

# Anubha Goel, PhD., M.Tech CE, IIT Kanpur

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## Personal Information

Name: Anubha Goel, Ph.D.  
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## Teaching

### **UG Courses Taught**

ESO 208/ 218: Computational Methods in Engineering  
CE341: Communication Skills for Civil Engineers  
CE211A: Environmental Quality and Pollution  
CE213: Introduction to Environmental Science (*SUGC Approved 2016*)  
CE766 A: Agricultural Sustainability and Climate Change (Self proposed)  
CE241: Sustainable Built Environment

### **PG Courses Taught**

CE602: Advanced Mathematics for Civil Engineers  
CE669A (Earlier EEM 613): Atmospheric Physics and Chemistry  
CE664A (Earlier EEM 602): Physicochemical Principles and Processes  
CE763A (Earlier EEM 607a): Solid and Hazardous Waste Management  
EEM 615a: Agriculture Environment and Climate Change (Self proposed)  
EEM 701: Special Topics in Environmental Engineering  
Module 1: Risk Assessment  
Module 2: Solid Waste Management  
Module 3: Introduction to Sustainable Agriculture

## **Supervision of Bachelor/Master thesis**

### **Bachelors' Students supervised**

Students supervised for Bachelors Term Project (BTP/ UGP): 16

Currently supervising:

SURGE (Students supervised under Summer Undergraduate Research Grant for Excellence): 6

Currently supervising: 3

### **Masters' Students supervised**

Supervised and Graduated: 21 (Includes 3 co-supervised students)

Currently supervising: 1 (1, co-supervised)

### **M. Tech and Dual Degree (BT/MT) thesis details**

[21] "Retrofit of a Residential building in Composite climate to achieve energy efficiency", Vivek Singh (2021).

[20] "Retrofitting Strategy for Transforming an Existing Residential Building into a Net-Zero Energy Building", Savit Vikram (2020).

[19] "Solar-based Sustainable Solution to Increase Production of Vegetables and to Handle Organic Solid Waste in Extreme Weather Conditions of High Altitude Area for Defence Forces", Anshul Rawat (2020). (Co-guide: Dr. Mukesh Sharma)

[18] "Assessment of Human Health Risk from Exposure to PPAHs in Different Indoor Microenvironments" Deepshikha Ola, BT/MT (2018).

[17] "Examining Impact of Ventilation Conditions on Air Quality of Different Indoor Micro-Environments at IIT Kanpur", Divyam Garg (2018).

[16] "Examination of Characteristics of Particles Emitted from Incense Burning in an Experimental Chamber", Radhika Mundra (2018).

[15] "A comparative analysis of chemical characteristics of size segregated pre-monsoon and post-monsoon aerosols in urban environment" Supreme Jain (2017).

[14] "Extraction, quantification and characterization of Humic like substances in ambient aerosols in Kanpur", Varun Verma (2016).

[13] "Size resolved chemical characterization of sub-micron aerosol of an urban environment in winter season", Mrinmoy Chakraborty (2016).

[12] "Measurement of airborne pollutants in schools and assessment of health risk to children", Rushyendranath (2016).

- [11] "Measurement and Characterization of air pollutant levels inside a temple in Kanpur city", Om Prakash Chaudhary (2015).
- [10] "Assessment of heavy metal pollution in agricultural field irrigated with wastewater from common effluent treatment plant in Jajmau, Kanpur", Vijay Kumar Pal (2014).
- [9] "Assessment of Health Risk to Farm Workers through Inhalation during Pesticide Application", Rishu Kumar (2014).
- [8] "Characterization of Particulate Matter Emissions and Assessment of Cancer Risk Due to Incense Burning", Roshan Wathore (2014).
- [7] "Comparative study of Variation in Exhaust & Non-Exhaust Emissions from 2W (3 Major types) in Kanpur city (Year 2007, 2010 & 2013)", Ashutosh Kumar Pathak (2014)
- [6] "Occurrence and risk assessment of Polychlorinated Biphenyls (PCBs) in ambient air near power stations in Kanpur", Kritika Upadhyay (2013).
- [5] "Indoor air quality assessment: particulate Polycyclic Aromatic Hydrocarbons (PAHs) in cooking fumes", Anita V.V. (2013).
- [4] "Air quality assessment in residential and industrial locations in Lucknow & Kanpur through "Air Quality Indexing" (AQI)", Aswathy. V. S. (2013).
- [3] "Indoor Air Quality under cooking condition: Assessment of particle deposition through inhalation, Deepchandra Srivastava (2012).
- [2] "Investigations into CO2 sequestration through microalgae photo bioreactor, Sandhya Sharma,(2011) (Co-guide: Dr. Mukesh Sharma).
- [1] "Development of Micro Algae Photo -Bioreactor for CO2 Sequestration", Nitin Srivastava (2011) (Co-guide: Dr. Mukesh Sharma).

