Co–operation in development through fellowships and training

For many countries, scientific fellows have become an important link in the effective transfer of nuclear technologies

by
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Every year, hundreds of scientists from developing countries are awarded fellowships for training and study programmes covering peaceful applications of nuclear energy in medicine, agriculture, industry, and other fields. In the process, they frequently become key links in the effective transfer of technology and knowledge for social and economic development in the Third World.

Through the IAEA's fellowship programme, more scientists are being trained than ever before in connection with more than 600 active technical co–operation projects around the world. During 1990—a record year in terms of participation—a total of 1057 scientists took part in fellowship training programmes and scientific visits involving 75 developing countries.

For the most part, the programme's costs are met from the IAEA's Technical Co-operation and Assistance Fund (TACF); in 1990 they amounted to US $6.8 million. Additionally, the United Nations Development Programme (UNDP) provides funds for fellowships connected to certain projects. In years ahead, the total amount of financial support for fellowships is expected to approach US $10 million.

In addition to these financial resources, contributions come from IAEA Member States that host these programmes on a cost–free or gift–in–kind basis. *(See map.)* In 1990, there were 68 countries which hosted 1057 fellows and scientific visitors. Among these, 18 countries hosted 145 fellows on a gift–in–kind basis (called a Type–II fellowship).

Why do countries host fellowships and scientific visits, and even provide this co–operative support on a gift–in–kind basis?

Perhaps the main reason is that co-operation in scientific research and development in the less developed countries is an absolute necessity. Numerous limitations exist in the Third World that are insurmountable obstacles to development without such co–operation. Chief among them are economic constraints which limit a host of elements necessary for development, such as equipment, education and training, and the continuous flow of current information from industrialized countries.

Relevant scientific research, and as a consequence technical development, cannot be accomplished in isolation. Without development, Third World countries would not be in any position to import and utilize new technologies, let alone develop any technology of their own. Thus, all developing countries must strive to maintain a good scientific infrastructure. In so doing, their standards of living can be improved through the development and use of local technology, and their ability to absorb modern technology can be maintained with minimal dependence on advanced countries. In turn, it is in the interest of industrialized countries that those nations on the road to development maintain a good scientific infrastructure. This facilitates the exportation and utilization of their newly developed technologies.

Throughout this process, fellowship training programmes and scientific visits help to build goodwill among countries—and among the key people involved in national development projects.

How fellowships benefit development

Over the past three decades, approximately 15 000 men and women have been awarded an IAEA fellowship for training or scientific visit under the IAEA fellowship programme. Many of them have become leaders in professional posi-

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The IAEA awards fellowships and scientific visits to enable men and women from developing countries to undertake training or scientific visits in support of projects for the peaceful application of nuclear technology in their countries.

In granting these awards, a number of factors are involved.

Fellowships. A major consideration for fellowships is that the training must be required for the successful execution of an approved IAEA technical co-operation project, or of an important national project not funded by the IAEA but supported by the Government concerned. Training should provide the fellow with expertise not available in his or her home country. The ultimate objective is to strengthen development projects in countries by increasing the capabilities of individuals working on them. Fellowship awards are never provided to individuals who are not employed or who are not working on a specific project of national interest in their countries.

As a rule, the IAEA's technical co-operation projects do not start from scratch; rather, a certain infrastructure already exists. They include trained or educated manpower, facilities such as buildings and equipment, and a significant degree of development in the field of activity related to the technical co-operation project. Input from the IAEA consequently should provide the international expertise and training required to achieve project objectives, including operation and maintenance of required equipment.

Upon receiving an award, IAEA fellows agree to return to their home countries to work on the project for a period of at least 2 years. The training itself is not necessarily long—it averaged only 4 months in 1990—which means that IAEA fellows generally do not stay away from their home countries for too long. Upon their return home, fellows are expected to immediately apply their training to the project and, in turn, to train other less qualified colleagues or staff. The aim is to train a sufficient number of personnel to assure that a "critical mass" is reached whereby trained personnel can regularly provide training at the home institution. The technical co-operation project can thus become "self-sustaining" at a certain level of development. While this is always the goal, financial constraints and consequent low salaries in Third World countries can distract research scientists and project staff from devoting their full efforts to project objectives. In these cases, national institutions must provide incentives and find ways to reward staff to remain on projects important to development.

