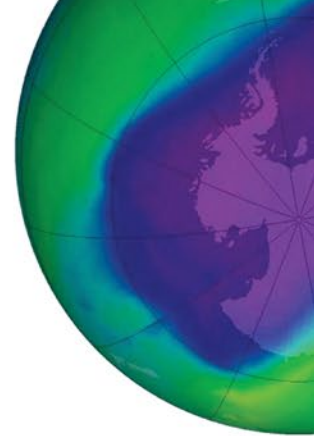


K. Madhava Sarma

A Man of the Earth





Acknowledgements

The information in this biography has been compiled from Sarma's personal files, web searches, and particularly from interviews with family, colleagues and friends, including his wife K. Ramalakshmi; daughters Naga Nandini, Gouthami and Sridevi Kalavakolanu; brother K. Harsha Vardhan and his wife K. Umadevi; uncle-in-law S. Rama Krishna Sastry; colleagues Dr. Husamuddin Ahmadzai (Stockholm Group, Nordic Environment Finance Corporation, and Swedish EPA), Dr. Radhey Agarwal (Indian Institute of Technology), Dr. Arumugam Duraisamy (Ministry of Environment, Government of India), K.P. Geethakrishnan ICS/IAS Retd. (former Finance Secretary), Marco Gonzalez (Executive Secretary, Montreal Protocol Ozone Secretariat), Rajeeva L. Karandikar (Director, Chennai Mathematical Institute), A. Mohana Krishnan (former Chief Engineer, Public Works Department, Tamil Nadu), Wing Commander Manoj Kumar (Indian Air Force), K. Narayan Kumar (MCFI), K.Venkatesan ICS/IAS Retd. (former Secretary, Expenditure, Govt of India, a true friend, philosopher and guide to Sarma), M.M. Rajendran ICS/IAS Retd. (former Governor of Orissa), K.S. Ramakrishnan ICS/IAS Retd. (former Chairman, Madras Port Trust), K.R. Ramasubban (retired from the Birla Group of Companies and neighbour), G. Ranga Rao ICS/IAS Retd. (former Executive Secretary of Education), C.S. Seshadri (Director-Emeritus, CMI), G. Sundaram ICS/IAS Retd. (former Secretary in the Cabinet Secretariat), T.N. Seshan ICS/IAS Retd. (former Secretary of Environment and Forests and Chief Election Commissioner), Air Marshal A.K. Singh (Indian Air Force, Retd.), S. Sripathy (Chief Administrative Officer, CMI), Scott Stone (Stockholm Group and Hunton & Williams), K.V. Subramaniam IPS Retd. (former Inspector General of Police), R. Thyagarajan (founder and CEO of the Shriram Group) and Durwood Zaelke (Institute for Governance and Sustainable Development).

The author is particularly grateful to wife K. Ramalakshmi and daughter Gouthami who provided full access to Sarma's files and organized the many interviews and who hosted Stephen and Janet Andersen in their home. However, Stephen O. Andersen, and not those contributing information, is responsible for accuracy, omission and completeness.

Corrections and additions are welcome at: soliverandersen@aol.com

Steve completed this document in 2012 and passed it on to us, Sarma's daughters, for final editing and printing. It has taken me this long to be able to deal with my emotions and complete the task. I am grateful to Aniruddha Sen Gupta for working on the design of this book to show off the man I called appa/naina/daddy, to best advantage.

If you would like to get copies of this book, please write to me at gouthami11@yahoo.com

Gouthami

June 2016

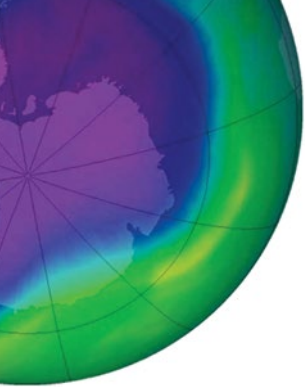
Foreword by Stephen O. Andersen

A good way to start any biography is with the words a person always chose to describe himself publicly. Sarma did this for the two books we wrote together, using the same text for both, with the exception that the second book mentioned the first. From ‘Technology Transfer for the Ozone Layer: Lessons for Climate Change’ (2007):

K. Madhava Sarma is currently a consultant to the United Nations Environment Programme (UNEP) on ozone issues and integration of the common aspects of global environmental treaties for greater synergy. With Stephen O. Andersen, he authored “Protecting the Ozone Layer: the United Nations History” (Earthscan, 2002, co-published by UNEP). He was Executive Secretary of the Secretariat for the Vienna Convention and the Montreal Protocol from 1991 to 2000. During his tenure as Executive Secretary, he served the Parties to the Protocol through the turbulent Meetings of the Parties in Copenhagen, Vienna, Montreal, and Beijing – including three replenishments of the Multilateral Fund for the Implementation of the Montreal Protocol. He streamlined the administration of the institutions of the Protocol, the reporting requirements, and other administrative obligations so that Parties could devote their full attention to resolving challenging political issues. Prior to being recruited to head the Secretariat, Madhava Sarma was a senior member of the Indian diplomatic team involved in the Montreal Protocol negotiations between the first and second Meetings of the Parties (1989–1991). During this time, he was often an effective spokesman for the developing country perspective and cosponsored many of the provisions of the London Amendment that satisfied developing countries while creating enforceable obligations to protect the ozone layer. He made other significant contributions as the senior Indian official looking after environmental policy, law, institutions and international cooperation, including responsibility for all global environmental issues. Prior to joining the national Government of India, he served as Head of District Administration, State Water Supply Board, and as Secretary to the Government, Irrigation and Power. During this state tenure, he was responsible for planning and implementation for many water supply, irrigation and energy projects. He earned the 1996 US Environmental Protection Agency (EPA) Stratospheric Ozone Protection Award and an award from UNEP for ‘Extraordinary Contributions to Ozone Layer Protection’.

Read that text again, but this time overcoming Sarma’s understatement by correctly perceiving him as a mastermind in intelligence, in crafting policy, in securing agreement on policy and in implementing complex agreements.

The biography that follows will help you know K. Madhava Sarma better, but you



will appreciate him the most when you read his writings or study his accomplishments. Some of the essential writings of Sarma are the many books, articles, guest editorials, and speeches that you will find online and from Internet booksellers; key publications are listed on the timeline appended to this bibliography. The other part is a complete collection of his professional correspondence, drafts, and internal memos that were collected from his computers in 2010 and are being organized for the Montreal Protocol Collection at the Environmental Science and Public Policy Archives at Harvard University. The Harvard Collection took shape when Sarma and I wrote our first book. At its initiation in 2002, it amounted to approximately 50 large boxes of publications, memoranda, videotapes, posters, photographs and promotional materials. The collection continues to grow as others make contributions.

Lost are his writings created by hand or on typewriters and never saved and the files lost on computer media no longer readable or without matching software. Fortunately, in Sarma's case, most of his writing is after 1990 and is preserved.



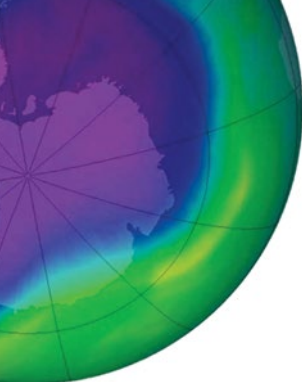
Sarma's good life started with an interesting childhood during extraordinary times

K. MADHAVA SARMA is well known in the environmental community for his accomplishments as founding Executive Secretary of the Montreal Protocol on Substances that Deplete the Ozone Layer, and as a prominent scholar and author on multinational environmental agreements and industry leadership. However, his career began long before the ozone treaty came into existence.