### PhD Supervision

<b>Students completed Thesis Evaluation:</b>	1
<b>Currently Supervising:</b>	4
<b>Expected year of graduation:</b>	2023, 2025

### PhD. thesis details

#### In progress:

- [3] "Characterization of indoor Environmental conditions and determination of abatement strategies for particle levels." Supreme Jain, Joined in 2017, Comprehensive exam (April 2019).
- [2] "Development of emission factor for PM2.5 from light duty vehicles (LDV) through on-road measurements", Shubham Rathi, Joined in 2014, Comprehensive exam (March 2016)

#### Graduated:

- [1] "Evaluation of exposure to particle bound PAHs by road side in Kanpur city for assessing health risk of vehicular emissions", Manish Agrawal, May 2017 (Graduated).

## **Patents**

Title of the invention: "Solar-Based Heat-Transfer at Root-Zone Level in High Altitude Areas: Sustainable Production of Fresh Vegetables and Organic Waste Management"

Innovators details: Mr. Anshul Rawat, Dr. Mukesh Sharma, Dr. Anubha Goel

Status: Indian patent filed

## **Knowledge Dissemination**

### **Webinars**

- Thermal Comfort is a significant indicator towards acceptability of IEQ by occupants. ISHRAE workshop, June 22, 2020
- IEQ Standards in India: Challenges and needs for researchers. Invited talk. Healthy Buildings 2021 Europe workshop: IEQ guidelines worldwide open database, June 21, 2021
- Ventilation of indoor microenvironments is a key parameter to maintain quality of air in healthy buildings. ISHRAE Webinar, June 22, 2020
- Ventilation and Indoor microenvironments. SIE Webinar Series "Environment and Covid-19- Air quality in Urban Built Environment", June 20, 2020 (with co-presenter Dr. Prashant Kumar)

### **Panelist in seminar/ Resource Person**

- Co-chaired sessions and presented 'Reflections on Air Quality Management experiences India' as Institute representative at Knowledge Sharing and Capacity Building Workshop for NCAP Knowledge Network (NCAP-NKN) in the Indo-Gangetic Plain States. Panjab University, Chandigarh, December 2-3, 2019
- Resource Person for the Brainstorming Session on "Energy, Environment and Climate Change: Unlocking the Potential for Innovations" CSI R-N EERI, Nagpur, 20th February 2019.
- Session titled 'Management of Fixed Dissolved Solids and completion of natural salt cycle at IWIS, India Water Impact Summit 2017, at Vigyan Bhavan, New Delhi, 4th to 7th December 2017.

### **Recent invited talks**

- Invited talk 'Strategies for Effective Teaching' as part of Faculty Induction Programme (FIP) for early career lecturers from across the country. The online event was organized by Guru Nanak Dev University (GNDU), Amritsar. October 3, 2019
- Invited talk at Workshop 'Waste Nothing- A circular Economy Perspective' Water, Sanitation and Solid Waste Management, Faculty of Engineering, Dayalbagh Educational Institution, Agra. December 20-21, 2019.
- Talk title 'Phasing out single use plastic in India: Overview of current strategies and insight into challenges towards a plastic free society', December 21, 2019.

- Distinguished Speaker in Executive Development Programme – 2019. National Sugar Institute, Kanpur. Talk title 'Air Pollution and Importance of Waste to Energy Conversion'. June 2UG7<sup>th</sup>, 2019.
- Invited Session, The China India Association of Atmospheric Scientists (CIAAS 2019). Talk title 'Particle levels in indoor microenvironments frequented by students: Indicators of environmental health threat', IIT Delhi, March 24, 2019

#### **Seminar related to Sustainable development**

- An examination of current techniques in use for NO<sub>x</sub> emissions reduction from automobile and industrial sector. Invited talk at seminar on "Innovative Process Technology for Sustainable Development (IPTSD-2018) at Kolkata, India, 23-24 February 2018 . Seminar jointly organized by Indian Institute of Chemical Engineers (IICChE) and CSIR-Central Glass and Ceramic Research Institute (CSIR-CGCRI). (*paper presented in absentia*)

#### **Seminar related to Waste Management and health impact of air quality in schools on student health**

- Efficient waste utilization for profitable and sustainable solid waste management. Talk at Workshop titled 'From waste to profit through reduce, reuse and recycle' at HBTU, Kanpur, India. March, 2017.
- Air quality in schools at Kanpur: Need for knowledge of strategies to ensure a green and healthy environment. Seminar planned at IIT Kanpur, India, April 2015

#### **Invited lectures related to vehicle emissions and agricultural air quality**

Assessment of Predicted Deposition of Pesticides in Lung Due To Exposure Post Spray Application. APCHNE 2016, 3rd IUPAC International Conference, New Delhi, 6-9 April 2016.

