Drain is an old term but has not lost its meaning even today. Every year bright students from developing countries queue up to get a seat in some university in the developed western countries. Post doctoral fellows frantically search the Net for an opening in renowned laboratories of these countries and are more than ready to shift for life. Such is the pull of the facilities in the developed world and the repulsion generated by the lack of the same in developing nations that brain drain goes on unabated.

Fifty years ago, in 1964, a would-be Nobel laureate endeavoured to bring down the pace of this undesirable process. He built an institute in Trieste, Italy to help physics students from developing and least developed countries get exposure to the latest developments in their field. It was named the International Centre for Theoretical Physics (ICTP). The founder Abdus Salam, a renowned physicist from Pakistan, created history at an international level.

To start a new international institute for collaborative physics research outside the developed countries was not an easy task. Land and finance were the basic requirements. Both were provided by the Government of Italy. On 18 June 1964, Carlo Arnaudi, Italy’s Minister of Scientific Research, and Sigvard Eklund, Director General of the International Atomic Energy Agency (IAEA), laid the foundation stone for what would become ICTP’s main building.

IAEA had decided to partially fund the operations of the institute on a provisional basis. The decision was to be reviewed after four years. Some IAEA member states that had supported the creation of the Centre suggested that ICTP, if successful, should eventually be moved from Italy to a developing country. That was the thorn in the flesh with which Salam had to contend. There was still need for more funds and the gap was bridged by a four-year grant from the Ford Foundation.

With all this support ICTP’s first scientific activity was held in October 1964. It was a four-week seminar on Plasma Physics. It was to be followed by a two-month seminar on High Energy Physics and Elementary Particles in May and June of next year. Physicists who attended included future Nobel Prize winners Murray Gell-Mann, Sheldon Glashow and Julian Schwinger.

The decade of the 1970s started with the United Nations Educational, Scientific and Cultural Organization (UNESCO) joining as a full partner in the management of ICTP. The 1970s witnessed the launching of courses in computing as a language of physics (1971); applied mathematics (1972); atomic, molecular and laser physics (1973); the physics of ocean and atmosphere (1975); science teaching (1976); non-conventional energies (1977); and mathematical economics (1978).

According to Luciano Bertocchi, acting director of ICTP from 1994 to 1995, ‘The number of scientists visiting the Centre throughout the 1970s was small, averaging about 1000 each year.’ Another comment gives away the nature of functioning of ICTP at that point. Bertocchi says, ‘ICTP research and training activities tended to be fewer in number and longer in length. Take, for example, the Workshop on Solid State Physics in 1972. It began on 15 April and ended on 31 August, attracting 64 scientists from 21 countries.’
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Funding. Help came from United Nations the institute found new sources of animosity. However, in the seventies to plan and travel a lot to reduce this difficult year for the ICTP. ‘Salam had writes, ‘This was just the beginning of a event had to be shifted to Venice. Greiff his former students decided to organize a boycott of the event at ICTP. Thus the boycott was led by American and Israeli scientists.

In 1975, writes Alexis De Greiff, Salam’s plan to celebrate the 60th birthday of Fred Hoyle received a jolt when a group of scientists led by one of his former students decided to organize a boycott of the event at ICTP. Thus the event had to be shifted to Venice. Greiff writes, ‘This was just the beginning of a difficult year for the ICTP.’ Salam had to plan and travel a lot to reduce this animosity. However, in the seventies the Institute found new sources of funding. Help came from United Nations Development Programme (UNDP) and Swedish International Development Authority (SIDA).

In 1979, Abdus Salam received the Nobel Prize for Physics along with Sheldon Glashow and Steven Weinberg. This was a huge recognition for his contributions to physics which would ultimately benefit the standing of ICTP.

In his banquet speech Salam said, ‘Let us strive to provide equal opportunities to all so that they can engage in the creation of Physics and science for the benefit of all mankind.’ It was, as if, he was promoting his centre at Trieste on the highest platform of recognition.

One of ICTP’s major programmes to equip students from developing countries is its one-year intensive diploma course. The course is intended to prepare the students for PhD programmes in Western universities. However, in some countries the level of education is so poor that the brightest would-be physicists are not prepared to take the rigors of the diploma programme at ICTP. Hence the Institute had to make plans to reach out to such countries and lend a helping hand to the local academic institutions.

At the same time it was felt that an in-house PhD programme was necessary that would absorb some of the students who complete the diploma but are unable to find PhD places at universities in Europe or North America. Changes in this direction have been effected in recent years and now ICTP and the International School for Advanced Studies (SISSA) offer the opportunity for carrying out PhD studies in Astrophysics, Applied Mathematics, Particle Physics, Physics and Chemistry of Biological Systems, etc.

