



Chairman, CESDAC

ACADEMIC QUALIFICATIONS:

Certificate/Degree	Board / University	Year of Completion	Subjects
High School	U.P. Board	1963	Science
Intermediate	U.P. Board	1965	Science
B.Sc. (Hons)	Banaras Hindu University	1967	Physics, Maths, Geology
M. Sc.	Banaras Hindu University	1969	Geophysics (Meteorology)
Ph. D.	Banaras Hindu University	1972	Geophysics (Atmospheric Science)
Professional Meteorologist Course	India Meteorological Department	1979	Operational Weather Forecasting Techniques

EMPLOYMENT RECORD SUMMARY:

2006 – Cont.	Chairman, CESDAC
2004 – 2005	Professor, PACE-SD, University of the South Pacific, Fiji
1995 - 2003	Chief Scientific Officer (Professor's Cadre), IIT Delhi
1990 - 1995	Principal Scientific Officer, IIT Delhi
1982 - 1990	Senior Scientific Officer, IIT Delhi
1979 - 1981	Lecturer, Banaras Hindu University, Varanasi
1977 - 1979	Assistant Meteorologist, India Meteorological Department, Pune
1975 - 1977	NRC Post Doc Fellow, Atmospheric Environment Service, Toronto, Canada
1972 - 1974	Junior Scientific Officer, Indian Institute of Tropical Meteorology, Pune

FIELD OF SPECIALISATION:

Global and Regional / Monsoon Climate and its Variability – Scenario Development, Regional Environmental Change – Integrated Approach, Sectoral Vulnerability Assessment (Water, Marine and Coastal Biodiversity, Health and Agriculture), Landscape Ecology, Biophysical Remote Sensing – GIS Applications, Highland and Coastal Ecosystem Modeling, EIA/SEA Methods and Practices, Regional Adaptation and Mitigation Approaches, Carbon Sequestration Potentials and Energy Efficiency – Clean Development Mechanism Opportunities and Options, Natural Resource Management - Technological Options and Interventions – Environmental and Economic Feasibility, Policy Development including the review and analysis of Multilateral Environmental Agreements in Asia – Pacific Regional Context, Social Dimensions and Sustainable Development.

MEMBERSHIP OF PROFESSIONAL SOCIETIES:

Indian Meteorological Society, New Delhi (Life Member)
 American Meteorological Society, Boston (Member)
 Royal Meteorological Society, London (Fellow)

HONOURS / AWARDS:

- **Elected Fellow** of the Indian Association of Hydrologists in July 2002.
- **Elected Fellow** of the National Academy of Agricultural Sciences in January 2000.
- Only faculty from IIT Delhi to have participated in **Indian Antarctic Expedition**, 1986-87.
- Certificates of **Appreciation from UNEP** for contributions in the Assessment of the Scientific, environmental, technological and economic aspects of the Protection of Ozone Layer important for Policy Decisions to the Parties of Montreal Protocol in 1995 and 1997.
- UGC's **Young Scientist Career Award** for the year 1981-82.

RESEARCH PUBLICATIONS:

Papers published in National and International Scientific Journals:	93
Papers published/presented in Conference Proceedings (National and Intl):	90
Technical Reports:	25
Books (Published by Tata McGraw Hill, edited):	1

NUMBER OF Ph.D.s SUPERVISED: Eight Ph.D.s awarded under my supervision.

TEACHING EXPERIENCE: Have taught Environmental Physics and Environmental Science Courses (Atmospheric Sciences, Dynamics of Land Use and Land Cover Change, Natural Resource Management and Sustainability, Biogeochemical Cycles, Physical, Tropical and Synoptic Meteorology, Climatology / Hydrology / Ecology) at **Tertiary (Postgraduate) Level** in IIT Delhi and elsewhere **for over 20 years**.