An overview of need for Emission Factors for PM emissions from vehicles. Workshop on Sustainable Urban Transport, Organized by TERI, ICCT, New Delhi, August 30th 2013.

Emission Factor for PM Fine from Vehicular Exhaust: Need for Emission Inventory and Air Quality Management. Seminar on Metropolitan Air Quality Forecasting and Services (SAFAR), Organized by IITM – WMO, Pune, April 30th 2013.

Emissions from vehicles: An overview of current knowledge and future research requirements. Workshop on improving vehicular technologies and fuel quality for air pollution control, Session 2: Improving vehicular technologies to reduce emissions, Organized by TERI, ICCT, Ahmadabad, 11th April 2013.

Atmospheric presence of pesticides: Importance for realistic Risk Assessment. IPFT (Indian Pesticide Formulation Technology) Gurgaon, Haryana India. May 2012'

World Environment Day 2012: Is India a Green Economy? NTPC (National Thermal Power Corporation) Dibiyaapur, Auraiya, UP India. June 2012

#### **Publications**

##### **Books chapters published**

[03] Goel, A., Mundra, R., Ola, D. (2020) "Examination of Particle Characteristics and Quantification of Emission Factors for Smoke Generated from a Popular Indian Incense Burnt in an Experimental Chamber". Indoor Environmental Quality, Select Proceedings of the 1st ACIEQ, Sharma, A., Goyal, R., Mittal, R. (Editors), Springer (2020), pp. 77- 84.

[02] Jain, S., Garg, D., Goel, A. (2020) " Comparison of Indoor Air Quality for Air-Conditioned and Naturally Ventilated Office Spaces in Urban Area". Indoor Environmental Quality, Select Proceedings of the 1st ACIEQ, Sharma, A., Goyal, R., Mittal, R. (Editors), Springer. pp. 1-8.

[01] Goel, A. Izhar, S. Gupta, T. (2017) "Study of Environmental particle levels, its effect on lung deposition and relationship with human behavior". Gupta, T., Agarwal, A. K., Agarwal, R. A., and Labhsetwar, N. K.. Eds. Singapore: Springer Nature Pte. Ltd, pp. 77–91.

### ***Papers Presented in Conferences and Published (over the past 5 years)***

[01] "Rationale And Design Of A Study To Test The Effect Of Personal Protective Aids On Hypertension And Diabetes In People Exposed To High Levels Of Air Pollution" D Barbhaya, A Khetan, J Tran, S Jain, A Goel (2021). Conference: Circulation 143

### ***Papers in Referred Journals (Chronologically Descending order)***

[20] "Health Benefits Due to Reduction in Respirable Particulates during COVID-19 Lockdown in India," Goel, A., Saxena, P., Sonwani, S., Rathi, S., Srivastava, A., Bharti, A.K., Jain, S., Singh, S., Shukla, A., Srivastava, A. (2021). Aerosol Air Qual. Res. Special Issue on COVID-19 Aerosol Drivers, Impacts, and Mitigation. (IX) DOI: <https://doi.org/10.4209/aaqr.200460>

[19] "Comparison of ambient air pollution levels of Amritsar during foggy conditions with that of five major north Indian cities: multivariate analysis and air mass back trajectories," R. Yadav, M. S. Bhatti, S. K. Kansal, L. Das, V. Gilhotra, A. Sugha, D. Hingmire, S. Yadav, A. Tandon, R. Bhatti6 · A. Goel, T. K. Mandal ( 2020). SN Applied Sciences (2020) 2:1761 | DOI: <https://doi.org/10.1007/s42452-020-03569-2>

[18] "Effect of Spray Particle Size Distribution on Deposition in Human Respiratory Tract – Safety Evaluation," A. Goel, P. Bhandari, S. Izhar, C. Sharma, and P. K. Patanjali.(April 2020). Journal of Scientific and Industrial Research (JSIR) (***accepted for publication***) DOI:

[17] "Burden of disease for workers attributable to exposure through inhalation of PPAHs in RSPM from cooking fumes," A. Goel, D. Ola, and A. V. Veetil, (2019). Environ. Sci. Pollut. Res., vol. 26, no. 9, pp. 8885–8894. DOI: <https://doi.org/10.1007/s11356-019-04242-x>

[16] "Toxicity potential of particles caused by particle-bound polycyclic aromatic hydrocarbons (PPAHs) at two roadside locations and relationship with traffic," A. Goel, S. Rathi, and M.