Sarma was born the fourth, among nine siblings, to K. Lakshminarayana and Seethamma in Chiriwada village, Krishna district, Andhra Pradesh, India, on 8 July 1938, which is the sacred Hindu day of Toli Ekadasi. His brothers are K. Ramakrishna Murthy (born 1929), K. Sreenivasa Sarma (1932) and K. Harsha Vardhan (1957); and his sisters are B. Vasantha Rukmini (1935), V. Indira (1943), R. Jayalakshmi (1945), S. Renuka (1951) and D. Suchitra (1954). His extended childhood family included a maternal uncle who also had nine children, a widowed sister of his mother and his maternal grandmother, all living together in one home; however, they were not all living together at any one time because Sarma and others left home before later children were born.

Throughout his life, Sarma was surrounded by extraordinary people who shaped his integrity, inquisitiveness, intellect and life-skills. During pre-independence days in Indian villages there were lively intellectual and revolutionary debates. His maternal





uncle took great pleasure in having young Sarma read the newspaper and he was encouraged to speak up. He was a weak child and so his father gave him money to go by rickshaw to school. Young Madhava was interested in films, and so he walked to school and used the money to buy cinema tickets for matinee shows. When Sarma was missing, his father would usually find him in the library where he was known for charming librarians into getting books on inter-library loan once he had exhausted the local collection. The library was also where he began his daily habit of reading the newspaper, since in those days his family did not have a subscription. His lifelong passions included music, reading, films, writing, mathematics, lecturing, and intellectual discussions with his family and friends. In films, he was a fan of Raj Kapoor, who portrayed the idealistic aspirations of newly emerging independent India in the 1950s. He was also taken up by the radical ideas of George Bernard Shaw, and 'Pygmalion' and its film adaptation 'My Fair Lady' remained his favourites. He was an eclectic reader throughout his life and read widely of fiction, biography and historical narrative.

Until age nine, Sarma was schooled at home by his father (a tutor in mathematics) and mother and then attended Sri Kanyaka Parameswari Vissamsetty Venkataratnam (SKPVV) Hindu high school in Vijayawada, from where he graduated on 29 May 1952 at age 13. He pursued college preparatory studies in Chemistry, Physics and Mathematics from 1952 to 1954 at Sri Raja Rangayya Apparao & Chundurur Venkata Reddi (SRR & CVR) Government College (Vijayawada, India), scored high on college



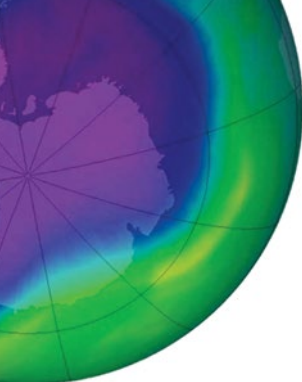
entrance examinations, and was encouraged to pursue Engineering (as was the norm then for gifted students). However, he opted for the Mathematics Honours program at Andhra University (Visakhapatnam, India) from 1954 to 1957, where he graduated as a Bachelor of Science (BSc) with Honours. In recognition of graduating with first class grades and completing the program in four years instead of the normal five years, he received an honorary Master of Science (MSc) degree in Mathematics.

Sarma often told his closest friends that a person's character is complete by the teens and can only be controlled after that.

Sarma's higher education

AFTER GRADUATING from college, Sarma enrolled at the Indian Statistical Institute (ISI) in Kolkata, India, which was started in 1931 by Professor P.C. Mahalanobis at the request of the late Prime Minister Jawaharlal Nehru. Sarma was the protégé of Calyampudi Radhakrishna Rao, who later earned the highest science awards from both the Government of India and the United States of America. ICS Professor J.B.S. Haldane, who is considered one of the most eccentric figures in modern science, also influenced him. ISI was an institution of great intellectual vigour and he was exposed to a rich tradition of learning and debate that he fondly recalled, decades after.





Fellow students included R. Thyagarajan – founder and Chairman of the Shriram Group of Companies – who describes Sarma as the smartest and best-liked student in their class. He stood out for his intelligence, his outgoing personality and sense of humour, which was unusual among the typical reclusive mathematics students. Thyagarajan remembers how surprised Rao and fellow students were when top student Sarma chose to depart with an MSc in Planning and Econometrics rather than continue on as faculty. Thyagarajan speculates that financial obligations to family was the primary reason that Sarma pursued the better-paid life in executive government service.

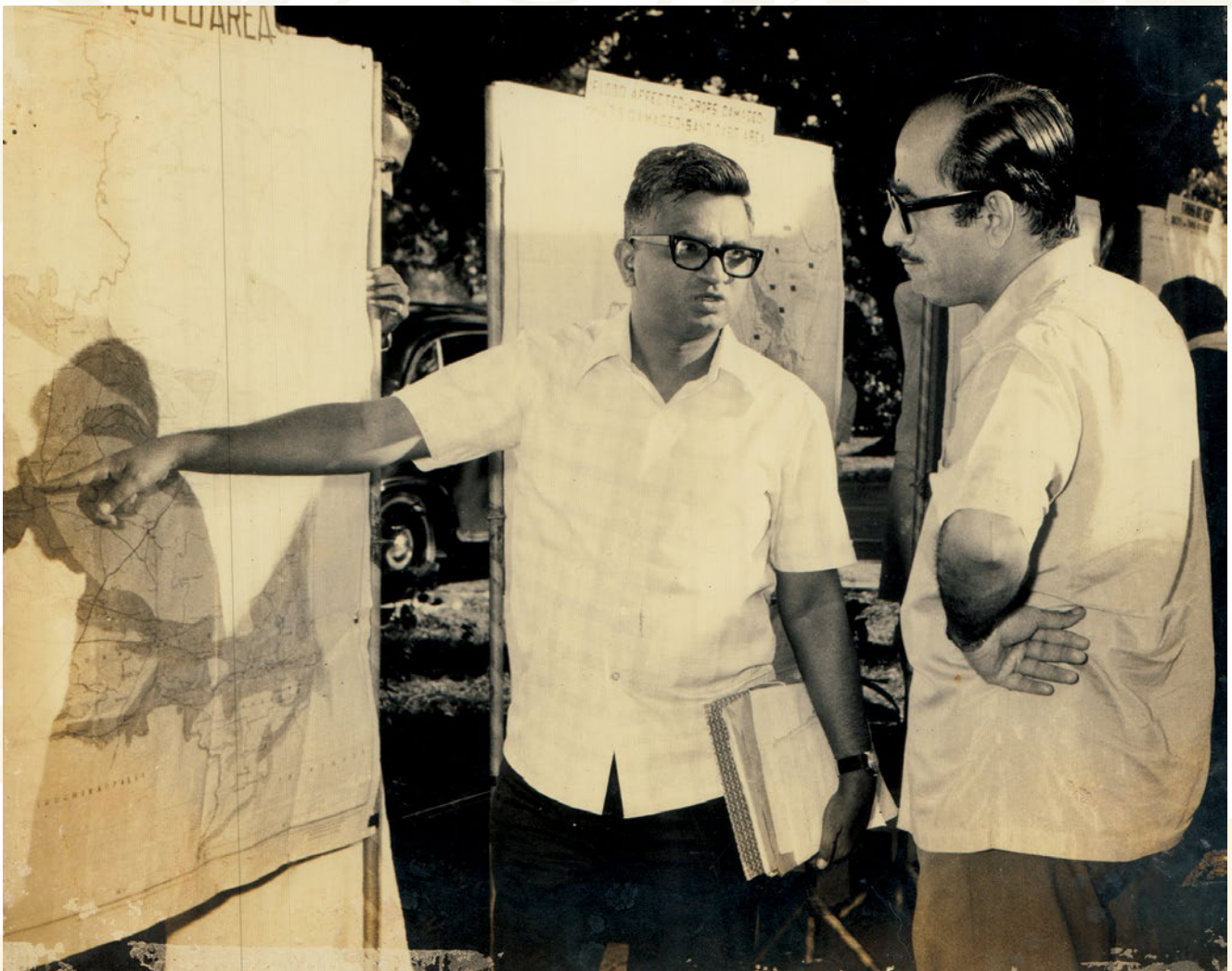
This commitment to his family included his siblings, their spouses, nieces, nephews, their children or others far removed. He could be said to have practised the Hindu Dharma – a duty to be carried out to the extent possible without thought of reward or payback or any negative criticism. One of his oft-repeated sayings was ‘Karmanye vadhika raste maa faleshu kadachana’, a quote from Krishna in the Bhagavad Gita, which in Sanskrit means that a person should focus on one’s duty and not on the reward or results.