RECOGNITION IN SCIENTIFIC LEADERSHIP:

- Coordinator, Climate Modeling Research Activities of the Indian Institute of Technology Delhi (1982-2001).
- **Member, Steering Committee on Environment, Forestry, Wildlife and Wastelands of the Planning Commission, Government of India; Also Member-Secretary of the Task Force on Environmental (Air) Pollution for the Ninth Five Year Plan.**
- **Member, Expert Group on Greenhouse Gas Emission Inventories, Scenarios and National Communications constituted by the Ministry of Environment and Forests, Government of India.**
- Member, Expert Group on Impacts of Climate Change constituted by the Ministry of Environment and Forests, Government of India (1998-2000).
- **Member, Core Group of the Committee of the Planning Commission, Government of India on Regional Climate Change Issues (1998-2000).**
- Assisted SPREP (Samoa) on behalf of USP in preparing the **Draft Pacific Framework on Climate Change.**
- **Authored Intergovernmental Panel on Climate Change's Reports** on 'Radiative Forcing of Climate Change - 1994' and 'Climate Change - 1995' published by Cambridge University Press, UK.
- **Co-authored "Scientific Assessment of Ozone Depletion, 1994 and 1998" Reports of the International Ozone Assessment Panel of UNEP, NOAA and NASA.**
- Authored Intergovernmental Panel on Climate Change's **Technical Paper II** entitled 'An Introduction to Climate System Models Used by IPCC for the Projections of Future Climate' prepared for Policy Makers and published by Cambridge University Press, UK.

- **Convening Lead Author** for Chapter 11 of Intergovernmental Panel on Climate Change's **Special Report on Regional Impacts of Climate Change** published by Cambridge University Press, UK.
- **Member of the Task Group on 'Climate Scenarios for Impact Assessment' of the Intergovernmental Panel on Climate Change (1997-2003), WMO - IPCC Secretariat, Geneva.**
- **Co-ordinating Lead Author** for Chapter 11 of Intergovernmental Panel on Climate Change's **Third Assessment Report of Working Group II** and also **Lead Author of Chapter 13 of IPCC's WG I TAR.**
- **Member, Core Writing Team of the Synthesis Report of the IPCC Third Assessment Report.**
- **Co-ordinating Lead Author for Asia - Chapter 10 of Intergovernmental Panel on Climate Change's Fourth Assessment Report of Working Group II (2004-2007)**
- **Lead Author for Asia Pacific Chapter of GEO-4 Report of UNEP (2004-2007)**
- **Member of the Technical Committee of the Scenarios Advisory Group of AIACC, International START Secretariat, Washington (USA). Also Member of the Programme Advisory Board of the Indo-German Forum on International Environmental Governance, Potsdam (Germany).**
- **Have more than a decade of work experience in the subject of global and regional environmental change issues including liaisons with national, regional and intergovernmental agencies and NGOs (viz., climate change, vulnerability assessment in biodiversity, hydrology, forestry, health and agriculture sectors and feasibility of adaptation/mitigation measures).**

SPONSORED PROJECTS UNDERTAKEN:

- Global Warming and Associated Sea Level Rise with Particular Reference to Indian Ocean (DST)
- Development and Validation of Land Surface Hydrology Scheme in Regional Model Sensitivity Studies to Investigate the Nature of Biosphere-Hydrosphere Interactions over the Indian Subcontinent (DST)
- Biodiversity Status of Indian Forests and Their Carbon Sequestration Potential (ICFRE)
- Model Development and Numerical Experiments to Assess the Climate Change Scenario over Indian Subcontinent and its Impact as a Consequence of Greenhouse Warming (MOEF)
- Climate Variability and Rice Productivity in Bihar, Uttar Pradesh and West Bengal (Consultancy - RW Consortium)
- Simulation of Intra-seasonal and Inter-annual Variability and Its likely Changes in Asian Monsoon due to Global Warming in Global and Regional Climate Models (Dept of Space – ISRO GBP)
- Greenhouse Gas Inventory preparation for the Sultanate of Oman (Consultancy, MRME – CES)
- Data support for Asia-Pacific Integrated Assessment Model (Consultancy - FRIC, Japan)