Agrawal, (2018). Environ. Sci. Pollut. Res., vol. 25, no. 30, pp. 30633–30646. DOI: <https://doi.org/10.1007/s11356-018-3043-6>

[15] “Atmospheric abundance of HULIS during wintertime in Indo-Gangetic Plain: impact of biomass burning emissions,” V. Kumar, P. Rajput, and A. Goel, (2018). J. Atmos. Chem., vol. 75, no. 4, pp. 385–398. DOI: <https://doi.org/10.1007/s10874-018-9381-4>

[14] “Compositional and surface characterization of HULIS by UV-Vis, FTIR, NMR and XPS: Wintertime study in Northern India,” V. Kumar, A. Goel, and P. Rajput, (2017). Atmos. Environ., vol. 164, pp. 468–475. DOI: <https://doi.org/10.1016/j.atmosenv.2017.06.008>

[13] “Characteristics of exposure to particles due to incense burning inside temples in Kanpur, India,” A. Goel, R. Wathore, T. Chakraborty, and M. Agrawal, (2017). Aerosol Air Qual. Res., vol. 17, no. 2, pp. 608–615. DOI: <https://doi.org/10.4209/aaqr.2016.04.0146>

[12] “Analysis of size-segregated winter season aerosol data from New Delhi, India,” P. Pant et al., (2016). Atmos. Pollut. Res., vol. 7, no. 1, pp. 100–109. DOI: <https://doi.org/10.1016/j.apr.2015.08.001>

[11] “Particle Bound Metals at Major Intersections in an Urban Location and Source Identification Through Use of Metal Markers,” D. Srivastava, A. Goel, and M. Agrawal, (2016). Proc. Natl. Acad. Sci. India Sect. A - Phys. Sci., vol. 86, no. 2, pp. 209–220. DOI: <https://doi.org/10.1007/s40010-016-0268-y>

[10] “Elevated aerosol layers and their radiative impact over Kanpur during monsoon onset period,” C. Sarangi, S. N. Tripathi, A. K. Mishra, A. Goel, and E. J. Welton, (2016). J. Geophys. Res., vol. 121, no. 13, pp. 7936–7957. DOI: <https://doi.org/10.1002/2015JD024711>

[9] “Investigation of levels in ambient air near sources of Polychlorinated Biphenyls (PCBs) in Kanpur, India, and risk assessment due to inhalation,” A. Goel, K. Upadhyay, and M. Chakraborty, (2016). Environ. Monit. Assess., vol. 188, no. 5, p. 278. DOI: <https://doi.org/10.1007/s10661-016-5280-9>

[8] "Annual trends in occurrence of submicron particles in ambient air and health risk posed by particle bound metals," S. Izhar, A. Goel, A. Chakraborty, and T. Gupta, (2016). *Chemosphere*, vol. 146, pp. 582–590. DOI: <https://doi.org/10.1016/j.chemosphere.2015.12.039>

[7] "Snapshot of PM Loads Evaluated at Major Road and Railway Intersections in an Urban Locality," A. Kumar, D. Srivastava, M. Agrawal, and A. Goel, (2014). *Int. J. Environ. Prot.*, vol. 4, no. 1, pp. 23–29. DOI:

[6] "Determining contaminate sources to the Chesapeake Bay to discern the effectiveness of conservation practices," C. J. Hapeman et al., (2013) in abstracts of papers of the American Chemical Society, vol. 246. DOI:

[5] "Environmental factors affecting the levels of legacy pesticides in the airshed of Delaware and Chesapeake Bays, USA," A. Goel et al., (2010). *Environ. Toxicol. Chem.*, vol. 29, no. 9, pp. 1893–1906. DOI:

<https://doi.org/10.1002/etc.243>

- [4] "Determination of vapor pressure-temperature relationships of current-use pesticides and transformation products," A. Goel, L. L. McConnell, and A. Torrents, (2007). *J. Environ. Sci. Heal. - Part B Pestic. Food Contam. Agric. Wastes*, vol. 42, no. 4, pp. 343–349. DOI: <https://doi.org/10.1080/03601230701309494>

