

PERSONAL NEWS

discovery now-a-days is not just an individual endeavour, as it used to be in the past. Individual originality and creations have been replaced largely by collective work aided by complex giant instruments, which call for funding, and this brings into the loop, the administrative authorities and Governments to play their roles.'

Pandya was a respected 'gurunam guru' amongst the physics fraternity of Gujarat and will be remembered fondly for long times to come. A few would match his personal contribution to the science in Gujarat, and the state of Gujarat will remain ever indebted to this simple, affable, unassuming yet gargantuan persona of Science in Gujarat. *Sudhirb-*

hai, you are immortal for all of us. You will always be by our side, and taking care of us.

Benchmark contributions of Pandya and his colleagues.

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Anand Swarup Arya (1931–2019)

Professor Anand Swarup Arya was born on 16 June 1931 in Ambehta (Saharanpur, UP) in India. He breathed his last on 1 September 2019 at the age of 89 years. His passing is a national loss and his absence will be felt as long as memories last.

Arya obtained his Bachelor's degree in Civil and Master's degree in Structural Engineering from University of Roorkee (UOR) and Ph D from University of Illinois, USA in 1961. He was honoured with Distinguished Alumnus Award by the University of Illinois as well as by UOR.

UOR became Arya's *Karma Bhumi* for 35 years, where he became Head of Earthquake Engineering Department in 1971 and Pro-Vice Chancellor in 1988. Upon retirement in 1989, he continued as Professor Emeritus. His work was so profound that he captured national imagination as a renowned engineer, an adorable teacher and a much sought-after engineering consultant. By the time he left the university, he had already bagged Khosla National Award (1980), ISET Jai Krishna Award (1982), FICCI Cash Award (1986) and National Design Award (1987).

Arya's expertise spanned the disciplines of earthquake engineering, soil dynamics, geotechnical engineering and structural engineering. For over half a century, he contributed immensely towards developing India's indigenous expertise in earthquake disaster prevention and mitigation aiming at the safety of structures ranging from common man's

housing to multi-storey buildings, bridges, dams, petrochemicals and nuclear power plants. He also served as a consultant to the Ministry of Railways, Nuclear Power Corporation, Central Water Commission and the Government of Gujarat.



Arya nursed the foundation of earthquake engineering in India laid by the legendary Jai Krishna. In the process, he and his teams achieved many firsts. The birth of Indian Society of Earthquake Technology (1962), the establishment of a Post Graduate Course in Earthquake Engineering (1963), the publication of the first Indian Standards IS:1893 on Design Earthquake forces, and IS:4967 Seismic Instrumentation for River Valley Projects are just a few examples.

His focus was always on finding apt solutions to the real life problems. When

the Koyna dam developed cracks after the Koyna earthquake of 11 December 1967, he and S. K. Thakkar addressed the broader issue of strengthening all the vulnerable masonry dams in the state of Maharashtra.

When the Bharuch earthquake struck on 23 March 1970, and the holding down bolts of two of the 14 piers of Narmada bridge got sheared off, Arya's team set out to explain the failure by conducting lateral load and vibration tests.

When the Latur earthquake struck Maharashtra in 1993, India faced the huge challenge of post-disaster reconstruction and rehabilitation. Impressed by Arya's advocacy for simple retrofitting techniques, the World Bank came forward to fund a major project involving seismic retrofitting of nearly 200,000 houses.

Arya's retirement came about the same time as the UN Resolution 44/236 declaring 1990s as the International Decade of Natural Disaster Reduction (IDNDR). The prime goal of IDNDR was to improve national capacities to mitigate the effects of natural disasters. Arya represented India as a Member of UN Scientific and Technical Advisory Committee of IDNDR.

So substantial was his contribution to the cause of Disaster Risk Reduction (DRR) that, during IDNDR, Arya was honoured with the coveted DHA-Sasakawa Disaster Prevention Award by Yasushi Akashi, the then Under-Secretary-General for Humanitarian

Affairs at UN Headquarters in New York on 11 December 1997. Established in 1986, the award carries a cash prize, a citation and a trophy. He donated this money to his Alma Mater to further the cause of DRR.

The mapping of India's national disaster vulnerability profiles being fundamental to DRR, the Building Materials Technology Promotion Council (BMTPC) of the Ministry of Urban Affairs under the visionary leadership of its Executive Director T. N. Gupta decided to produce the first Vulnerability Atlas of India. Arya was invited to lead the project which climaxed in publication of the first edition of *Vulnerability Atlas of India* in 1997. Only a few months ago, on 2 March 2019, the third edition of the *Vulnerability Atlas* was released by the Prime Minister Narendra Modi. His continued association with BMTPC resulted in publication of some world class documents. While working at National Institute of Disaster Management (2005–2011), he delivered Guidelines on Rapid Visual Screening of Buildings, Disaster Resistant Construction and Retrofitting of different types of structures.