Scientific visits. The scientific visit programme is another means by which the IAEA promotes the establishment of links for North–South and South–South co-operation between Member States. Scientific visits are short fellowships; they do not involve training. Rather, they consist of awards to senior scientists, project leaders, and even directors of institutions in developing countries to enable them to travel and visit advanced institutions in Member States. The awards by and large do not exceed a month in duration.

An overriding aim is to provide senior project staff the opportunity to meet with counterparts or experts in other Member States to discuss research methods, project implementation, and possibilities for future co-operation in fields of mutual interest. In 1990, there were 243 scientific visit programmes implemented by the IAEA for senior project staff from 53 developing countries. Programmes are carefully planned by IAEA technical officers and arranged through negotiations with host Governments.

Experience has shown that scientific visits can be very effective in advancing development projects. Many of the personal contacts established by the IAEA through the scientific visit programme lead to greater co-operation for development. For Member States, the IAEA often serves as the best channel or means of establishing links between institutions of various countries. This co-operation is often more difficult to arrange on a purely bilateral basis.

Fellowships and scientific visits

tions that are very important to development in their countries.

To help gauge the impact of its fellowship programme on national development, the IAEA recently surveyed former fellows for their views. Governments specifically were asked to identify former IAEA fellows who have made major contributions towards development in their countries, who have occupied important posts, or who are now filling positions in their countries that can play a key role in development. Fellows were then asked to describe their present position and duties, and any position they held which was important in the development programme of their respective countries. They were also asked whether they felt that, in the long term, their fellowships led to any beneficial co-operation between their country and the country which hosted their fellowship.

Based on responses received, fellowship training is having a positive, lasting impact on development projects and on international co-operation in general. Some selected cases, here presented under regional headings, follow:

Asia and the Pacific

Sri Lanka. Ms Nandrani de Zoysa, Director of the National Blood Transfusion Service (NBTS) of Sri Lanka, received training in radioimmunoassay techniques and enzyme immunoassay techniques in Hepatitis B testing at the National Reference Laboratory of the Canadian Red Cross Blood Transfusion Service in Toronto. As a result of the training, Ms de Zoysa was able to start Hepatitis B testing on donor blood at the NBTS central blood bank in

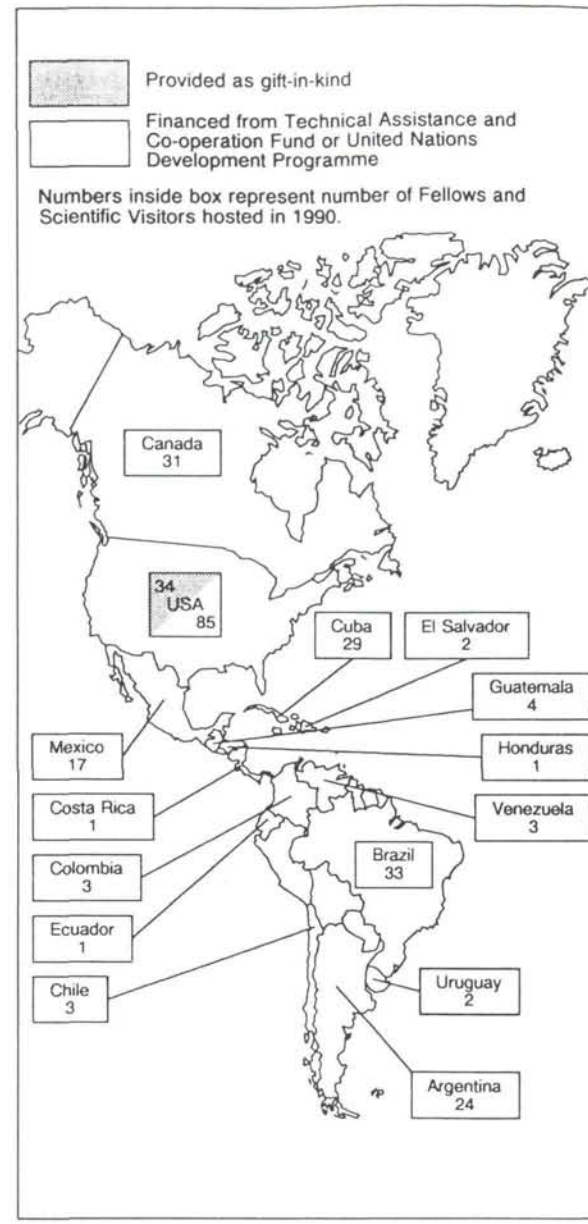
1985, and introduced the same testing to NBTS's 40 regional blood banks in 1987.