Largely omitted in contemporary history of science is the crisis that ICTP went through in the mid-seventies. This was due to its relationship with UNESCO. In 1974, the General Conference of UNESCO approved three resolutions against Israel. Soon thereafter a group of physicists promoted a boycott of ICTP since it was partly supported by UNESCO. This boycott was led by American and Israeli scientists.

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Theoretical physics was initially the subject around which all research activities were designed in ICTP. However, as time went by more and more subjects were added to the pool. Biology is getting a lot of importance these days at the institute. Closer ties are being built up with the International Centre for Genetic Engineering and Biology (ICGEB) in Trieste, which was founded in 1983 along similar lines as the ICTP to promote experimental biology in the developing world. Computational biology is receiving ample attention from the director and his colleagues at ICTP.

India enjoys a special place in ICTP. Along with China and Brazil it has become a country that now has the capacity to give back to the institute what it received. A document released by the institute informs that 8,641 scientific visitors have stepped into the prestigious corridors of the Trieste centre between 1970 and 2012. The same document tells us that 741 women from India had been at the institute for scientific purposes since 2001.

One Indian had been the director of this institute earlier. He is Katepalli Sreenivasan. From 2003 to 2009 he served as director and was also the Abdus Salam Honorary Professor. Immediately after his tenure, he was honoured by the American Association for the Advancement of Science with the International Science Cooperation Award. In a press release the association noted:

‘One of Sreenivasan’s visions at the ICTP was to create the Earth System Physics Research Center to conduct research on regional climate modeling, anthropogenic climate change, natural climate variability, chemistry-climate interactions, biosphere-atmosphere interactions, seismology, the physics of the lithosphere, and earthquake predictions. Since 2006, the ICTP has established new diploma programs in earth system physics as well as basic physics – an effort to provide young physicists and mathematicians from sub-Saharan Africa with a strong foundation in physics before they pursue further studies at the graduate level. Under his leadership, an initiative called the Sandwich Training Educational Programme (STEP) has offered fellowship opportunities to PhD candidates from developing countries in the fields of physics and mathematics.’
Many Indian scientists have been members of its Scientific Council. Ashoke Sen, world famous string theorist, has been on the council since 2004. ICTP had honoured him with the ICTP Prize in 1989 and recently with its prestigious Dirac Medal. Sen is not the first Indian scientist to receive this award. Earlier E. C. George Sudarshan (2010) and Jogesh Pati (2000) had received this award. Indian scientists had also received other prizes given by the institute like the Ramanujan Prize in the past.

ICTP supports various research activities in India through its Office of External Activities. In 2013, the Winter School in Quantitative Systems Biology was held in Bangalore. The collaborating centre was the International Centre for Theoretical Sciences of TIFR. It was held in the Indian Institute of Science campus.

Two other conferences were held in the same year in Hyderabad and Pune. The Hyderabad conference was on Fundamentals of Ocean Climate Modelling at Global and Regional Scales while the one at Pune was titled Targeted Training Activity (TTA): Intra-seasonal Monsoon Predictability and Prediction.

The institute is keen on making regional scale future climate projections successful. Any climate projection initiative in recent times has to take into account the uncertainties created by increased concentrations of anthropogenic greenhouse gases. ICTP uses its own modeling system released in 2010. It is named RegCM and its fourth version is being used currently. The credit for developing this goes to the Earth System Physics (ESP) section. It claims that its RegCM4 model is being widely used by communities of scientists in Africa, Asia, Europe, North America and South America.

ICTP’s areas of engagement also include renewable energy. It is well known that countries which are richest in solar energy are poorest in technology. ICTP seeks to bridge this technology gap. Its researchers are also aiming at something novel. Currently the energy from the sun can easily be converted into electricity but there are not enough techniques to use the energy at another time or place. The problem can be solved by storing the energy from sun into chemical bonds that are similar to those present in gasoline and methane. In effect, the scientists are trying to manufacture hydrocarbon fuels which will be easily portable. In the solar cells they aim to manufacture, the energy will come from the sun and the hydrogen from water. But what will be the source of carbon? It will be the dreaded greenhouse gas carbon dioxide. Yes, instead of dumping this notorious gas into the environment the ICTP scientists plan to use it as feedstock to make fuels.

The completion of fifty years of existence is a big milestone for ICTP. The institute remains dedicated to its original programmes centred on physics and mathematics. At the same time it endeavours to enrich the fields of climate change, renewable energy, telecommunications and so on. It is an outstanding meeting ground for scientists from the developed, developing and least developed nations.

Dr Manas Pratim Das is a Programme Producer with the Science Cell of All India Radio, Kolkata. Address: 52/1, Adjacent to Ramkrishna Pathagar, Netaji Subhash Road, PO-New Barrackpore, Kolkata-700131