OTHER KNOWLEDGE and COMPETENCIES:

- **Have two decades of teaching and research experience in the subject of environmental issues (viz., climate variability and change and its implications for water, agriculture, forestry, energy and ecology) in India and elsewhere; have a strong publication record.**
- **Possess a thorough understanding of UN Conventions on Climate Change, Biodiversity, Desertification and Montreal Protocol** and have assisted the Ministry of Environment and Forests, Department of Science and Technology and Planning Commission of the Government of India on Policy matters related to these conventions from time to time.
- **Member of the Scientific Coordination Committee of Ad hoc group for the modeling and assessment of contributions of climate change (MATCH) – Brazilian Proposal.**
- **Have acted as Resource Scientist for regional meetings on vulnerability Assessment and Adaptation Issues organized by UNDP.**
- **Member of the Editorial Advisory Board of a book series entitled "Advances in Global Change Research" published by Kluwer Academic Publishers.**
- **Have traveled extensively in Europe (UK, Germany), Japan and North America (Canada, USA) for extended periods and also to Australia, New Zealand, France, Italy, The Netherlands, Sweden, Korea and China to interact with research community under international scientific collaborations.**
- **Familiar with environment and sustainable development challenges in Developing Countries of Asia and the Pacific including those of Small Island Developing Countries.**

- **Possess skill to analyze and synthesize scientific and policy related information.**
- Have experience in the design, development and implementation of scientific/technical projects in developing countries of Asia and the Pacific, which includes database management and administrative experience in implementation activities;
- Have fairly long experience in project identification, development, implementation and evaluation (including those dealing with linkages between environment and development issues) relevant to integration of environmental sustainability into activities to achieve the MDGs and have proven record of successful liaison with donor agencies;
- Have experience in planning and organizing international/regional conferences, consultative meetings, workshops and training courses (including the customization of the course contents) in developing countries of Asia and the Pacific;
- Have excellent drafting creativity - ability and communication / presentation skills, both oral and written English (e.g., development of communication material such as brochures, leaflets and Publications for dissemination to students and other stakeholders); and
- Currently engaged in creative writing work on challenges of developing countries in environment and sustainable development aimed at addressing the MDGs.