Mr Ransi Devendra reports that his fellowship training helped him to establish the technology of radiation vulcanization of natural rubber latex in industry in his country. Mr Devendra, who is with the Ceylon Institute of Scientific and Industrial Research, says he maintains professional contact with his former fellowship host in Japan, and that his institute is hoping to establish a bilateral project for co–operation with the Japan Atomic Energy Research Institute (JAERI).

Pakistan. Dr Saeeda Asghar, who is Head of the Division of Nuclear Medicine in the Institute of Nuclear Medicine and Oncology in Lahore and Associate Professor of Nuclear Medicine at the Federal Postgraduate Medical Institute, has had two fellowships at the John Hopkins Medical Institution in the United States. The training enabled her to pass the M.D. examination for foreign medical graduates. When she returned to Pakistan, Dr Asghar helped initiate the use of new technologies in the imaging of human organs, particularly for cardiac studies and dynamic studies of brain, kidneys, liver, bone, and other organs. She was awarded a second IAEA fellowship in 1990, involving 3 months of training in state–of–the–art clinical aspects of nuclear medicine with emphasis on medical diagnosis. After returning to her home country, Dr Asghar reported to the IAEA in February 1991 that she was using her newly acquired knowledge and experience in routine patient care, in diagnosis, and for treatment of patients with radioactive material. "With the help of this training, I have been able to start some new nuclear medicine imaging procedures in our department," she said.