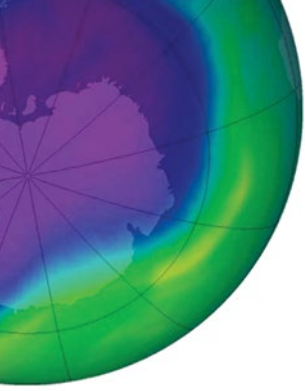
Sarma’s eldest sister’s husband, B. Ramakrishna Paramahamsa, an Agricultural Officer with the State Government, influenced him to write the prestigious Indian Civil Services (ICS) examination. When Sarma went on holiday to his sister’s house, his brother-in-law would introduce him as a future ICS officer to his friends. In 1960, this brother-in-law passed away and this strengthened Sarma’s resolve to write the ICS examination.



Straight from ISI, Sarma wrote the ICS examination. He wanted to enter the Indian Administrative Service (ICS/IAS), which is the civil service of the executive branch of the Government of India. The officers of the ICS/IAS are the professional executives of both the Union Government (Central Government) and the State Governments, selected by rigorous examinations, essays and interviews. Being part of these services remains a most highly sought-after career choice. While studying for the examinations, Sarma worked as a planner at the National Council of Applied Economic Research (NCAER).

The first time Sarma took the examination in 1961, his score was not high enough for him to join the ICS/IAS, but qualified him for admission into the allied service of Defence Accounts, where he worked for a year at the Army Accounts Department in Delhi. In 1962, he took the test a second time and passed easily, ranking 17th among the approximately 1,000 candidates taking the ICS/IAS advanced qualifying examination. He was inducted into the top government cadre of India. He achieved this through sheer hard work, tenacity and determination. He was not from an influential family and whatever he achieved was through his own effort, ambition and determination, and the unquestioning support of his family. He also had a lively intellectual curiosity, which coupled with a natural inclination to share and collaborate, enabled him to cross barriers and work with a wide variety of people and institutions in getting the job done throughout his career.





In 1962, he attended the ICS/IAS Academy in Mussorie, in the Himalayas in northern India, for advanced training in personal management, accounting and public administration. At the Academy, he was required to learn to ride a horse and often dined in formal evening wear with his fellow batch-mates; a first experience for many of the newly inducted ICS/IAS officers in using a fork and knife and wearing a 'Bandhgala' (formal tunic suit). He also went on a 'Bharat Darshan' tour with his batchmates and travelled the length and breadth of the country. The group also had an audience with the then Prime Minister, Jawaharlal Nehru. He would serve in the ICS/IAS for the next 29 years, under every Prime Minister from Nehru to P.V. Narasimha Rao, until his retirement in 1996 (although after his secondment to UNEP in 1991 to serve as Executive Secretary of the Montreal Protocol Ozone Secretariat, he no longer reported directly to the Government of India).

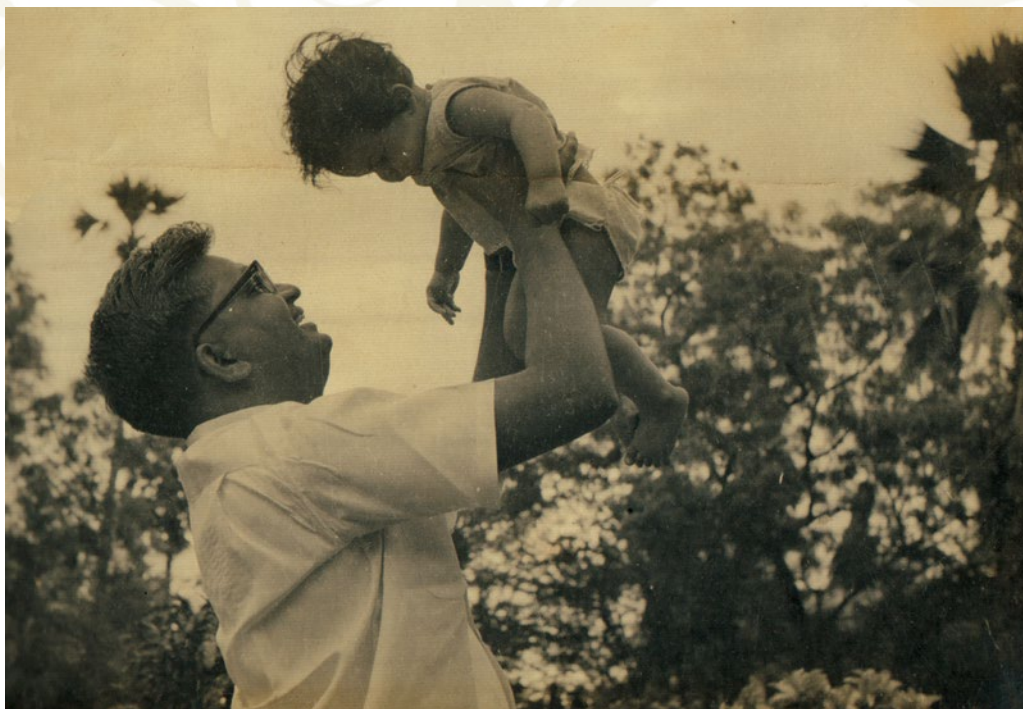
Sarma received additional periodic training during his career at ICS/IAS, including a 1978 World Health Organization Fellowship for study of Water Systems Operation at the University of California, Los Angeles, and 1981 Irrigation Study Tour in Korea, the United States and Spain.

