districts in Bihar and upon analyses of data past one year; it appears that the particulate matter is consistently high across the State. The Map-view of daily bulletin on Air Quality Index being released by the Central Pollution Control Board also depicts agglomeration of particulate matter across the State, which may not be only due to anti-cyclonic movement of aerosols both in the upper (with prevailing N-NW to E-SE) and lower atmosphere (prevailing W to E) over Bihar but also be attributed to typical geographical location of Bihar being located right onto the foothills of the Himalayas (bordering Nepal) and also being not located on the mainstream winter air flow (North-west to South-east) of Indo-Gangetic air basin. It also appears creation of air-locked situation due to back air flow (tidal) from the Bay of Bengal. All these needs detailed investigation.

To understand the local meteorological conditions at the ground (height of CAAMMS ~20 feet from the ground), a series of data of meteorological parameters viz, wind speed (m/s), barometric pressure (mb), solar radiation data of some CAAQMS stations along the IGP States (Haryana, Punjab, Rajasthan, Delhi, Uttar Pradesh, Bihar Jharkhand and West Bengal) was analysed for the period from October 2022 to February 2023. The data reveals that there are less wind speed to the tune of 0.20 m/s at Patna; 0.48 m/s at Muzaffarpur; 0.35 m/s at Hajipur; less barometric pressure (at some stations), least solar radiation (29.45 W/m<sup>2</sup> at Muzaffarpur; 43.01 W/m<sup>2</sup> at Gaya; 14.06 W/m<sup>2</sup> at Bhagalpur etc.) in Bihar, appears to be the possible cause for creation of 'pollutant-accumulation- pool' at the ground level, over the State. More investigations and comparisons are required in this direction.



### Speaker 3: Shri Anand Shankar



Shri Anand Shankar is presently working as Scientist-C Indian Meteorological Department. He is B.Tech. from the National Institute of Technology, Patna, and a Master's in Environmental Science from the Nalanda Open University. He is currently pursuing Ph.D. in the field of machine learning from the National Institute of Technology, Patna. His role primarily includes Environmental Monitoring, Weather, and Climate Services of IMD in the state of Bihar. His research interest focuses on the assessment and prediction of disasters prone to the state of Bihar, India (Environmental Monitoring, Impact-based Heavy Rainfall Warning System, Graded Nowcast Warning System, Lightning, etc.).

**Title:** Influence of meteorological factors on the concentration, transportation, and dispersion of particulate matter over Bihar, India.

As a large number of cities in Bihar are consistently reporting pollution levels much above the accepted level, this has necessitated a detailed scientific study of the causative factors leading to enhanced concentrations of  $PM_{2.5}$  and  $PM_{10}$  in the atmosphere. The status in Bihar is anomalous since, in the absence of a major industrial source, only the transport sector can be attributed to the entire particulate matter load. Thus, the influence of meteorological factors, apart from geographical factors, assumes importance for the state. Among the meteorological parameters responsible for higher concentrations of particulate matter, wind plays the most important role, followed by the stability of the atmospheric condition, which is judged by parameters like the inversion layer, lifting condensation level, and wind profile at a lower friction level. In terms of seasonality, late March and April are the transition months during which the dry westerly regime is gradually replaced with a south-easterly wind in Bihar, leading to convective activities, which in turn become instrumental in the rapid dispersion of particulate matter. As the Indo-Gangetic belt also experiences dense fog, generally between the 3rd week of November and the 2nd week of February, this is also the period of persistence of high  $PM_{2.5}$  concentrations for a prolonged period stretching from 2-3 days to 2 weeks. As some studies have suggested a relation between high concentrations of PM in the lower atmosphere and enhanced thunderstorm activities, this likely combination is also being studied. A hybrid CNN-LSTM model is also being attempted to predict the variability of  $PM_{2.5}$ .