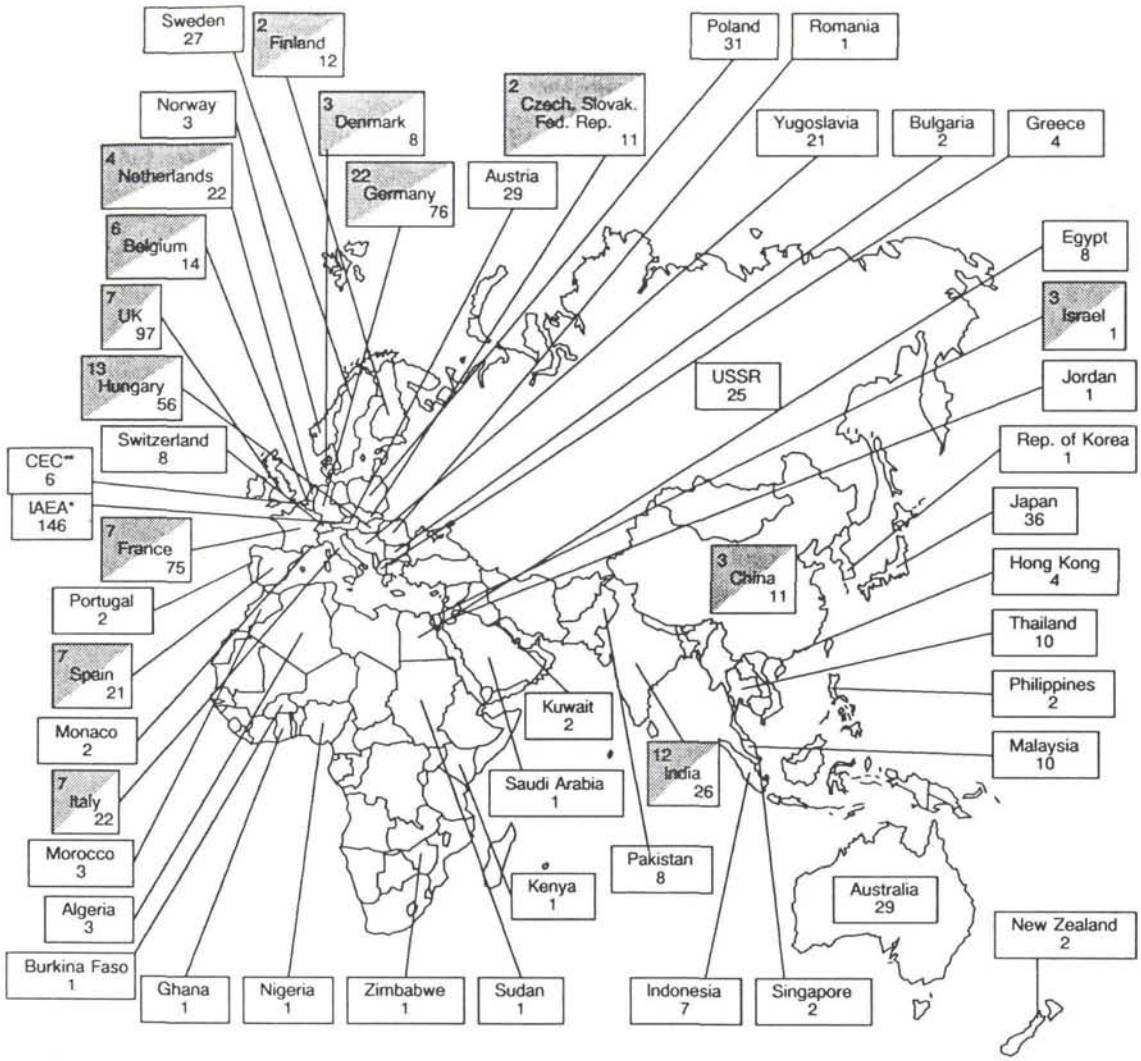
Philippines. Dr Carlito Aleta, Director of the Philippine Nuclear Research Institute and an IAEA fellow during 1966–67, considers his training an important element in his career. He says it specifically equipped him with the knowledge, skills, and ability to undertake his Institute's regulatory role with confidence. He further notes that the fellowship has helped in the establishment of bilateral co–operation between the United States Nuclear Regulatory Commission (USNRC) and the Philippine Atomic Energy Commission and in negotiations for co–operation with counterpart agencies in Japan.

China. Mr Zhang Wanli, a divisional Director at the National Safety Administration of China (NNSA), received his fellowship training in 1986 at the USNRC. Mr Zhang credited his on–the–job training there on the licensing process and methods to manage safety reviews as contributing to his successful management of the safety review of the Qinshan nuclear power plant. He says he continues to exchange information on nuclear regulation with counterparts there. The understanding he gained during his 6–month stay has "certainly facilitated bilateral co–operation" between the USNRC and NNSA, he says.



Malaysia. Mr Mohammed Tadza Abdul Rahman received 6 months of fellowship training at the Argonne National Laboratory in the USA in 1980. He is now Director of Inspection and Enforcement of the Atomic Energy Licensing Board of Malaysia. Mr Abdul Rahman says that his professional achievements would have been difficult without the knowledge and experience gained during his fellowship training.

Bangladesh. Mr M.A. Matin, who is now Head of the Radiation and Molecular Biology



* Covers training programmes offered by the IAEA at its Seibersdorf Laboratories, its Isotope Hydrology Laboratory, and through its various technical and administrative divisions.

** Fellowships hosted by the Commission of the European Communities at its Joint Research Centre at Ispra, Varese, Italy.

