Anand Madhukar, PhD
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Profile:

Dr Anand Madhukar is an Assistant Professor at the Interdisciplinary Centre of Excellence on Climate Change, Green Transition, and Sustainability, South Asian University, New Delhi. His research focuses on understanding the impacts of climate change and developing adaptation and mitigation strategies to build sustainable and climate-resilient societies. His work spans diverse areas including climate–agriculture interactions, crop yield response to climate variability, vulnerability and risk assessments, decarbonization and energy transition, climate–air pollution linkages, and the use of statistical modelling, AI-ML, and science–technology–innovation interventions for sustainable rural livelihoods.

Before joining SAU, Dr. Madhukar served as Assistant Professor and Program Coordinator for Climate Science and Policy at TERI School of Advanced Studies, New Delhi, where he also coordinated institutional participation in UNFCCC COP events and actively contributed to teaching, research, students mentoring, board of studies, academic council and doctoral program governance. Over the years, he has supervised 29 master's theses and guided 5 PhD scholars, mentoring the next generation of climate researchers and practitioners.

Dr. Madhukar has a highly interdisciplinary and multi-disciplinary educational background and deep domain expertise reflected by his diverse work exposure, training, and skills. He holds a PhD in climate change from the Indian Institute of Technology Delhi (IIT Delhi), where his thesis on crop yield trends and climate variability was recommended for the Distinction in Doctoral Research award by the international reviewer. His PhD work investigated big climate-crop data to understand spatio-temporal patterns in climate trends, crop yields, and the complex relationships between the two. During PhD, he also investigated adaptation strategies such as irrigation to address the negative impact of climate change on agriculture. He holds M.Tech. and B.Tech. degrees in Environmental Engineering and Mechanical Engineering, respectively, from Aligarh Muslim University.

He was associated as a Visiting Faculty for the M.Tech. (Energy & Environmental Engineering) Program with the Centre for Energy Studies at JC Bose University of Science & Technology, YMCA, Faridabad, Haryana and taught two courses on Air Pollution Control Engineering and Fuel Technology. He also worked as Principal Project Scientist on a Department of Science & Technology (DST) funded project "Revisiting Traditional Indian Agricultural Practices against Climate Change Vulnerabilities using Machine Learning Techniques" at the Indian Institute of Technology Delhi. His academic journey is complemented by over a decade of experience in research, teaching, industry, fieldwork, and social entrepreneurship in sustainability.

Passionate about bridging science, policy, and practice, Dr. Madhukar regularly contributes to peer-reviewed journals, international conferences, popular media and regularly delivers invited talks on international and national platforms. At SAU, he teaches courses on climate change

science, energy transition, and emissions trading, and continues to build collaborative networks aimed at advancing knowledge and solutions for climate resilience and sustainability. He can be reached at anand.m@sau.int or anmadh11@gmail.com.

Research Interests:

- Climate change impacts, risks, and resilience
- Climate-agriculture interface and rural livelihoods
- Adaptation and mitigation strategies and policies
- Decarbonization and energy transition
- AI/ML applications in climate studies
- Climate–air pollution linkages
- Climate skills and sustainability

Education:

- Ph.D. in Climate Change Impacts & Adaptation, IIT Delhi
  Thesis: Spatio-Temporal Analysis of Crop Yield Trends and Climate Variability in India
  Recommended for "Distinction in Doctoral Research" award by the international reviewer
- M.Tech. in Environmental Engineering, Aligarh Muslim University
- B.Tech. in Mechanical Engineering, Aligarh Muslim University

Professional Experience:

- Assistant Professor, South Asian University, New Delhi (Present)
- Assistant Professor & Program Coordinator (Climate Science & Policy), TERI School of Advanced Studies, New Delhi
- Director, IOCL Indane Gas Enterprise
- Visiting Faculty, JC Bose University of Science & Technology, YMCA, Faridabad
- Principal Project Scientist, IIT Delhi (DST-funded project on agriculture & climate change)

Teaching:

At SAU:

- History and Science of Climate Change
- Process of Climate Change
- Green Transition of Energy
- Emissions Trading
- Research Methodology

At TERI SAS:

- Basics of Climate Science (PG)
- Earth System Sciences (PG)
- Climate Change Vulnerability & Adaptation (PG)
- Impacts of Climate Change (PG)
- Seminar Course in Global Change (PG)
- Independent Study (PG)

- Mitigation of Climate Change (PG)
- Global Climate Change (UG)
- Conventional and Renewable Energy Resources (UG)

AT JC Bose University, YMCA:

- Air Pollution Control Engineering (PG)
- Fuel Technology (PG)

Courses Designed:

At TERI SAS:

- Global Climate Change (UG)
- Conventional and Renewable Energy Resources (UG)
- Atmosphere and Oceans (UG)
- Basic Concepts of Sustainable Development (UG)

In addition to designing and preparing individual UG and PG courses, I actively engaged and contributed to developing the overall four-year course structure for the UG program in Environmental Studies and the two-year course structure for the PG program in Climate Science and Policy.