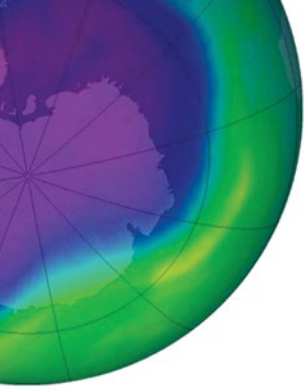


Marriage, family, work and more

ON 24 MAY 1964, he wrote in his diary, “Jumped off the docks”, in a style picked up from P.G. Wodehouse. He got married to Ramalakshmi and brought his bride to a collapsing house full of snakes set on the seashore in Tuticorin, Tamil Nadu. Ramalakshmi proved to be a worthy life partner, sharing his wanderlust, his need to do his duty in helping others and his simplicity. Never has it been truer, that behind every great man there is a great woman supporting him. He was also close to her family, which included her two sisters Indira and Rukmini and her brother V.S. Murthy, and their families.

Over a span of 29 years in the IAS, Sarma served as Collector of two districts (South Arcot and Tirunelveli), Commissioner of Madurai Municipality, Special Officer of the Chennai Corporation, Managing Director of the Tamil Nadu Water Supply & Drainage Board, Secretary to the Government of Tamil Nadu for the Public Works Department and finally Joint Secretary and Additional Secretary in the Ministry of Environment and Forests to the Government of India. A highlight of his ICS/IAS service in Tamil Nadu was reaching a final agreement on the approval of the Telugu Ganga Project and management of other complex water supply, irrigation and energy projects for the Tamil Nadu government – critical positions with a great deal of responsibility, considering the importance of agriculture and drinking water to the region.





Colleagues who worked with Sarma in India are unanimous in characterising him as highly respected, capable, articulate and ethical. He is remembered for his modesty despite high rank and accomplishments, even temperament, professionalism, patience, openness to new ideas and persistence. He had the unusual ability to take on and expertly accomplish work from the smallest technical detail to the most complicated policy development and implementation. He demonstrated objectivity and fairness and fought relentlessly for projects and policy he believed in. Ministers he worked for in New Delhi reported that he investigated every detail and considered every option before putting forward proposals and that they came to trust completely his advice and counsel. Many of his superiors reported that his affable demeanour and altruistic motivation made it possible for him to fight relentlessly for what he believed in and still keep the respect and gratitude of even the people who initially fought hardest against him.

His effective management in Tamil Nadu and other conspicuous successes led him to the post of, at first, Joint Secretary and later Additional Secretary to the Government of India in the Ministry of Environment and Forests. In this capacity, he developed detailed regulations on hazardous chemicals, impact assessment and other provisions of the Environment Protection Act of India; participated in the World Climate Conference of 1989; represented India in the negotiations leading to the amendment of the Montreal Protocol in 1990 and was a member of the Intergovernmental Panel on Climate Change (IPCC), which shared the 2007 Nobel



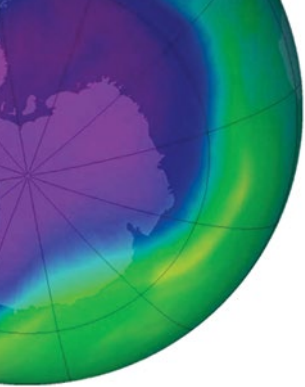
Peace Prize with Albert Gore. In representing India in the negotiations leading to the amendment of the Montreal Protocol in 1990, Sarma often crafted the negotiating strategy, wrote the speeches for the Indian diplomats and ministers, served as a fully effective spokesperson for the developing country perspective and co-sponsored many of the provisions of the London Amendment that satisfied the developing countries, including on the financial mechanism, while creating enforceable obligations to protect the ozone layer.

His experience in bringing India into the Montreal Protocol and crafting enforceable obligations for developing country Parties was particularly important in preparing him for his future contributions as the top UNEP executive of the Vienna Convention and the Montreal Protocol.

In 1991, shortly after he distinguished himself in helping amend the Montreal Protocol and create its financial mechanism, the Multilateral Fund (MLF), Sarma was recruited to be the first Executive Secretary of the Ozone Secretariat. In this capacity, he steered 190 member countries through nine ministerial-level meetings and 20 Working Group meetings and facilitated the working of the Implementation Committee and three Assessment Panels – the Scientific Assessment Panel (SAP), the Environmental Effects Assessment Panel (EEAP), and the Technology and Economic Assessment Panel (TEAP).

Some of the key issues resolved at the meetings included replenishments of the Montreal Protocol's financial mechanism and complex adjustments and amendments





that continually strengthened the treaty. In addition, he monitored compliance of the Parties through the collection and analysis of data on the use of 96 ozone-depleting chemicals and dissemination of results to ensure effective implementation. He streamlined the administration of the institutions of the Protocol, the reporting requirements and other administrative obligations so that the Parties could devote their attention to resolving challenging political issues. He was the mastermind of collaborative solutions for non-compliance and was an effective supporter of other flexibility mechanisms such as the Essential Use Exemption. For example, Sarma was among the first to grasp that allowing Essential Use Exemptions made it easier for Parties to agree more stringent phaseout without fear that a particular important use would be lost. Sarma was responsible for the origin of the idea of open-ended 'Global Exemptions' for important uses common to many Parties and 'Emergency Exemptions' that are granted by the Ozone Secretariat between meetings after consulting with TEAP Co-Chairs. These exemptions were granted in as little as 72 hours.

In 2001, after nearly ten years of exemplary service, Sarma retired from his executive position at the Ozone Secretariat, where he was replaced by Marco Gonzalez. He didn't stray far, however, as the Parties to the Montreal Protocol appointed him as a Senior Expert Member of the TEAP, which provides the necessary technical information on alternative technologies to assist the Parties in making decisions which continue their progress of eliminating the use of substances that harm the ozone layer. In this consulting role, Sarma worked quietly and closely with Marco Gonzalez,

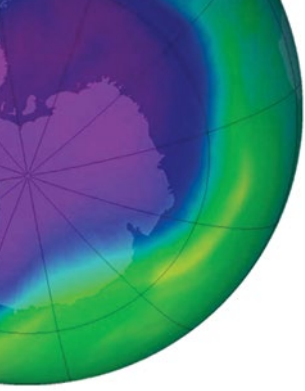


at first to assure a smooth transition, but soon as a confidante, collaborator and true friend. He reviewed and suggested improvements to the OzonAction programme of UNEP; advised the Environmental Management Group, a UN-wide group initiated by the Secretary General on strategies for coordination of all environmental activities within the UN system; and wrote a Guide to the Montreal Protocol for developing countries. He was also a member of the Technology and Finance Committee on Montreal Protocol of the Government of India.

While working on the Montreal Protocol, Sarma and Stephen O. Andersen became fast friends and highly productive colleagues. Together they translated obscure technical and economic information into policy-relevant findings that made ozone-depleting substance (ODS) phaseout almost a foregone conclusion. As they co-authored individual papers for publication and presentation, they realized that the Montreal Protocol had lessons for other multilateral treaties that, if taken on board, could better protect the Earth at a lower cost and with more pride of ownership. In five years, they published two major books and dozens of separate articles and presentations telling the history and success of the Montreal Protocol.

Unbeknownst to the world and the ozone community at the time, the extensive ODS phaseouts implemented under Sarma's expert guidance led to an unintentional, but incredibly fortunate outcome: the mitigation of 135 billion tonnes of carbon dioxide-equivalent between 1990 and 2010, effectively delaying climate change by up to 12 years. Because many of the ODS being phased out were also potent greenhouse





gases, in addition to being considered the most successful environmental treaty, the Montreal Protocol has now become the world's most successful climate treaty and is the only United Nations treaty with membership of all countries.