[3] "Spray irrigation of treated municipal wastewater as a potential source of atmospheric PBDEs," A. Goel, L. L. McConnell, A. Torrents, J. R. Scudlark, and S. Simonich, (2006). *Environ. Sci. Technol.*, vol. 40, no. 7, pp. 2142–2148. DOI: <https://doi.org/10.1002/etc.243>

[2] "Wet deposition of current use pesticides at a rural location on the Delmarva Peninsula: Impact of rainfall patterns and agricultural activity," A. Goel, L. L. McConnell, and A. Torrents, (2005). *J. Agric. Food Chem.*, vol. 53, no. 20, pp. 7915–7924. DOI: <https://doi.org/10.1002/etc.243>

[1] "Biodegradation of Nonylphenol Ethoxylate Surfactants in Biofilm Reactors," A. Goel, M. B. Müller, M. Sharma, and F. H. Frimmel, (2003). *Acta Hydrochim. Hydrobiol.*, vol. 31, no. 2, pp. 108–119. DOI: <https://doi.org/10.1002/aheh.200300482>

#### Recent activities

- Invited to endorse the paper by Eichler et al. entitled "Assessing Human Exposure to SVOCs in Materials, Products and Articles: A Modular Mechanistic Framework", submitted to *Environmental Science & Technology* as a Critical Review.



Implications: a signatory supporting the development and implementation of the proposed "consensus framework". (May 2020)

### **Other publications**

[2] "Ventilation in enclosed spaces: Importance in maintaining acceptable IAQ and ensuring the health and well being of occupants" The Indoors, Quarterly Newsletter of Society for Indoor Environment SIE. (Invited) *Submitted for publication*

[1] "Trends in AQI at Selected Residential and Commercial Locations in Kanpur City", Sakariya, M., Izhar, S., & Goel, A. (2015). Indian Journal of Air Pollution Control, Vol. XV, No. 1, 39-50.

### **Manuscripts in internal review (for submission)**

- Influence of proximity to traffic sources on indoor air quality of classrooms: A study on particle size distribution of four schools with different ventilation system in Kanpur city.
- Evaluation of real-time variation in the diurnal distribution of particulate matter and gases during high and low occupant density inside the library of an academic campus and suggested interventions.
- A study inside high and low occupancy office spaces with different ventilation conditions for assessment of exposure to PM10 and PM1 and factors influencing the temporal variation of particle distribution indoors.
- Construction activities of Metro Rail Network at a busy highway in Northern India: Quantification of Impact on ambient air quality
- Appraisal of the possible influence of proximity to the highway on the air quality inside temple premises in Kanpur city and evaluation of particle toxicity contributed by PAHs and metals.
- Monitoring of Environmental quality parameters at places frequented by IIT Kanpur campus staff and students and examination of link with occupants' perception of the indoor climate.
- Chemical characterization of PM1 emissions from indoor combustion sources in an experimental chamber.

### **Papers Presented in Conferences but Not Published (over the past 5 years)**

[26] "Identification of possible pollutant hotspots in academic campus as indicated by measured health risk parameters", Goel A., Ola D. and Rathi S., (2019). European Aerosol Conference (EAC) Gothenburg, Sweden, Aug 25-30.

[25] "Particle Levels in Indoor Microenvironments Frequented by Students: Indicators of Environmental Health Threat", Jain S., Ola D., Rathi S. and Goel A., (2019). The China India Association of Atmospheric Scientists (CIAAS) IIT Delhi, March.

[24] "Particle Levels in Indoor Microenvironments Frequented by Students: Indicators of Environmental Health Threat", Mundra R, Goel A. and Ola D., (2019). Asian Conference on Indoor Environmental Quality (ACIEQ) Delhi, Feb 1-2.