Students Supervision:

- PhD: Guided 5 scholars (as supervisor or SRC member)
- Master's Theses: 29 supervisions across TERI SAS, Central University of Haryana, and JC Bose University Faridabad

Recent Publications:

Submitted

24. Jain, N., Kumari, K., Jain, R., & **Madhukar, A***. Integrating climate-crop statistics, machine learning, and household surveys for sustainable agricultural practices. Submitted.

23. Madhukar, A*, Niranjan, A., & Kumar, V. Investigating wheat crop yield variability and its relationship with irrigation and temperature in India. Submitted.

Published Peer-Reviewed Articles

22. Niranjan, A., **Madhukar, A***. (2025). Trans Gangetic Plains of India: Understanding Maximum Temperatures Trends across Seasons and Methods. Acta Geophysica 73, 4963–4979.

21. Biswas, B., Awasthi, V. & **Madhukar, A***. (2025). Probing Vegetation, Climatic Data, and Machine Learning for Agricultural Planning and Climate Action: A Case Study from North India. Remote Sensing in Earth Systems Sciences 8, 213–231.

20. Madhukar, A.*, Kumar, V. & Dashora, K. (2022). Spatial analysis of temperature trends during Rabi and Kharif seasons in India. Letters in Spatial and Resource Sciences 15, 451–467.

19. Madhukar, A.*, Kumar, V. & Dashora, K. (2022). Temperature and precipitation are adversely affecting wheat yield in India. Journal of Water and Climate Change 13(4), 1631–1656.

18. Madhukar, A.*, Dashora, K. & Kumar, V. (2021). Climate Trends in Temperature and Water Variables during Wheat Growing Season and Impact on Yield. Environmental Processes 8, 1047–1072 (2021).

17. Madhukar, A.*, Dashora, K. & Kumar, V. (2021). Investigating historical climatic impacts on wheat yield in India using a statistical modeling approach. Modeling Earth Systems and Environment 7, 1019–1027.

16. Madhukar, A.*, Dashora, K. & Kumar, V. (2021). Spatial Analysis of Yield Trends and Impact of Temperature for Wheat Crop Across Indian Districts. International Journal of Plant Production 15, 325–335 (2021).

15. Madhukar, A., Kumar, V. & Dashora, K. (2020). Spatial and Temporal Trends in the Yields of Three Major Crops: Wheat, Rice and Maize in India. International Journal of Plant Production 14, 187–207.

Conference Proceedings

14. Niranjan, A., Kumar, V., & **Madhukar, A***. (2024). Designing the climate vulnerability framework for rural communities in western Uttar Pradesh, India. 7th International Conference on Smart Villages and Rural Development (COSVARD 2024), University of Melbourne.

13. Awasthi, V., Chaudhari, J.S., Singh, S., & **Madhukar, A***. (2024). Leveraging Non-Timber Forest Products (NTFPs) for Community Development: A Case Study of the Kotwalia Tribe in Gujarat. 7th International Conference on Smart Villages and Rural Development (COSVARD 2024), University of Melbourne.

12. Niranjan, A., **Madhukar, A***. (2024). Contrasting Precipitation Patterns during Summer and Winter Seasons in Trans-Gangetic Plains of India. International Conference on Sustainable Developments in Air and Waste Management, University Teknologi Brunei and Aligarh Muslim University.

11. Awasthi, V., **Madhukar, A***. (2024). Delhi's Urban Landscape: Exploring the Relationships Between LST and NDVI under Changing Climate. International Conference on Sustainable Developments in Air and Waste Management, University Teknologi Brunei and Aligarh Muslim University.

10. Madhukar, A.*, Kumar, V. (2024). Spatial Investigation of Precipitation Trends for India's Kharif and Rabi Cropping Seasons. International Conference on Global Climate Change: Resilient Society and Sustainable Development (ICGCC-2024), Aligarh Muslim University.

9. Kumar, H., **Madhukar, A.**, & Kumar, V. (2022). Local adaptation measures to address climate change: understanding the Nandurbar model, Maharashtra, India. 9th International Conference on Sustainability (SUSCON IX), IIM Shillong.