With climate change posing a grave threat to the world, Sarma's efforts during the last decade was focusing on maximizing the climate mitigation potential of the Montreal Protocol while further protecting the ozone layer and finding synergy with other multilateral environmental agreements (MEAs). Sarma and Andersen were among the first to appreciate what the Montreal Protocol had done for climate. Sarma set to work setting the stage for new policy and Stephen recruited a 'dream team' of scientists to document the magnitude of the success.

As the science started coming together in 2006, Sarma, together with Husamuddin Ahmadzai of the Swedish Environmental Protection Agency, Marco Gonzalez, Andersen, and Durwood Zaelke and Scott Stone at the Institute for Governance and Sustainable Development (IGSD), conceived of the 'Stockholm Group' to discuss the way forward with like-minded authorities from governments, industry and non-governmental organisations (NGOs). Sarma and the others recruited Heiðrún Guðmundsdóttir from Iceland, Sophia Mylona from Norway, Sophia Tapper and Johan Gråberg from Sweden and Blaise Horrisberger from Switzerland to launch the Stockholm Group discussions on an accelerated hydrochlorofluorocarbon (HCFC) phaseout. As the Stockholm group proceeded, Sarma was instrumental in seeing it not just as something that could be done, but also as something that could be done



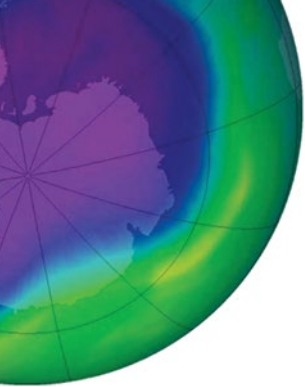
quickly – and with broad support from developed and developing governments, industry and NGOs.

Sarma and his team interpreted key scientific findings for journalists and policymakers so that there was wide appreciation for the significance when the study was published in the spring of 2007. One measure of success of the science and the strategy is that the publication (now widely known as ‘Velders I’ in honour of lead author Guus Velders) was featured on the face pages of a dozen government and non-governmental organisation websites including the UNEP, Netherlands Environmental Protection Agency, US National Oceanic and Atmospheric Administration (NOAA) and more.

Sarma, with the Stockholm Group, contributed significantly and was instrumental to the success of the 2007 adjustment to accelerate the phaseout of HCFCs – chemicals which are ODSs as well as potent greenhouse gases. Sarma had a good grasp on how to use science to build the confidence of policymakers, how to inspire developed and developing country diplomats to take a precautionary approach and how to set the stage to come to agreement at a diplomatic meeting.

Even before the 2007 Montreal Protocol Adjustment was agreed, Sarma, Gonzalez, Zaelke and Andersen realised that the climate benefits of the accelerated HCFC phaseout would be even higher if the HCFCs were replaced with technology with the lowest carbon footprint rather than with HFCs, which were once necessary substitutes for ODSs, but are no longer needed because environmentally superior technology





is now available or can be rapidly invented and commercialized.

Although HFCs are included under the Kyoto Protocol, Sarma and his friends realised that action under the Montreal Protocol would be faster and more cost-effective and sustainable. Zaelke, Sarma and Andersen recruited a new team to make the case that fast action on HFCs would reduce the risk of abrupt climate change ('tipping points'). The new team comprising Mario Molina, Zaelke, Sarma, Andersen, Veerabhadran Ramanathan and Donald Kaniaru published "Reducing Abrupt Climate Change Risk Using the Montreal Protocol and Other Regulatory Actions to Complement Cuts in CO₂ Emissions", in the March 2009 issue of the 'Proceedings of the National Academies of Science' (PNAS), which complemented the new study quantifying the potential carbon reductions (widely known as 'Velders II'). From this foundation, Sarma's network of environmental advocates are promoting an Amendment to the Montreal Protocol crafted by Canada, the Federated States of Micronesia, Mexico and the United States, and supported by over 90 other countries.

The pending HFC amendment will reduce greenhouse gas emissions enough to protect the climate while efforts to control CO₂ get under way.



Sarma's life outside the Montreal Protocol

SARMA ALSO ANONYMOUSLY undertook a wide range of humanitarian, environmental and educational campaigns. For example, in 1996, Sarma and Ramalakshmi started and financed the 'Act Now Trust'

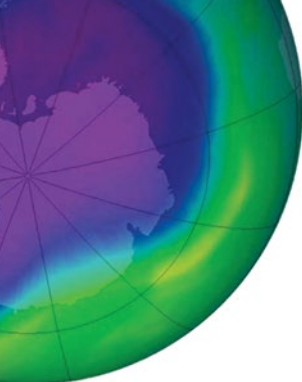
(1) To provide facilities and/or financial assistance to needy persons – irrespective of their caste or creed – for their education, training, sustenance, medical care, welfare or other needs;

(2) To undertake such other activities as necessary to assist and promote the welfare of needy persons; and

(3) To promote such activities as necessary to protect and enhance the natural or man-made environment, including humankind, animals, plants, land and water.

Sarma's closest friends recall the many times that Sarma offered advice, support and even financing when they needed it most. He was unselfish and giving of his time, whether it was to humanitarian causes, career advice to a nephew or to volunteer his support to the Chennai Mathematical Institute (CMI). No query or request for help was ever beneath him, and he counselled inexperienced young students with the same patience, wit and wisdom as he did senior government officials, corporate executives and civil society leaders. When he and Ramalakshmi returned from Nairobi to Chennai, one of the first tasks they took up was the formation of a neighbourhood association to ensure that the streets would be kept clean, that recycling would occur, and that fair wages would be paid to people taking the new jobs that were created.





In the mid-1960s at the request of R. Thyagarajan – who was a student with Sarma at the Indian Statistical Institute and founder and CEO of the Shriram Group – Sarma joined the CMI as Trustee Secretary of the Board of Trustees. At that time, CMI was challenged by declining private support, housed in an unimpressive rented space, and struggling to recruit and retain a talented and inspired faculty and students.

CMI was founded in 1989 by Prof C.S. Seshadri and a dedicated team of mathematicians as part of the SPIC Science Foundation and is a good example of public–private partnership in research and education in India. Its vision is to build on its early success and develop into a well-rounded academic institution, in the tradition of the best universities around the world.

Sarma oversaw a wide range of reforms at CMI, including restructuring and government approval of corporate papers authorising the unusual private/public funding, identifying and purchasing a building site in a new technology park, and supervising the design and construction of the new campus. As a result of these efforts, in October 2005, CMI moved to its new campus at Siruseri, on the southern outskirts of Chennai. In December 2006, it was recognised by the Government of India as a University under Section 3 of the UGC Act, 1956. CMI offers B.Sc. (Honours) Programmes in Mathematics and Computer Science, and also in Physics; M.Sc. Programmes in Mathematics, Computer Science, and Computer Science and Applications of Mathematics; and Ph.D. Programmes in Mathematics, Computer Science, and Physics in cooperation with Bhoj University. Today, CMI receives major

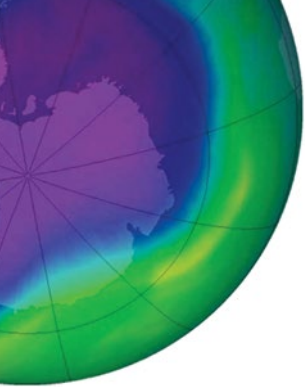


private funding side by side with substantial financial support from the Government of India, is a highly respected centre of excellence for teaching and research in the mathematical sciences, and students who have graduated from CMI have gone on to join leading institutions throughout the world.

