# Birth Centenary of Anil Kumar Ganguly (1918–1988)

The Atomic Energy Programme in India under Dr Homi Jehangir Bhabha, during its evolution, had the advantage of the professional expertise of several experts. Among them, hardly a few took indelible, firm strides, as Dr Anil Kumar Ganguly did. He was an environmentalist to the core and a born teacher. The contributions of Ganguly to the setting up of the multi-disciplinary health physics sciences will be remembered for ever. Anil Kumar Ganguly was the person whom Homi Bhabha selected from his successful academic perch in radiation chemistry at the University of Notre Dame in USA, where Ganguly was a research associate and colleague of Prof. Magee. His pioneering work there had led to the famous Ganguly–Magee theory.

When we talk of evolution of the health physics discipline in India, it is invariably tied to the professional career of Ganguly. From being in a profession generally confined to merely monitoring radiation levels, he gave it a firm and committed direction, showing how the profession transcends into many other branches of science, and turned it into a meaningful and effective radiation protection programme that requires expertise in many fields. In the process Ganguly generated a whole gamut of expertise and experts.

Acknowledging Ganguly's pioneering work on environmental protection in atomic energy, Dr Sarabhai directed him to organize the country's first ever National Symposium on 'Pollution and Human Environment', on the directive of the Committee on S&T (COST) of the Union Cabinet in 1970. This was in preparation for the country's participation in the UN Conference at Stockholm on the theme, 'Man and Environment'. The Government found that the only worthwhile research on controlling environmental pollution was being done in Atomic Energy Establishment Trombay (AEET). The deliberations at the symposium and the recommendations made by Ganguly, led to the formation of a separate Ministry of Environment in 1972, by the Government of India. Ganguly's concern for the environment made him a much larger figure as an environmentalist, transcending beyond the boundaries of the health and safety programme in AEET/Bhabha Atomic Research Centre (BARC).

Ganguly introduced the concept of Environmental Survey Laboratories (ESL), operationally independent of the management of nuclear power plants and allied facilities. The concept has stood the test of time and continues to be of high utility value to the nuclear power operators in projecting the minimal environmental impact due to operation of nuclear power stations. His initiative attracted the attention of World Health Organization (WHO) and International Atomic Energy Agency (IAEA) in the very early days and the Agency advised other member states, the need for a minimum environmental programme in nuclear reactor sites. Environmental radioactivity monitoring carried out by various groups under Ganguly led to basic research on how heavy elements interact with organic matter in the seabed and helped understand their mobility.

Foreseeing the possibility of immobilization of waste way back in 1959, he computed the temperature distribution in radioactive solids to assess the limit of radioactivity loading in immobilized glass matrix. This was an example of his foresight of vision.

With his concept of a fixed exclusion zone, supplemented by a zone free of unrestricted growth of population around a reactor, he laid the firm foundation norms for the selection criteria of nuclear power plant (NPP) sites in India.

He laid the foundation for the regulatory activities in India, starting from the preparation of the report on Safety Analysis and Waste Management for Canada India Reactor (CIR) in 1960. Naturally, Ganguly was called upon in 1975 to chair the Safety Review Committee (DAE-SRC), the forerunner of the Atomic Energy Regulatory Board (AERB), to oversee the regulatory aspects of all nuclear operations in DAE.

The work on thermo-luminescence (TL) was initiated by him way back in 1964. BARC thus became one of the global pioneers in the field and contributed to the understanding of the theoretical and experimental aspects of this phenomenon. This led to one of the world's largest TL dosimetry programmes today, all home grown.

A number of activities that he initiated in diverse areas like oceanography, radiation ecology, thermal pollution, radiation transport, dosimetry, criticality computations, fission and fission product physics, etc., attracted wide attention in those days. These activities have been instrumental in establishing a comprehensive and self-reliant radiation safety programme for the multi-faceted activities in DAE. He initiated basic work on the principles of laser isotopic enrichment by starting a group known as Multi-Disciplinary Research Section in 1972. His penchant for basic research is demonstrated by his contributions to the understanding of fission and fission product physics, leading to applications in nuclear safeguards.

Experts on radiation transport in his group carried out pioneering work on developing radiation transport computational methodologies and incorporating them in codes for shielding, and these were included by the American Nuclear Society in their computer code library. His teams were the first in AEET to establish computational codes essential for the nuclear programmes of the Centre.

His contribution to the setting up of the Indian Society for Radiation Physics is noteworthy and led to the formation of the international version of it, the International Radiation Physics Society (IRPS). The coining of the term 'radiation physics' is itself ascribed to him.

As an example of his premonition, he foresaw the need for addressing the possible impact of the tsunami at Kalpakkam coast, as early as 1975, when the Fast Breeder Test Reactor (FBTR) was being set up. These stood well when the tsunami struck the east coast of India years later in December 2004.