SELECTED PUBLICATIONSNATIONAL AND INTERNATIONAL JOURNALS

- The effect of moist convection and water vapour radiative processes on climate sensitivity, *Jr. Atmos. Sci.*, 41, 1984, 2238-2249 (M. Lal and V. Ramanathan)
- Ozone depletion due to increasing anthropogenic trace gas emissions: The role of stratospheric chemistry and implications for future climate, *Climate Research*, 1(2), 1991, 85-95 (M. Lal and T. Holt)
- Potential impact of greenhouse warming on the water resources of the Indian subcontinent, *Jr. Environ. Hydrology*, 1(3), 1993, 3-13 (M. Lal and Subhash Chander)
- Water resources of the south Asian region in a warmer atmosphere, *Adv. in Atmos. Sci., Academia Sinica, China*, 11(2), 1994, 239-246 (M. Lal)
- Effect of global warming on Indian monsoon simulated with a coupled ocean-atmosphere general circulation model, *Current Science*, 66(6), 1994, 430-438 (M. Lal, U. Cubasch and B.D. Santer)
- Trace gas radiative forcing indices, **Ch 5 in 1994 Report of the IPCC on Radiative Forcing of Climate Change**, WMO/UNEP, 1995, 204-231 (D. L. Albritton, R.G. Derwent, I.S.A. Isaksen, M. Lal and D.J. Wuebbles)
- Ozone depleting potentials, global warming potentials and future chlorine / bromine loading, **Ch. 13 in 1994 Scientific Assessment of Ozone Depletion**, WMO GORMP Report No. 37, 1995, 13.1-13.36 (S. Solomon, D. J. Wuebbles, I.S.A. Isaksen, J. Kiehl, M. Lal, P. Simon and N. Sze)
- Monsoon climate and its change in a doubled CO₂ atmosphere as simulated by CSIRO9 model, *Terr. Atmos. and Oceanic Sciences*, 5(4), 1994, 515-536 (B. Chakraborty and M. Lal)
- Climatic response of Indian subcontinent to doubled CO₂ concentration. *Intl. Jr. Climatology*, 1995, 15, 873-892 (B. Bhaskaran, J.F.B. Mitchell, J. Lavery and M. Lal)
- Synoptic scale disturbances of the Indian summer monsoon as simulated in a high resolution climate model, *Climate Research*, 5(3), 1995, 243-258 (M. Lal, L. Bengtsson, U. Cubasch, M. Esch and U. Schlese)
- Effect of transient increase in greenhouse gases and sulphate aerosols on monsoon climate, *Curr. Sci.*, 69(9), 1995, 752-763 (M. Lal, U. Cubasch, R. Voss and J. Waszkewitz)
- Radiative Forcing of Climate Change. **Chapter 2.5 in Climate Change 1995: Second Scientific Assessment Report of the IPCC**, WMO/UNEP, 1996, 65 -131 (D. L. Albritton, R.G. Derwent, I.S.A. Isaksen, M. Lal and D.J. Wuebbles)
- Implications of global warming on the diurnal temperature cycle of the Indian subcontinent, *Curr. Sci.*, 1996, 71(10), 746-752 (M. Lal, G. Srinivasan and U. Cubasch)
- Simulation of the Indian monsoon climatology in ECHAM3 climate model: Sensitivity to horizontal resolution, *Intl. Jr. Climatol.*, 1997, 17, 847-858 (M. Lal, U. Cubasch, J. Perlwitz and J. Waszkewitz)
- An Introduction to simple climate models used in the IPCC Second Assessment Report, **IPCC Technical paper II** (Eds. J. T. Houghton, L. G. M. Filho, D. J. Griggs and K. Maskell), February, 1997, 50 pp. (D. Harvey, J. Gregory, M. Hoffert, A. Jain, M. Lal, R. Leemans, S. Raper, T. Wigley and J. Wolde)
- Vulnerability of Rice and Wheat Yields in NW - India to Future Changes in Climate, *Agri. and Forest Meteorol.*, 1998, 89, 101-114 (M. Lal, K. K. Singh, L. S. Rathore, G. Srinivasan, S. A. Saseendran)
- Tropical Asia, **Chapter 11 in IPCC's Special Report on the Regional Impacts of Climate Change**, (Eds: Watson R.T., Zinyowera M.C., Moss R.H. and Dokken D.J.) Cambridge University Press, UK, 1998, 517 pp. (R. F. McLean, S. K. Sinha, M. Q. Mirza and M. Lal)
- Indian summer monsoon variability as simulated by regional model nested in a global climate model, *Chinese Jr. Atmos. Sci.*, 1998, 22(1), 93-102 (M. Lal, B. Bhaskaran, S. K. Singh)
- The Greenhouse Gas-Induced Climate Change over the Indian Subcontinent as Projected by General Circulation Model Experiments, *Terr. Atmos. Ocean Sci.*, 1998, 9(4), 673-690 (Lal, M., P.H.. Whetton, A.B. Pittock and B. Chakraborty)
- Growth and Yield Responses of Soybean in Madhya Pradesh, India to Climate Variability and Change, *Agri. and Forest Meteorol.*, 1999, 93, 53-70 (Lal, M., K.K.Singh, G.Srinivasan, L.S.Rathore, D.Naidu and C.N. Tripathi)
- Simulation of monsoon meteorology in a nested regional climate model, In Dash, S. K. and Bahadur, J. (Eds.): *The Himalayan Environment*, New Age International (P) Limited, Publishers, New Delhi, 1999, 139-147 (M. Lal and S. K. Singh).
- Halocarbon Scenarios for the Future Ozone Layer and Related Consequences, **Chapter 11 in 1998 Scientific Assessment of the Ozone Layer**, WMO GORMP Report No. 44, 1999, 11.1-11.36, (Guus J. M. Velders, Sasha Madronich, John S. Daniel, Murari Lal, Archie McCulloch and Harry Slaper)
- Sustainable Forestry for Bio-energy as Fossil Fuel Substitution, In Innes, J. L., Verstraete, M. M. and Beniston, M. (Eds.): *Biomass Burning and Its Inter-Relationships with the Climate System*, **Kluwer Academic Publishers**, Dordrecht, The Netherlands, 2000, 281-298 (M. Lal and Roma Singh)
- Carbon Sequestration Potential of Indian Forests, *Environmental Monitoring and Assessment*, 2000, 60(3), 315-327 (Lal, M. and Roma Singh)
- Sustainable Forestry in India for Carbon Mitigation, *Curr. Sci.*, 2000, 78(5), 563-567 (Roma Singh and M. Lal)
- Simulation of Indian Summer Monsoon Rainfall and its Intraseasonal Variability in the NCAR climate system model, **Regional Environmental Change**, 2000, Vol 1 (3 and 4), 163-179 (Lal, M., G. A. Meehl and Julie M. Arblaster)
- Climate Change and its Impacts on India, *Asia-Pacific Journal of Environ and Development*, 2000, Vol. 7 No. 1, pp.1-41 (M. Lal)
- Future Climate Change Scenarios for Asia as Inferred from Selected Coupled Atmosphere-Ocean Global Climate Models, *Jr. Meteorol. Soc. Japan*, 2001, Vol.79 (1), 219-227 (M. Lal and H. Harasawa)
- Tropical Cyclones in a Warmer World, *Current Science*, 2001, Vol 80(9), 1103-1104 (M. Lal)
- Global Warming and Monsoon Climate, *Mausam*, 52 (1), 2001, 245-262 (M. Lal and S. K. Singh)