Countries hosting IAEA fellowships and scientific visits in 1990

Division of the Institute of Food and Radiation Biology at Dhaka, received 15 months of fellowship training in the field of food irradiation at the National Institute of Hygienic Sciences in Tokyo in 1979 and 1980. He was also awarded a scientific visit in food irradiation in 1988 to Hungary, the former German Democratic Republic, and the Netherlands. Mr Matin says, "Fellowship training has given me unique opportunities in building my career and preparing myself for the pursuit of advanced research and development and the solution of certain national problems of economic importance." Mr Matin still keeps in touch with counterparts in Japan, Hungary, Germany, the Netherlands, Pakistan and Member States of the Regional Co–operative Agreement (RCA) for Asia and the Pacific on food irradiation commercialization efforts. Bilateral arrangements for food irradiation process control and acceptance are also under way, he notes.

Africa, Europe and the Middle East

United Republic of Tanzania. In 1985, Mr James Boyi received 4 months of fellowship training in radiation protection in Vienna at the IAEA's Radiation Protection Services Section. Today, he is Head of the Radiology Department of the Bugando Medical Centre in Tanzania. He also serves as radiation protection officer of the Lake Zone in Tanzania encompassing approximately one–fourth of the country's land mass. Mr Boyi further credits the fellowship

training with helping him to assume the responsibilities of the National Radiation Commission Representative for his country.

Hungary. Mr Andor Andrasi, currently Head of the Health Physics Research Laboratory of the Central Institute in Physics in Budapest, was awarded a scientific visit to institutions in Austria and Germany. He reports that the scientific visit was important in establishing personal and institutional scientific contacts which proved to be fruitful. He states, "I have continued contacts with almost all persons and institutions visited. In addition, two bilateral projects and co–operation programmes have been established with institutions in Germany and Austria in the field of personnel monitoring and environmental radioactivity monitoring."

Poland. Mr Andrej Strupczewski, Deputy Director of WWER Safety Studies of the Institute of Atomic Energy, credits fellowship training hosted by the United States in technical areas of nuclear plant safety with directly affecting a large body of work done over about 8 years, including patents in some countries.

Turkey. Mr Omer Dogan Oner first received fellowship training back in 1960 in nuclear chemical engineering at Atomic Energy of Canada Limited. He received a second fellowship in 1964 involving 16 months of training in reactor technology at Oak Ridge National Laboratory in the United States. He later was awarded scientific visits to several countries in Europe. Since his training, he has held some very important positions dealing with peaceful nuclear energy applications in his country. He has served as Vice President of the Turkish Atomic Energy Authority (TAEK), Scientific Adviser to the Ambassador and Representative of Turkey to the IAEA, and adviser to the President of TAEK, a position that he currently holds. Mr Oner says the fellowship training was particularly important in providing him with the experience of conducting negotiations with other countries. He reports that he has participated in numerous bilateral negotiations for co–operation in the peaceful applications of nuclear energy with the USA, France, Germany, Canada, and Argentina.

Greece. Dr Athanasios Simopoulos, Director of the Institute of Material Science at the Democritos Nuclear Research Centre in Greece, largely credits fellowship training that he received in Israel with helping him to establish a group at the Centre specializing in the Mossbauer technique, which he says has proved especially useful for the development of basic research in his country.

Syria. Dr Ibrahim Othman, Acting Head of the Department of Radiation Protection and Nuclear Safety of the Syrian Atomic Energy Commission (SAEC), completed a fellowship in 1971–72 in radiotherapy at the University of Glasgow and a second fellowship in 1975–76 for an MSc degree in medical physics at the University of Surrey. He also participated in some scientific visits and short training courses. Following his first fellowship in 1971, he established the physics section of the SAEC's Nuclear Medicine Centre. After his second fellowship, he established the Department of Protection and Safety, which is now considered to be one of the leading departments in the region. Dr Othman attributes much of this success to the training he and his staff have received through the IAEA's programme.

Bulgaria. Dr Lubomir Kanchev, Director of the Institute of Biology and Immunology of Reproduction in Sofia, attended his first IAEA training course in 1971, which acquainted him with the field of immunology. In 1975 he was awarded another 9–month fellowship and training in this field at the University of Liverpool. Dr Kanchev says that after the fellowship he helped establish the first agriculture and veterinary science laboratory of radioimmunology in Bulgaria and that, since 1975, long-term co–operation has been established between the Department of Clinical Studies of the University of Liverpool and the Institute.