Popular Publications

8. Madhukar, A.*, Vashishth, A. Methane a hidden climate culprit. Deccan Herald, Apr 2025.

7. Madhukar, A.*, Barthwal, V. What COP29 holds. Deccan Herald, Oct 2024.

6. Madhukar, A.*, Mohan, A. Turning carbon into opportunity. Deccan Herald, Oct 2024.

5. Madhukar, A.*, Mohan, A. Securing sustainable livelihood for Kotwalias. Deccan Herald, July 2024.

4. Madhukar, A.*, Mohan, A. AI and Productive Use of Renewable Energy (PURE) for climate goals. Deccan Herald, Apr 2024.

3. Madhukar, A.*, Shah, J. Go beyond GHGs to clean air faster. Deccan Herald, Mar 2024.

2. Madhukar, A.*, Mohan, A. Data driven policy for better air quality. Deccan Herald, Dec 2023.

1. Madhukar, A.*, Mohan, A. Use AI to combat climate change. Deccan Herald, Oct 2023.

Invited Talks/Lectures:

20. Apr 2025, Experiential Interactive Workshop on Sustainability and Climate Action, Heritage School, Jammu. Organized by International Union for Conservation of Nature (IUCN).

19. Mar 2025, Youth Climate Conclave (YCC), India Habitat Centre, New Delhi. Organized by The Energy and Resource Institute, the Delegation of the European Union to India, GIZ, and CEEW.

18. Feb 2025, Miranda House, Delhi University, New Delhi. Organized by University of Delhi.

17. Jan 2025, Navigating PhD and Beyond, IIT Jodhpur, India. Organized by Indian National Science Academy (INSA) and IIT Jodhpur.

16. Jan 2025, Trans Indian, Pacific, and Atlantic Research and Development Interchange on Sustainability (TIPARDIS 2025), Mumbai, India. Organized by Indian Institute of Technology Bombay (IIT Bombay), Vishwamitra Research Institute, Chicago, Illinois (USA), University of Miskolc, Miskolc (Hungary) and sponsored by the National Science Foundation (NSF), USA.

15. Jan 2025, 31st National Children's Science Congress (NCSC), Ravindra Bhawan, Bhopal, Madhya Pradesh. Organized by the Department of Science and Technology (DST), Government of India and the Madhya Pradesh Council of Science and Technology (MPCST).

14. Jan 2025, Student Ignite Program - Blue Economy 2025.

13. Dec 2024, International Conference on Sustainable Development in Air and Waste Management, Aligarh, India. Organized by Universiti Teknologi, Brunei and Department of Civil Engineering, Aligarh Muslim University.

12. Nov 2024, Symposium on Climate Resilience in Agri-Food Systems: Building Evidence, Tools and Action Frameworks, India Habitat Centre, New Delhi. Organized by Indian Institute of Management Ahmedabad and International Rice Research Institute, Philippines.

11. Jul 2024, School of Agriculture and Environment, and Global Engagement Office, Massey University, Palmerston North, New Zealand.

10. Apr 2024, Regional Workshop on Renewable Energy in Agriculture in the Hindu Kush Himalaya, Kathmandu, Nepal. Organized by International Centre for Integrated Mountain Development (ICIMOD).

9. Apr 2024, National level subject matter expert in the evaluation process of SUSTAIN-A-THON 2024: A Sustainability Hackathon organized by Indian Oil Corporation Limited (IOCL).

8. Feb 2024, Indo-German Workshop on Resilient Food Systems: AI, Remote Sensing, and Crop Models in Harmony, Bonn, Germany. Organized by Indo-German Science and Technology Centre (IGSTC), Federal Ministry of Education and Research (BMBF), Government of Germany, and University of Bonn, Germany.

7. Nov 2023, Lightning Talks, New Delhi. Organized by American Chemical Society (ACS).

6. Nov 2023, INSA-ACS Faculty Leadership Summit, New Delhi. Organized by Indian National Science Academy (INSA) and American Chemical Society (ACS).

5. Sep 2023, Expert Consultation Event on SDG Blueprint for Sustainable Agriculture, New Delhi. Organized by Norwegian Embassy, New Delhi and The Energy and Resources Institute.

4. Feb 2023, Youth Climate Conclave (YCC) 2023, India Habitat Centre, New Delhi. Organized by the UNICEF, GIZ, Italian Embassy, CEEW, TERI, and the Delegation of the European Union.

3. Nov 2022, Food Systems Dialogue, India International Centre, New Delhi. Organized by Tata-Cornell Institute, Centre for Policy Research, International Food Policy Research Institute, National Foundation for India, ICAR, CEEW, and six other partners.

2. Nov 2022, ACS Environment and Sustainability Workshop, Indian National Science Academy, New Delhi.

1. Nov 2022, Climate Resilient Agriculture Virtual Breakfast Club, New Delhi. Organized by MSC (MicroSave Consulting).

University Service:

- Coordinator, TERI SAS participation in UNFCCC COP27–COP29
- Member, Academic Council, TERI SAS
- Member, Doctoral Programme Executive Committee (DPEC), TERI SAS
- Member, Institution Innovation Council (IIC), TERI SAS
- Member, Board of Studies, Department of Natural & Applied Sciences, TERI SAS
- Program Coordinator for Climate Science and Policy, TERI SAS
- Affiliate Faculty, Emerson Centre of Excellence on Sustainability Studies, TERI SAS

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