- Climatic Change: Implications for India's Water Resources, Jr. Indian Water Resources Society, 21 (3), 2001, 101-119 (M. Lal)
- Climate Scenario Development, **Chapter 13 in Climate Change 2001: The Scientific Basis**, Contribution of WG I to the Third Scientific Assessment Report of Intergovernmental Panel on Climate Change (WMO/UNEP), 2001, pp. 739-768 (L. O. Mearns, M. Hulme, T. R. Carter, R. Leemans, M. Lal and P. Whetton)
- Asia, **Chapter 11 in Climate Change 2001: Impacts, Adaptation and Vulnerability**, Contribution of WG II to the Third Scientific Assessment Report of the IPCC (WMO/UNEP), 2001, pp. 533-590 (M. Lal, H. Harasawa and D. Murdiyarsa)
- Future Climate Change: Implications for Indian Summer Monsoon and its Variability, *Current Science*, 81(9), 2001, pp.1196-1207 (M. Lal, T. Nozawa, S. Emori, H. Harasawa, K. Takahashi, M. Kimoto, A. Abe-Ouchi, T. Nakajima, T. Takemura and A. Numaguti)
- Future Climate Changes and its Impacts over Small Island States, *Climate Research*, Vol 19, 2002, pp. 179-192, (M. Lal, H. Harasawa and K. Takahashi)
- Potential Impacts of Global Climate Change, Published in *Climate Policy Assessment: Asia-Pacific Integrated Modeling* (Eds: M.Kainuma, Y.Matsuoka and T.Morita) by Hideo Harasawa, Yuzuru Matsuoka, Kiyoshi Takahashi, Yasuaki Hijioaka, Yoko Shimada, Yosuke Munesue and Murari Lal, (Springer-Verlag, Tokyo) 2002, 37-54 pp.
- Global Climate Change: India's monsoon and its variability, *Journal of Environmental Studies and Policy* (JESP), 6 (1), June 2003, pp. 1-34 (Murari Lal)
- Mitigating climate change impact on Soybean productivity in India: A simulation study, *Agri. and Forest Meteorology*, 121 (1-2), 2004, pp. 113-125 (R. K. Mall, M. Lal, V. S. Bhatia, L. S. Rathore and Ranjeet Singh)
- Climate change in small island developing countries of the South Pacific, *Fijian Studies – Special Issue on Sustainable Development*, Vol. 2(1), 2004, pp. 15-31 (Murari Lal)
- Climate Change – Implications for India's water resources, Chapter 7 in *Climate Change and Water Resources in South Asia* (Eds.: M. Monirul Mirza and Q. K. Ahmad), A. A. Balkema Publishers, The Netherlands, Pages 155-196, 2005 (Murari Lal)
- Baseline Climatology of Viti Levu (Fiji) and current climatic trends, *Pacific Science*, Vol 60(1), 2006,. 49-68 (Melchior Matakai, Kanayathu C. Koshy and Murari Lal)
- Simulation of surface air temperature and rainfall and its temporal and spatial distribution over Fiji, *Climate Dynamics – Communicated*, October 2005 (Murari Lal, John L. McGregor and Kim C. Nguyen)