## Technical Session – II

**Theme 3:** Air Quality measurement, monitoring and management.

**Speaker:** Dr. Kripa Ram



Dr. Kripa Ram is assistant Professor at the Banaras Hindu University's Institute of Environment and Sustainable Development in Varanasi, India. He obtained his doctoral degree in Atmospheric Chemistry from Physical Research Laboratory (PRL), in Atmospheric Chemistry, Geoscience. His research areas include Carbonaceous Aerosols with emphasis on Black Carbon, Secondary Aerosols, Optical and Microplastics Properties of Aerosols, Aerosol-Cloud Interaction and Climate, Trace Gases and ozone Measurements, Stratosphere-Troposphere Exchange, Volatile Organic Compounds, Poly Aromatic Hydrocarbons and Platinum Group Elements, Carbon Dioxide Capture and Sequestration. Apart from being researcher in the field of aerosol science, he delivered many lectures on World Environment day, Ozone day and at various orientation and refresher courses organised by the Universities as well as to the schools and colleges. Dr. Kripa Ram is giving consultancy services to various organizations like Central and State Pollution Control Boards, Nagar Nigam/ Municipal Corporations and Scientific organizations. He is recently been inducted to Editorial Advisory Board of Environmental Science and Technology Journal.

**Title:** Factors influencing air pollution mitigation and management in India.

The growing anthropogenic activities has put a lot of pressure on Earth's resources and its ecosystems leading to high levels of pollution in all parts of Earth's sphere. The Indo-Gangetic Plain (IGP) consist of several urban hot spots of air pollution and Improving air quality in these urban areas is one of the top environmental challenges in today's scenario. Often these air pollutants are derived from different emission sources (including natural and anthropogenic emissions) with their varying emission strength leads to a huge spatiotemporal distribution of aerosols within the IGP itself. In this lecture, the results on chemical characteristics and sources of atmospheric aerosols over northern India will be presented. Success stories of Japan and China which might be helpful to curb air pollution in the IGP will also be presented.

**Theme 4:** Trajectory analyses of pollutants & Health Impact studies

**Speaker:** Dr. Ravindra Khaiwal



Dr. Ravindra Khaiwal is Professor of Environment Health and has 20 years of research in field of Environment and Public Health. He is Fellow of Higher Education Academy, UK; Receiver of P.N. Raju Oration Award by ICMR, India; INSA-Scopus award finalist, and IVLP Fellow, Department of State's, USA. He is creator of VAAYU comicbook series and leading IEC activities on public health and environment. Dr. Khaiwal is Nodal Officer of 'Centre for Excellence as a part of the National Health Mission under 'Prime Minister Council of Climate Change', MoHFW, India and Nodal Faculty under the National Knowledge Network under National Clean Air Programme (NCAP), MoEF&CC, India. Dr. Khaiwal was the key person in developing the 'Health Adaption plan for diseases due to Air Pollution and Climate Change', including infographics under the National Programme on Air Pollution and Climate Change, adopted by the Ministry of Health, India. Recently, MoHFW nominated him as a WHO country consultant on air pollution. Dr. Khaiwal holds M. Tech from GJUST Hisar, D.Sc. from University of Antwerp Belgium, Diploma in European Research Course

on from CNRS University Joseph Fourier of Gren, Diploma in Environment Resource Manag from University of Ljubljana Slovenia Utr and Post Graduate Certificate in Higher Educ from University of Hertfordshire United King.

**Title:** Community Engagement in the reduction of Air Pollution and Human Health Effects.

Air Pollution has become a major health risk and with changing climate, it will add to the increasing burden of death and disease globally. Hence, it is vital to address the issues of air pollution through public and private partnerships along with Government initiatives. The public must realize the risk of air pollution before becoming partners in mitigation strategies. As highlighted in our latest study, major perceived health problems were eye, skin and throat irritation while exploring the public perception of crop residue burning and health. Further, only a few consider cardiovascular risk; a leading cause of mortality and morbidity. Hence, it is essential to communicate effectively using alternative and emerging communication approaches.

PGIMER, Chandigarh and Panjab University, Chandigarh, aim to engage the public through innovative and emerging modes of communication for modulating behavior for the desired and sustainable action for the environment and health. As shown in the image, we have developed several Information, Education and Communication (IEC) materials to educate the readers for informed decision-making to ensure sustainability and good health. These documents also go hand-in-hand with the Government's new initiative, Lifestyle For the Environment (LiFE), which focuses on building environmentally conscious societies through behavior change modification. Hence, we also aim to develop a partnership with states not to repeat the efforts but utilize the existing best practices in synergy to achieve the desired goal of the National Clean Air Program on time.

## TEAM



**Dr. Dipankar Saha**  
BSPCB



**Dr. Shilpa Shirodkar**  
IIT Kanpur



**Dr. Trailokya Saud**  
IIT Kanpur



**Shri. B. M. Sundaram**  
IIT Kanpur

## National Knowledge Network



**iFOREST**

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