In his final years, Sarma was also working with the Montreal Protocol Parties to build support for pending proposals that would address HCFC and CFC 'banks' found in refrigerators, stationary and mobile air conditioners, thermal insulating foam, and stockpiles of new or recovered ODS, which will be released into the atmosphere at the end of equipment life, if not recovered and destroyed. If the Parties can agree to fund these proposals, they will be able to prevent up to 7.4 billion tonnes of carbon dioxide-equivalent that would be emitted by 2015, greatly benefitting both climate and the ozone layer.

The Montreal Protocol has great potential for climate change mitigation, but there is still a need for a post-2012 international climate agreement. Utilising his years of experience managing, moderating and negotiating, and his profound understanding of the dynamics of multilateral environmental agreements, Sarma had been reaching out to Parties and their climate negotiation teams to try to find common ground and a way to structure a fair agreement with a strong financial foundation to address this growing threat. The extensive technology transfer knowledge and experience that he had gained from his nine years working with the TEAP allowed Sarma to share the Montreal Protocol's lessons of success with developing countries for the ongoing





climate negotiations. Some have already realised the potential of using the ozone treaty's regulatory structure as a model for climate, including the G77 and China, who are now developing their financial mechanism based on it. Many, however, have yet to see how beneficial the lessons of the ozone treaty could be for climate and Sarma worked tirelessly in hopes that the ozone treaty will help move negotiations towards a successful climate treaty. To this end, Sarma served as an adviser to the UNFCCC's Expert Group on Technology Transfer.

Prestigious awards for diplomacy and character

K. MADHAVA SARMA earned all of the most prestigious awards for diplomacy and ozone layer protection, including the 1995 UNEP Award for Extraordinary Contributions to Ozone Layer Protection, the 1996 US EPA Stratospheric Ozone Protection Award, the 2005 Special Vienna Convention Award for Ozone Layer Protection, the 2007 UNEP Montreal Protocol Visionaries Award and the 2007 US EPA Best-of-the-Best Stratospheric Ozone Protection Award.

Sarma was the only Indian awardee of 11 persons from around the world to earn the UNEP Montreal Protocol Visionaries Award 'in recognition of extraordinary contributions in the creating of the Montreal Protocol, the global treaty to protect the ozone layer'. The US EPA Agency 'Best-of-the Best Stratospheric Ozone Award' has been presented to 31 awardees around the world, selected from the list of over 500



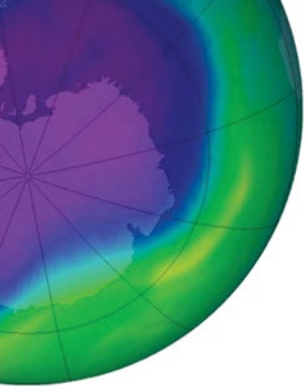
EPA annual ozone awardees from 1990 through 2007. Professor Radhey S. Agarwal, a Professor of the Indian Institute of Technology, Delhi, is the only other Indian awardee. This award was given to Sarma ‘in recognition of the most exceptional global contributions in the first two decades of the Montreal Protocol for strategy, leadership and institution-building for ozone layer protection.’

Significant books, studies, articles and editorials

WITH STEPHEN O. ANDERSEN, Sarma authored ‘Protecting the Ozone Layer: The United Nations History’ (Earthscan London, 2002) and with Stephen O. Andersen and Kristen N. Taddonio, ‘Technology Transfer for the Ozone Layer: Lessons for Climate Change’ (Earthscan London, 2007) and wrote chapters in many books including: ‘Climate Change in Africa’ (Cambridge University Press, 2005), ‘Making Law Work: Environmental Compliance and Sustainable Development’ (Cameron May, 2005), ‘The Montreal Protocol: Celebrating 20 Years of Environmental Progress’ (Cameron May, 2007), and ‘Twenty Years of Ozone Decline: Proceedings of the Symposium for the 20th Anniversary of the Montreal Protocol’ (Springer, 2009). He was also instrumental in the development of the Handbook for the International Treaties for the Protection of the Ozone Layer (UNEP; now in the 7th Edition) and the Guide for National Ozone Officers (UNEP 2005).

With Mario Molina, Durwood Zaelke, Stephen O. Andersen, Veerabhadran Ram-





anathan and Donald Kaniaru, he authored “Reducing Abrupt Climate Change Risk Using the Montreal Protocol and Other Regulatory Actions to Complement Cuts in CO₂ Emissions”, ‘Proceedings of the National Academy of Sciences’ (PNAS), vol. 106, no. 49, pp. 20616–20621. Sarma also wrote guest editorials in many journals.

Sarma was a frequent writer for ‘Industrial Economist’ magazine (circulation 10,000), ‘OzonAction’, and many other periodicals.

Grandchildren will share the future Sarma fought to protect

THE BIRTH OF his first grandchild came soon after he retired, in 2002. Two more grandchildren followed in the next three years. With them, he was completely himself and at ease. It didn’t matter that he had just chaired a global meeting. Watching him with his grandchildren, one would never believe that he had achieved anything at all. He was all eager to learn when any one of them said, “but thatha (grandpa) you don’t know anything – let me show you”. And it was surprising and shocking to the rest of his family who were used to him knowing everything. His philosophy after he got into the ICS/IAS was “I know nothing – others know less”, said with his characteristic chuckle. With his grandchildren, he shared a special bond and they certainly knew it.

During his 72 years of life, Sarma made outstanding contributions to family, friends, diplomacy and decency. Long into the future he will be remembered for his vision, wisdom and leadership in protecting the stratospheric ozone layer and climate. We can truly say of him that the world is a better place because of what he did and what he inspired others to keep doing.



What others say about Sarma

Identified by relationship to Sarma and citizenship(s)

K. Harsha Vardhan, youngest brother (Indian):

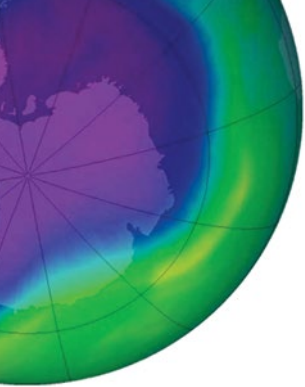
“Sarma has given me life, showed me the path, and was more like a god than a brother to me and everyone in the family. He was there when I had problems, listening carefully, offering hope, and always with a positive attitude. You simply cannot imagine a person like Sarma unless you know him.”

Omar El-Arini, First Chief Officer (Retd.) of the Montreal Protocol Multilateral Fund (Egyptian):

“We all know Sarma’s devotion to his family, friends and work, and we are cognizant of his achievements. It is this devotion that bound us, and many more, to this great soul. The best description of Sarma, the human being, is eloquently articulated by none other than the Mahatma Gandhi when he listed the attributes for the devotee, based on the Mahatma’s understanding of the Gita: ‘He is a true devotee who is jealous of no one; who is a fount of mercy; who is without egotism; who is selfless; who is always forgiving; who causes no dread; who is not afraid of others; who is free from exultation, sorrow and fear; who is pure; who is versed in action and yet remains unaffected by it; who treats friends and enemy alike; who is untouched by respect or disrespect; who is not puffed up by praise; who does not go under when people speak ill of him; who loves silence and solitude; who has a disciplined mind.’”