TECHNICAL / PROJECT REPORTS

- Regional Climate Projections: Technical Data Transfer and Capacity Building Issues in Developing Countries, Published in Report of the IPCC Workshop on Regional Climate Change Projections for Impact Assessment, London (UK), Sept. 24-26, 1996 (M. Lal)
- Global Warming and Associated Sea Level Rise with Particular Reference to Indian Ocean, Report submitted to Dept. of Science and Technology, Govt. of India, 1995, 117pp. (M. Lal)
- Climate variability and rice productivity in Bihar, Uttar Pradesh, West Bengal and Madhya Pradesh, Project Report submitted to Rice-Wheat Consortium for the Indo-Gangetic Plains, International Crop Research Institute for the Semi-Arid Tropics, New Delhi, May 1999, 25 pp. (M. Lal)
- Guidelines on the use of scenario data for climate impact and adaptation assessment (Version 1), Prepared for Task Group on Scenarios for Climate Impact Assessment of Intergovernmental Panel on Climate Change by T. R. Carter, M. Hulme and M. Lal (December 1999), 69pp.
- Development and validation of land surface hydrology scheme in regional model and sensitivity studies to investigate the nature of biosphere-hydrosphere interactions over the Indian subcontinent, Project Report submitted to Department of Science and Technology, Govt. of India, March 2000, 27pp. (M. Lal)
- Biodiversity status of Indian forests and their carbon sequestration potential, World Bank Aided Forestry Research, Education and Extension Project Report submitted to Indian Council of Forestry Research and Education, Dehradun, June 2000, 49pp. (M. Lal)
- POSSIBLE IMPACTS OF GLOBAL CLIMATE CHANGE ON WATER AVAILABILITY IN INDIA, Scientific Report submitted to "Global Environment and Energy in the 21st Century", Honolulu, Hawaii (USA) under the project on "Water and Security in South Asia (WASSA)", June 2002, 44pp. (M. Lal)
- GLOBAL CLIMATE CHANGE - INDIA'S MONSOON AND ITS VARIABILITY, Final Report under "Country Studies Vulnerability and Adaptation" Work Assignment with Stratus Consulting's Contract of the U.S. Environmental Protection Agency, September 2002, 58pp. (M. Lal)
- GUIDELINES FOR USE OF CLIMATE SCENARIOS DEVELOPED FROM REGIONAL CLIMATE MODEL EXPERIMENTS by L. O. Mearns, F. Giorgi, P. Whetton, D. Pabon, M. Hulme, M. Lal, Available at Data Distribution Centre of the IPCC TGICA, 2003, 38 pp.
- SUSTAINABLE DEVELOPMENT AND THE PACIFIC ISLAND COUNTRIES, A Discussion Paper presented at the International SIDS Meeting (BPoA+10) in Mauritius, Jan 10-14, 2005 (K. Koshy, M. Lal and M. Matakai), 2005, 50 pp.