- [23] "Examination of relationship between air pollutants and meteorological parameters and possible inter-dependence of pollutant levels in two major Indian cities with varying climatic conditions", Rathi S., Goel A. and Jain S., (2018). Indian Aerosol Science and Technology Association (IASTA) IIT Delhi, November 26-28.
- [22] "Impact of vehicular load on toxicity potential of ambient air by the road-side in northern Indian cities", Rathi S. and Goel A., (2018). International Aerosol Conference (IAC) St. Louis, USA 2-7 September.
- [21] "Analysis of Incense burning in a temple and it's health impacts: A study of Kanpur", Goel A., Chaudhary O. and Mundra R., (2017). European Aerosol Conference Zurich, Switzerland 27 Aug-1 Sept.
- [20] "UV-Vis Absorption properties of Water Soluble HULIS : Insights into structural properties and possible sources of origin", Kumar V. and Goel A., (2017). Indian International Conference on Air Quality Management (IICAQM) New Delhi, 24-25 February.
- [19] "Comparison of in-vehicle pollutant levels between odd-even and normal traffic scheme in New Delhi, India", Rathi S. and Goel A., (2016). Conference on Indian Aerosol Science and Technology Association, (IASTA) PRL, Ahmedabad, 6-8 December.
- [18] "Quantification and characterization of In- Vehicle Exposure on city roads in Kanpur, India: Passenger Car vs. School bus", Agrawal M. and Goel A., (2015). European Aerosol Conference, Milan, Italy.
- [17] "Parameter Sensitivity Analysis in Cancer Risk Estimation for Exposure to Particulate Bound Metals at Major Intersections", Goel A. and Srivastava D., (2014). Conference of Indian Aerosol Science and Technology Association, BHU Varanasi.
- [16] "Particulate Matter emissions from Incense Burning in Temples of Kanpur city: Assessment of Health Risk", Goel A. and Wathore R. (2014). Conference of Indian Aerosol Science and Technology Association, BHU Varanasi.
- [15] "A Case Study of Fipronil in Ambient Air Post Spray Application", Kumar R. and Goel A. (2014). Conference of Indian Aerosol Science and Technology Association, BHU Varanasi.
- [14] "Chemical Characterization of Particulate Matter in New Delhi, India", Pant P. Et al., (2014). Conference of Better Air Quality, Colombo, Sri Lanka.
- [13] "Particulate matter size distributions: A case study of Delhi, India", Pant P. Et al., (2014). Conference of Urban Environmental Pollution, Toronto, Canada.
- [12] "Assessment of Variation in Cancer risk due to exposure to ambient air at major intersections in Kanpur city, India", Agrawal M. and Goel A.,(2014). International Congress on Environmental Health held in Porto, Portugal.
- [11] "Public Health Implications of Polychlorinated Biphenyls (PCBs) in the Indian Atmosphere.", Upadhayay K. and Goel A., (2013). Seminar on Metropolitan Air Quality Forecasting and Services (SAFAR). IITM – WMO, Pune.
- [10] "Characterization of Carcinogenic Compounds from Incense burning at Places of Worship", Agrawal M. & Goel A., (2013). Seminar on Metropolitan Air Quality Forecasting and Services (SAFAR). IITM – WMO, Pune.

[9] “Polychlorinated Biphenyls (PCBs) in Environment: An Overview of Occurrence and Source Distribution in India”, Upadhyay K. and Goel A., (2012). Conference of Indian Aerosol science and technology Association, Mumbai, India.

[8] “Atmospheric transport of pesticides: Key to realistic Risk Assessment and Management Strategies.”, Goel A., (2012). 2nd International Conference on “Agrochemicals Protecting Crops, Health and Natural Environment (APCHNE) - Role of Chemistry for Sustainable Agriculture. IUPAC New Delhi.

[7] “Impact of vehicular and railway traffic on ambient air quality: Case study Kanpur city”, Srivastava D. and Goel A., (2012). Conference of Indian Aerosol science and technology Association, India.

[6] “Climate change to ensure sustainability: Agricultural growth with minimal health hazards”, Goel A., (2012). Conference of Indian Aerosol science and technology Association, India.

[5] “Occurrence and behavior of Particulate Matter in the Atmosphere of North India: Correlations of PM properties with health Issues”, Goel A., (2011).3rd Annual Indo-German Frontiers of Engineering Symposium, Khandala India.

[4] “Polycyclic Aromatic Hydrocarbons in Cooking Fumes: Urban Indian conditions.”, Srivastava D., Goel A. and Agrawal M., (2011). 4th International Congress of Environmental Research ICER, VNIT Surat, India.

[3] “Nanoparticles- The Indian Perspective.”, Agrawal M. & Goel A., (2011). 4th International Congress of Environmental Research ICER, VNIT Surat, India.

[2] “Impact of Traffic & Construction Activities near Major Intersections on Air Quality. Case Study: Kanpur City”, Kumar A., Agrawal M. & Goel A., (2011). 4th International Congress of Environmental Research ICER, VNIT Surat, India.

[1] “Sources of and temporal trends in occurrence of Legacy Pesticides in atmosphere of eastern United States”, Goel A., (2011). 21st Annual SETAC Europe Meeting, Milan Italy.