Maas Goote, Directorate of Legal Affairs/International, Netherlands Ministry of Housing, Spatial Planning and the Environment (Dutch)

“As first full-time executive of the Montreal Protocol Ozone Secretariat, Sarma helped create what came to be known as the ‘ozone community’ where participants respect each other’s views, work constructively to consensus, and craft policy that is affordable and sustainable. After he retired from UNEP, he was always available to those of us who later strengthened the Protocol to protect against abrupt climate change. The world will miss Sarma, but we will never forget how he showed us the way forward in making the world safe for future generations.”



Frank Pinto, Executive Coordinator (Retd.) of the United Nations Development Programme Global Environment Facility (Indian):

“Sarma was literally one of the pillars of both the Vienna Convention and the Montreal Protocol. He was a very able negotiator for India until he became Executive Secretary of the Ozone Secretariat in 1991, and then was able to quickly change hats and became an effective and impartial resource for all countries, agencies and indeed civil society. His cool and calm demeanour during MP negotiations in the 1990s – even when all those around him were very excited and red in the face – helped calm things down and ensure that a positive result was obtained.”

Air Marshal (Retd.) A.K. Singh, Indian Department of Defence (Indian):

“Sarma is a natural leader. He is sincere, strong, brave and stubborn and almost always successful. It was my honour and pleasure to work with him to make the world safe for future generations.”

Suely Carvalho, Chief, Montreal Protocol Unit, United Nations Development Programme (Brazilian):

“Mr. Sarma has touched so many lives. He surely made mine change for the better. In the past 20 years, he has guided me as a Brazilian delegate, then as TEAP Co-Chair and finally as part of the United Nations community. He was always there for me as he was for the whole ozone family! Smart, wise, firm, humble and a caring human being, Mr. Sarma always had a word to say that made all difference!”

Scott Stone, Stockholm Group (American):

“I learned an extraordinary amount about environment protection and international law from his simple, elegant, and always trenchant way of looking at the many complex and seemingly intractable problems confronting us – and his inimitable way of finding a path through them. The world is a richer place for his many selfless and far-reaching contributions.”

R. Thyagarajan, CEO, Shriram Group (Indian):

“Sarma was the brightest of the maths and statistics class and the protégé of Dr. Rao. But he was also the most charming and outgoing of the students. He was the student you wanted to be with, demanding but uncompetitive, unselfish in helping anyone to be as good as they could be and remarkably able to see life from the smallest detail to the biggest concept.”

Husamuddin Ahmadzai, Executive of the Nordic Environment Finance Corporation, and Senior Executive, Swedish Environmental Protection Agency (Indian, Swedish):

“I remember Sarma Ji as a beacon, a peer and a fond friend. His deeds immortalise him. Please count on my continuing devotion to Sarma Ji’s vision, ideals, and environmental ambition. When I started the Stockholm Group as an incubator of new ideas to protect ozone and climate, it was Sarma who was quick to draft an action agenda, to recruit the best of the like-minded participants, and to guide the conversations to successful campaigns such as accelerating the HCFC phaseout and controlling HFCs under Montreal.”

Durwood Zaelke, President, Institute for Governance and Sustainable Development (American):

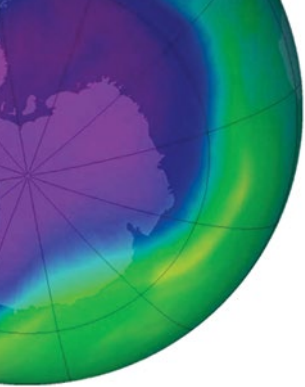
“Sarma was the mastermind of policy and knew just how to build momentum and make the case to even the most embedded sceptics. Time and time again, he motivated the best of human nature to act in the interest of future generations... patiently but firmly working to final success.”

G. Ranga Rao, Executive Secretary of Education (Retd.), Government of India (Indian):

“Sarma had full-time, unequivocal integrity that is too rare in India and the world today. He cared deeply about the interests of the citizens he served and also about future generations. By setting such a high example, he raised everyone up and demonstrated the true rewards and satisfaction of doing good.”

Shafqat Kakakhel, Deputy Executive Director (Retd.), United Nations Environment Programme (Pakistani):

“During the decade I worked with Sarma Ji, my wife and I visited Sarma and Ramlakshmi’s home for dinner and we often met during our evening walks in the UN Compound. I developed enormous fondness and respect for Mr Sarma on account of his ability, commitment to public well-being, and personal decency and politeness. After his retirement from UNEP, Sarma Ji told me to freely ask him whatever I needed him to do without bothering about having to pay because doing something good was more important than financial rewards and recognition. He called it ‘paying back to society part of the debt one owes it’. I am glad to say that I have carried out his advice to the best of my ability.”



**T.N. Seshan, Secretary of Environment and Forests (Retd.),
Government of India (Indian):**

“I was not surprised when Sarma became world famous protecting the stratospheric ozone layer because he had already achieved environmental miracles at the Ministry of Environment and in his service to the States and Districts. Someone as hard-driving and stubborn could not have accomplished nearly as much as Sarma because he counter-balanced that with sincerity, affability, and completely transparent and honest motives. More often than not, we ended up doing it Sarma’s way and have nothing but positive memories and pride for being on his side at the end.”

**Stephen O. Andersen, Co-Chair of the Montreal Protocol
Technology & Economic Assessment Panel (American):**

“I can see Sarma the child at the foreign movies dreaming of being the world citizen he became, in a math class finding the magic of science that served him so well on ozone and climate protection and at his beloved math institute, at the Montreal Protocol Meeting of the Parties holding court and directing the actions so skilfully. Best of all I see him with his extended family, proud to have had an influence in our lives and the lives of children to come. The only time I disagreed with Sarma was when I did not understand what he was saying.”

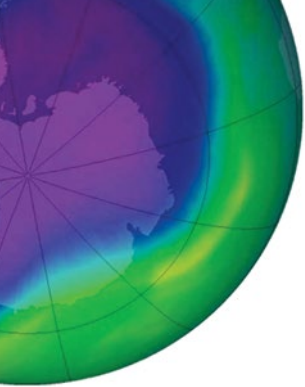
**Kristen N. Taddonio, Manager of Commercial Building Energy Alliances,
US Department of Energy (American):**

“Sarma is very much alive – in the words he wrote, the wisdom he shared, and in the hearts, minds, and actions of his friends, colleagues, and family. His lessons live on in the thought, word and deed of the friends and students whom he mentored. His legacy lives in the very strength of the Montreal Protocol that he shaped.”