Latin America

Peru. Mr Ricardo Espinoza Garcia, Deputy Director of Nuclear and Analytical Chemistry of Reactor RP-10 at the Peruvian Institute of Nuclear Energy, says that "without the least doubt, the regular international exchange I have had as a result of fellowships has permitted me to develop a high standard of work." Similarly, Mr Ignacio Frisancho Pineda, Director of the Institute's Advanced Centre of Nuclear Research, considers his fellowship training "invaluable" to his professional career and achievements.

Chile. Mr Luis Alberto Frangini Norris, Head of the Office of Legal Council at the Nuclear Energy Commission of Chile, received fellowship training in Spain in the field of nuclear legislation during 1978–79. This training, he says, was valuable because it helped him lead the professional group which elaborated Chile's nuclear legislation in April 1984. He says the training further served him well in negotiations concerning a safeguards agreement in 1982.

Brazil. Dr Augusto Tulman Neto received fellowships for training in Costa Rica and Puerto Rico in 1972 and 1973, Sweden in 1977, and at

the IAEA's Seibersdorf Laboratories in 1985 in the field of mutation breeding. Now responsible for the Radiation Genetics Section of the Centre for Nuclear Energy in Agriculture (CENA) in Brazil, he credits the fellowship training with playing an important role in his work. His initial training, he said, focused on the principles of mutation breeding and contributed to his research of beans, soybeans, wheat, and other crops. Subsequent training enabled his research group to expand activities in vegetatively propagated crops, initiating research with citrus, grapes, and rubber. Later, his group's interest in *in-vitro* techniques resulted in an IAEA fellowship that enabled the start of research on bananas and grapes using these techniques.

Cuba. Since 1962, Dr Rene Cardenas–Valdes has been Head of the Nuclear Medicine Department of the National Institute of Oncology in Havana. Throughout the past 30 years, he has participated in several IAEA fellowship training programmes, scientific visits, and training courses in this field. As a result, he says he has been able to help introduce advanced nuclear medicine technology in Cuba. "The training obtained through IAEA fellowships helped me have a better up–to–date knowledge of the development of nuclear medicine in the world, to establish friendships with some of the most known experts in this field, and to develop work in collaboration with nuclear medicine centres of other countries. Fellowships helped me strengthen relations, which ultimately facilitated co–operation with these countries and helped develop nuclear medicine in Cuba," he says.

Long-lasting impacts on development

As the experience of many IAEA fellows indicates, fellowship training can have a long–lasting impact on development in the recipient countries. Strong personal and institutional links are established to help ensure that technical co–operation projects become self–sustaining once the IAEA's direct involvement is over, often continuing on a bilateral basis between the countries involved. This is one of the most beneficial consequences, if not aims, of the IAEA's technical co–operation activities.

The strong personal contacts that are built during fellowship training and scientific visits are in themselves highly valuable. They frequently result from a "chain reaction" orginating from the co–operation and goodwill established between people in the host and recipient countries. IAEA fellows who train in a host country often build friendships with their immediate training supervisor and staff of the host institution. Once they return to their home countries, fellows maintain the contacts and further collaboration sometimes ensues. As a result, many fellowship supervisors later serve as IAEA experts assigned to provide advisory services to the fellow's home country and institute. They then inform the IAEA and recipient country of specific technical and human resource needs that may be required for effective project implementation. Equipment that is not made in the fellow's home country may be purchased from the expert's country, where further training on the equipment's operation and maintenance may be provided. This chain of events can establish lasting links of co–operation on projects of mutual interest, thereby providing vital and needed input to institutions in the Third World that are instrumental to their country's scientific and technical development.

In implementing the fellowship programme, the IAEA keeps these factors in mind when candidates are screened and evaluated. The overall objective is to carefully select candidates for awards with the assurance and confidence that they are working in IAEA technical co–operation projects or on national projects of importance to development, and that the fellow will use the training at home to work on the project. In this way, the limited funds that are available for fellowships and training can best be used to strengthen developmental efforts to the mutual benefit of host and recipient countries alike.

More than 60 countries hosted IAEA scientific fellows in 1990.