## Funding

<b><u>Sponsoring Organization</u></b>	<b><u>Title of Project</u></b>	<b><u>Amount of Grant</u></b>	<b><u>Duration/ Status</u></b>	<b><u>PI and Co-PI if any</u></b>
DST SERC- Fast track	Analysis of Size-Segregated Composition and distribution of organic compound on ambient air particle- Season variation in urban environment in northern India	25,00,000 INR	2012 - 2015  Completed  (Article in AAQR; Goel et al. 2016)	PI  Dr. Anubha Goel

MOEFCC	National Carbonaceous Aerosols Programme (NCAP)	9,32,049,50 INR For WGIII:Modeling carbonaceous aerosol source influence and atmospheric effects (Associate Institution)	2016-2020  In progress	<b>PI and Co Coordinator</b> for Work Packet 1 at IIT Kanpur Dr. Tarun Gupta <b>(Co-PI):</b> Dr. Anubha Goel, Dr. Debjyoti Paul
<b><i>Projects submitted and under review</i></b>				
CPCB Central Pollution Control Board	Identification of Hotspots through Noise Mapping of Lucknow City and Measures for Noise Abatement	44,94,320 INR	Submitted and Under Review	PI: Anubha Goel
<b><i>Consultancy project under review</i></b>				
AITH, Kanpur Dr. Ambedkar Institute of Technology for Handicapped U.P.	Developing plan for Sustainable Solid Waste Management System on AITH Campus, Kanpur	3,62,025 INR	Submitted and Under Review	PI: Anubha Goel

### Consultancy

- Environmental Compliance and Permitting **04/2007 - 01/2008** as Environmental Engineer II, Facilities Compliance and Engineering (FC&E) Business Unit at EA Engineering Science and Technology, Hunt Valley MD, USA

- **Permitting and Compliance Services Support** — Provided permitting and compliance services support to industrial and commercial clients, ranging from government utilities, industrial facilities including specialty chemical manufacturers. Experience includes preparation and revision of General Permits, permits to Construct and operate, Title V applicability and permitting; state and local air permit applicability; Reasonably Available Control Technology applicability and specification; and compliance assessment, planning, and monitoring.

- **Environmental Modeling**— Experience in using various environmental software for air dispersion modeling (AERMOD, TANKS, and MOBILE), Landfill Gas Emission Model (Land GEM). Emission inventories for Criteria Pollutants, Hazardous Air Pollutants (HAPs), Toxic Air Pollutants (TAPs) and Green House Gases (GHGs)

- Environmental Team, National Children’s Study (NCS) 05/2008 - 08/2009  
as Research Associate at NCS coordinating center Westat Inc. Rockville MD, USA

National Children’s Study (NCS) the largest health study in U.S. will follow 100,000 children, across the US, from pre-birth to the time they are 21 years of age. The results from this study will help better understand the influence of environmental, biological, cultural and socio-economic factors on child development. Project work at the NCS coordinating center (Westat) involves multiple teams working collaboratively to meet project requirements in a timely and well researched manner.

- **Development of Sample Collection Procedures** – Work collaboratively across teams in development of standard operating procedures (SOPs) for collection of environmental (air, dust, and water) samples. Initiated a brown bag lunch session for discussion of air quality issues.
- **Development of Training Material** - Provide support in development of material to be used to train data collectors of environmental samples. Other than SOPs, this includes development of field by field (FxF) instructions for sample collection forms used by data collectors, training modules used in instructor-led trainings, and completion of training requirements on Learning Management System (LMS). Developed instructions to be provided to the participants to collect air (passive sampler) and dust (dust plate) samples from their home.
- **Reference Database Management** - Co-ordinated Reference Manager (RefMan) update activities with two support staff. Initiated customization of RefMan to meet the requirements of the NCS environmental group.

- Personal Exposure Team; Particulate Matter Literature Review (EPA) 03/2008-05/2008 as Environmental Engineer/ Scientist at Westat Inc., Rockville MD, USA

- **Air Quality Health Impact Analyst** – Provide support in Literature Review and preparation of Tables Describing Human Exposure Assessment for the EPA Project titled ‘Literature Searches, Table Preparation, Data Analysis and Modeling In Support Of The Particulate Matter Integrated Science Assessment (ISAs)”. Literature review data will support standards for ambient air.