In international circles he was considered as a pioneer in radiation safety and environment, and many renowned specialists in United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) and International Commission on Radiological Protection (ICRP) like Dr Beninson and Dr Gonzales looked upon him as their *guru*.

He was always non-compromising and frank in expressing his firm convictions if he found any lapse in safety matters

and was known to have passed strictures against even governmental agencies, when it came to the question of environmental protection. Thus he commanded respect even from antagonists of nuclear power. He also had the unique knack of expressing his views in a pleasant manner without hurting anybody. As the chairman of Bhatsai River Pollution Committee, appointed by the Maharashtra Government, he castigated the government for lack of policy for locating industries causing extensive water pollution in the area. That turned out to be his last assignment of a remarkable professional career spanning three decades.

There was something rare in the personality of Ganguly that enthused people around him to start thinking; every conversation, be it official, personal or social was interspersed with this spirit.

It is hoped that this narration of a tribute to Ganguly will enlighten all the current stakeholders in the nuclear field, recalling the challenging past in the evolution of our atomic energy programme and sow the seed for productive pursuits in the future.

Ganguly was elected as INSA Fellow in 1979. Dr Jagadhish Shankar who on directions from Bhabha selected Ganguly to lead the radiation protection programme in 1955, had written an INSA Memoir on Ganguly. He was selected as National Environmental Fellow by the Department of Science & Technology, Govt of India in 1979 for two years. He carried out extensive research on the Western Ghats on the transport of rocky material by rivers and on forestry cover. He was honoured with the award of Padmashri in 1974 for his contributions to environmental sciences and radiation protection.

Indian Association for Radiation Protection has published a Compendium of Memoirs of Ganguly authored by Dr M. R. Iyer, at its golden jubilee conference in 2018.

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# Requirement of student-centric presentations in NIRF

The popularity of National Institutional Ranking Framework (NIRF) is increasing year after year. Ranking stimulates competition among institutions and helps improve quality or performance. Ultimately ranking of institutions will result in economic and social progress. It is time now to make NIRF results more user-friendly. Though NIRF simply states that it gives a 'scorecard' to stakeholders, it serves many purposes as follows: (1) Students can make informed decisions in selecting or short-listing institutions based on their ranks. (2) Government agencies prefer to provide autonomy and research grants based on ranks. (3) Companies prefer to recruit workforce from well-ranked institutions, and hence campus and other placements will be better for such institutions. (4) Faculty members prefer to work in well-ranked institutions. (5) Institutions, being aware of their strengths and weaknesses, plan for improvements.

Aspiring students have started using NIRF ranks in the selection or short-listing of higher education institutions. Students compare institutions in aspects such as rate of graduation, employment records of graduates, and qualifications of teaching staff as a proxy of teaching quality. NIRF uses five parameters or criteria and consolidates the score to rank the institutions. It provides criteria-wise scores for each institution, but institutional comparisons are to be checked manually. If the institutions can be sorted based on criteria-wise performance, say ranks based on 'teaching, learning and resources' alone, this will be useful to students. Also, the needs of students vary and weights given by NIRF for the criteria may not be suitable to all. A student may like to find an institution to complete his/her undergraduate programme and start earning immediately (may be necessary for family economic conditions). For this student, the 'research and professional practices' may be less important, but 'teaching, learning and resources' and placement details in the form of 'graduate outcomes' are more important. Another student may like to find an institution for research-intensive postgraduate programme, and thus the 'research and professional practices' is important. For this student, 'graduate outcomes' and 'teaching, learning and resources' may not be useful. NIRF can facilitate these students by providing a sorting facility of the institutions based on specific criteria. Ranking based on the combined mono-dimensional score alone is less useful in many cases[1]. At present, NIRF allows sorting of the institutions by state, and this seems useful to many students who prefer to study in their own or neighbouring states. This facility can be extended to criteria-wise sorting as well. The QS and THE Rankings websites reveal that these rankings focus on helping the aspiring students to select institutions. Discipline-wise ordering of institutions in 48 independent disciplines is facilitated by the QS Rankings 2019. It also provides ranks based on graduate employability. The Center for World University Rankings, ranks institutions in 227 subject categories[2]. These types of criteria-wise and subject-wise sorting are more useful to aspiring students. The tentative tuition-fee structure will also be helpful to students as many of them cannot afford high tuition fee. Initiatives along these lines are required from NIRF to take it to the next level. Online vendors of electronic items provide facilities to compare features of different products. Similar options to compare institutions (the feature here is criteria score) may also be useful.

1. Prathap, G., *Curr. Sci.*, 2017, **113**(4), 550–553.
2. Prathap, G., *Curr. Sci.*, 2018, **114**(6), 1151–1153.

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