As a follow-up, the Ministry of Home Affairs jointly with UNDP launched a project aiming at Earthquake Vulnerability Reduction. Arya was appointed as the National Seismic Adviser (2003–2009). He also served as a consultant to United Nations Centre for Regional Development, Japan, on the School Earthquake Safety Project in the Asia Pacific Region. The SAARC Workshop organized to draw a road map for earthquake risk mitigation in Islamabad in 2009 was also led by him.

Rapidly changing disaster scenario in India prompted Government of India to constitute a High Powered Committee (HPC) on 20 August 1999 under the Chairmanship of J. C. Pant, a former Secretary in the Ministry of Agriculture, to prepare disaster management plans for the country. Arya was invited to be a member of the HPC to which he made a seminal contribution to the substance of the report submitted in October 2001.

On India's 52nd Republic day in 2001, an intraplate earthquake of magnitude 7.7 hit the state of Gujarat. Arya was invited to serve as Seismic Adviser to Gujarat State Disaster Management Authority, during 2001–2003. It was under his guidance that more than 200,000 houses were reconstructed and many

hospitals and Government buildings were retrofitted. In recognition of his outstanding contribution to the nation, he was awarded *Padma Shri* in 2002.

India enacted a National Disaster Management Act in December 2005. Arya was invited to be a member of several of its apex level committees and of the Core Committee which delivered the National Guidelines on Management of Earthquakes in April 2007. Even before the Guidelines got published, the then Prime Minister of India Manmohan Singh honoured him with the first ever 'National Disaster Mitigation Award' on the occasion of the first India Disaster Management Congress in November 2006.

Arya was among the few founding Fellows of the Indian National Academy of Engineering (INAE), and served its Council during 1995–1996. He also received the INAE's most prestigious Lifetime Contribution Award in 2002. The Indian National Science Academy also elected him as a Fellow. The Indian Concrete Institute bestowed him with Life Contribution Award.

Arya was a great champion of seismic safety codes. Tracing the history from the original code IS: 1893 of 1962 right up to the 5th revision drafted during 1999–2000, he advanced the fail-safe concept of design as the scientific way forward. In 1993, it was under his chairmanship of the Bureau of Indian Standards Committee, CED 39 during 1991–2010 that IS: 4326 was not only revised but split into more detailed Codes and Guidelines. A new Guideline IS: 13935 on Repair and Strengthening of Buildings and a new code of Practice IS: 13920-1993 on Ductile Detailing of R.C. Buildings were added. As a UNCHS consultant, he also helped Nepal in drafting its National Building Code fortified with seismic safety provisions. His services were also utilized by International organizations like Asia Disaster Prevention Centre, UNESCO and UNDHA in erstwhile Yugoslavia, Thailand, Philippines, Japan, Iran, North Yemen and Armenia.

I first met Arya in 1975 when he was Head of Earthquake Engineering Department when I had joined the Central Building Research Institute as the Head of geotechnical Engineering Division across the road. We frequently discussed the geotechnical engineering concerns in seismic microzonation and earthquake safe design practices. In 1998, he being

one of the very few protagonists of seismic microzonation as a tool for risk assessment, DST asked him to Chair an Expert Group on the subject. On behalf of INAE and Centre of Disaster Mitigation and Management, I also submitted my report on geotechnical aspects of seismic microzonation to DST in 2002. Responding to my concern regarding credibility of the estimates of site effects, he encouraged me to contribute in this area citing the lessons to be learnt from earthquakes of Mexico City, Loma Prieta in California, Spitak in Armenia and Baguio in the Philippines. The subject was so important that a national level workshop was chaired by N. C. Vij, the founder Vice Chairman himself on 16 July 2008. Arya strongly pleaded for adoption of a nationally unified procedure for field explorations. Unfortunately, it still remains an unfulfilled item of the national agenda.

Dhar Chakrabarti, a former Executive Director of National Institute of Disaster Management often called Arya as the oldest young man of disaster management with intellect of a wise, the exuberance of a youth and the heart of a child. At the age of 86, when Arya expressed his desire at a meeting to quit the Bihar State Disaster Management Authority where he had enjoyed the status of Minister of State, I was witness to the unanimous view of the Committee's Vice Chairman Anil Sinha, and the members that he should not abandon the ship. Even at the age of 88 years, a few months before his death, he addressed the inaugural function of 16th Symposium of Earthquake Engineering held during 20–22 December 2018. At the end of August 2019, when BMTPC was preparing to launch the newly established e-course on Vulnerability Atlas of India, it was unaware of the fact that Arya was battling for life in a hospital.

It is with a very heavy heart that I pay my debt of gratitude and homage to Arya. He will continue to live in the hearts and minds of thousands of his students, colleagues and admirers and his work keep showing us the foot prints he has left behind.

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