## Peer Recognition

### Awards/ Fellowships:

- Leadership award (Indoor Environment) at ACIEQ 2019 (Asian Conference on Indoor Environmental Quality) Feb 1-2, 2019, New Delhi, India Le
- Kanpur Senate Commendation for EEM615a (Agriculture Environment and Climate Change) (2015) IIT
- Kanpur Academic Senate Commendation for performance as instructor in Course being rated as Exceptionally good by students as part of Student Reaction Survey for CE763A (Solid and Hazardous Waste Management) (2018-19 - II) IIT

- an's Dissertation Fellowship, University of Maryland (2006)
- Graduate Fellowship, University of Maryland (2001-2002, 2004-2005)
- Sandwich-Model Scholarship by German Academic Exchange Service (DAAD) for M. Tech research work in Germany (2000-01)
- University Merit Scholarship, GB Pant University (1996-97, 97-98, 98-99)
- SETAC Best Student Platform Presentation, SETAC National Meeting, Baltimore MD (2005)

## Contributions to the institute

### **Contribution for promotion of Inclusive education at IIT Kanpur**

As a faculty member in CDAP (Cell for Differently Abled Persons) at IIT Kanpur since its inception in 2017, I have been involved in promoting accommodation in academic environment for challenged students. A form outlining the requirements to meet academic and residential needs of students with challenges has been introduced. Recent activities include installation of assistive software for visually challenged students on campus, first time events during orientation include organization of sensitization sessions for new students, and informative/ interactive sessions for family members.

### **Outreach Activities**

***IUPAC Global Women's Breakfast***, Feb 12, 2019, at IIT Kanpur. The event aimed to bring together women engaged in scientific research for networking and knowledge sharing. The event at IIT Kanpur involved participation by female faculty, staff members and students across disciplines. Follow-up meetings are being organized. (*Event Organizer*)

***Health camp at village Bansathi, near IIT Kanpur, March 11 2018*** (*Faculty in charge, Organizing Committee*). IIT Kanpur has been actively involved in research on various problems in rural areas of tehsil Bilhaur related to water and agricultural activity. With assistance from CMO, Kanpur Nagar District, a health camp is being organized in the village, which will involve basic health checkup, distribution of medicines and referral to specialized doctors.

**Organized Workshop on 'PM2.5 mapping using low-cost sensors. February 2019'**. Organized in collaboration with researchers from Uni. of Tokyo.

### **Academic and non-academic administration**

- Convener, CE Dept. DUGC ( September 2019- August 2020)
- Member, institute Green Cell (October 2018 – Present)
- Department representative, Senate Library Committee (2018- Present)
- Co-organizer, CESE Open House (2018, January 20)

- Membership of CE Dept. DUGC (2017-2018; 2014-15)
- Member, Cell for Differently Abled Persons (erstwhile, Persons with Disabilities Cell) (January 2017 - Present)
- Member, IRDC (Institute Research and Development Committee) (October 2015 – October 2017)
- Convener, EEM PPGC (October 2014 - September 2015).
- Member, Advisory Committee, CESE (December 2014 - September 2015)
- Co-organizer, Dept. Research Scholar Day (2015, March 29)
- Faculty in charge, Wet Lab, CESE (2014 - Present)
- Representative EEM Group, SUGC (2014-15)
- Representative CE Dept. SPO (2013-14)
- Member, EEM PPGC (2013-Present)

### **Mentoring in the department and institute**

- Member (among Founding members), Cell for Differently Abled Persons CDAP (earlier called PwD Persons with Disabilities Cell)
- Member, Faculty Forum Executive Committee (February 2017 – December 2017)
- Member Selection Committee, Counseling Service, for Student guardians, 2015-16, 2016-17
- Faculty guardian for 1<sup>st</sup> year B. Tech students (2011, 2013)

### **Contributions outside the institute**

#### **Participation in national/international level committees**

- Member, Selection Committee, Indo-German Science and Technology Centre (IGSTC). To participate as a member of IGSTC in the Joint Scientific Committee meeting of the IGSTC 2+2 Joint Call for Proposals in the field of Sustainable Production - Clean and Green Technologies. 11- 14. September 2019 in Bonn, Germany.
- External expert, Evaluation board for oral exam of Waste Management course, HBTU, Kanpur, October 2017
- Member, Green Freight India Working Group (GFIWG), Clean Air Asia (Sept. 2015 - Sept. 2016)
- Member, Expert Panel, CSIR-CRRI Assessment Committee (2015 - Present)
- External expert, Doctoral candidate, ACSIR (Academy of CSIR)

### **Professional affiliations**

- ddgdg
- Member, National Committee on Noise Pollution Control (NCNPC)( UPC-1, CPCB) (Starting May 2020)
- Member, Indian Society of Heating, Refrigerating and Air Conditioning Engineers (ISHRAE) (June 2020)
- Life Membership, Society for Indoor Environment (SIE) (February 2019)
- Life Membership, Indian Meteorological Society (IMS) (August 2017)

- Associate Member, The Institution of Engineers (India) (IEI)
- Indian Aerosol Science and Technology Association (IASTA)
- Air and Waste Management Association (AWMA)
- American Chemical Society (ACS)