Abbreviated timeline

- 1938** K. Madhava Sarma is born 8 July in Chiriwada village, India
- 1952** Graduated high school, 29 May
- 1954** Completed college preparatory curriculum and entered Andhra University (Visakhapatnam, India)
- 1957** Bachelor of Science – B.Sc. (Hons.) in Mathematics from Andhra University and honorary Master of Science (M.Sc.) bestowed in recognition of exceptional scholarship at the top of his graduating class
- 1959** Master of Science – M.S. in Planning and Econometrics from the Indian Statistical Institute (Kolkata) with two months advanced internship at the Central Statistical Organization, Government of India, New Delhi
- 1959–61** National Council of Applied Economic Research (NCAER), New Delhi
- 1961** Recruited to the Indian Defence Accounts Service, serving one year at the Defence Accounts Department
- 1962** Entered Indian Administrative Service (IAS) after scoring 17th out of approximately 1,000 people screened to take the ICS/IAS Advanced Placement Examination; entered the 1962 Class of the ICS/IAS Academy
- 1963–91** Collector, Commissioner, Special Officer, Chief Executive, Secretary, Joint Secretary, Additional Secretary
- 1964** Married to K. Ramalakshmi, 24 May
- 1967** Daughter Naga Nandini born, 22 January
- 1969** Daughter Gouthami born, 1 June
- 1971** Daughter Sridevi Kalavakolanu born, 14 May
- 1991** Appointed Executive Secretary, Montreal Protocol Ozone Secretariat
- 1991** Authored with Duncan Brock the first Handbook of the Montreal Protocol
- 1995** UNEP Award for Extraordinary Contributions to Ozone Layer Protection
- 1996** US EPA Stratospheric Ozone Protection Award
- 1996** Started and funded with spouse K. Ramalakshmi the ‘Act-Now Trust’
- 2000** Retired from Montreal Protocol Ozone Secretariat
- 2001** Appointed as Senior Expert Member of the TEAP
- 2002** Authored with Stephen O. Andersen *Protecting the Ozone Layer: The United Nations History* (Earthscan London)
- 2002** Became a grandfather to Anika, daughter of Sridevi Kalavakolanu and Ravi Gururaj, 22 September
- 2003** Second grandchild, Nikhil, born to Naga Nandini and Sudipto Dasgupta, 27 January
- 2005** Third grandchild, Anjali, born to Sridevi Kalavakolanu and Ravi Gururaj, 12 May
- 2005** Special Vienna Convention Award for Ozone Layer Protection
- 2005** Authored “Compliance with the Montreal Protocol”, in *Making Law Work: Environmental Compliance and Sustainable Development* (Cameron May)
- 2005** Authored *Guide for National Ozone Officers*, UNEP Paris
- 2005** Authored “Lessons for Developing Countries from the Ozone Agreements”, in *Climate Change in Africa* (Cambridge University Press)



- 2007 Authored with Stephen O. Andersen and Kristen N. Taddonio: *Technology Transfer for the Ozone Layer: Lessons for Climate Change* (Earthscan London)
- 2007 UNEP Montreal Protocol Visionaries Award
- 2007 US EPA Best-of-the-Best Stratospheric Ozone Protection Award
- 2007 *The Financial Times* interviews K. Madhava Sarma and Nobel Laureate Mario Molina on how the Montreal Protocol can be strengthened to protect climate, 12 September (<http://www.ft.com/cms/s/2/b9d84dd6-6132-11dc-bf25-0000779fd2ac.html>)
- 2007 Authored with Kristen N. Taddonio: “The Role of Financial Assistance by the Multilateral Fund in Technology Change to Protect the Ozone Layer” in *Twenty Years of Ozone Decline: Proceedings of the Symposium for the 20th Anniversary of the Montreal Protocol* (Springer Science, published in 2009)
- 2008 Authored with Stephen O. Andersen, Donald Kaniaru, Hermann Ott and Peter Storey: “Identification and Assessment of Effective Means and Ways that Could Scale Up Diffusion and Transfer of Existing Technologies for Mitigation and Adaptation”, UNFCCC Secretariat and Expert Group on Technology Transfer
- 2009 Retired from the TEAP
- 2009 Authored with Mario Molina, Durwood Zaelke, Stephen O. Andersen, Veerabhadran Ramanathan and Donald Kaniaru: “Reducing Abrupt Climate Change Risk Using the Montreal Protocol and Other Regulatory Actions to Complement Cuts in CO₂ Emissions” in *Proceedings of the National Academy of Sciences (PNAS)*, vol. 106, no. 49, pp. 20616–20621
- 2009 Authored with Stephen O. Andersen: “The Montreal Protocol HCFC Challenge: Opportunity for Another Success” in *Ozone Action: Building on the Montreal Protocol, 2010 and Then*, United Nations Environmental Programme, Paris
- 2009 Authored with Stephen O. Andersen and Kristen N. Taddonio: “Dual Benefits of Technologies: Ozone Layer Protection and Climate Change Mitigation” in *International Journal of Environmental Consumerism*, vol. 5, nos. 9 & 10, Environmental and Consumer Protection Foundation, New Delhi
- 2009 Authored with Stephen O. Andersen, Durwood Zaelke and Kristen N. Taddonio: “Ozone Layer, International Protection” in *The Max Planck Encyclopaedia of Public International Law*, Max Planck Institute for Comparative Public Law and International Law, Heidelberg and Oxford, published in 2011
- 2010 Authored with Stephen O. Andersen: *Making Climate and Ozone Treaties Work Together to Curb HFC-23 and other ‘Super Greenhouse Gases’* (Natural Resources Defense Council, Washington DC)
- 2010 Authored with Stephen O. Andersen: “Science and Diplomacy: Montreal Protocol on Ozone Depleting Substances” in *Science Diplomacy: Antarctica, Science and the Governance of Internal Spaces*, Smithsonian Institution Scholarly Press, published in 2011
- 2010 K. Madhava Sarma dies with family at his side, 30 September

Abbreviations used in this biography

B.Sc.	Bachelor of Science
CO₂	Carbon dioxide
EEAP	Environmental Effects Assessment Panel (of the Montreal Protocol)
EPA	Environmental Protection Agency
HCFC	Hydrochlorofluorocarbon
IAS	Indian Administrative Service
ICS	Indian Civil Service
IGSD	Institute for Governance and Sustainable Development
IPCC	Intergovernmental Panel on Climate Change
ISI	Indian Statistical Institute
MEA	Multilateral Environmental Agreement
MLF	Multilateral Fund (of the Montreal Protocol)
M.Sc.	Master of Science
NCAER	National Council of Applied Economic Research
NGO	Non-Governmental Organisation
NOAA	National Oceanic and Atmospheric Administration
ODS	Ozone-Depleting Substance
PNAS	Proceedings of the National Academies of Science
SAP	Scientific Assessment Panel (of the Montreal Protocol)
SKPVV	Sri Kanyaka Parameswari Vissamsetty Venkataratnam (Hindu high school)
SRR&CVR	Sri Raja Rangayya Apparao & Chunduru Venkata Reddi
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
US	United States
TEAP	Technology and Economic Assessment Panel (of the Montreal Protocol)

Endnotes

i The Environmental Resources Librarian and Curator of the Environmental Science and Public Policy Archives, Cabot Science Library, Harvard University, 1 Oxford St, Cambridge, MA 02138-2901, USA; tel +1 617 496 6158; fax +1 617 495 5324; website <http://hcl.harvard.edu/environment>.

ii The Montreal Protocol is the only international treaty on any topic that has universal global membership of all nations recognised by the United Nations. In 2012, it had 197 Parties, including the latest country of Southern Sudan.

iii Guus J.M. Velders, David W. Fahey, John S. Daniel, Mack McFarland, Stephen O. Andersen and Mark H. Thiemens: “The Large Contribution of Projected HFC Emissions to Future Climate Forcing” in *Proceedings of the National Academy of Sciences (PNAS)* United States of America, vol. 106, no. 27, pp. 10949–10954, 2007.

iv Ibid

