RCA

Regional Cooperative Agreement

For Research, Development and Training Related to Nuclear Science and Technology for Asia and the Pacific

RCA

RCA Regional Office
www.rcaro.org

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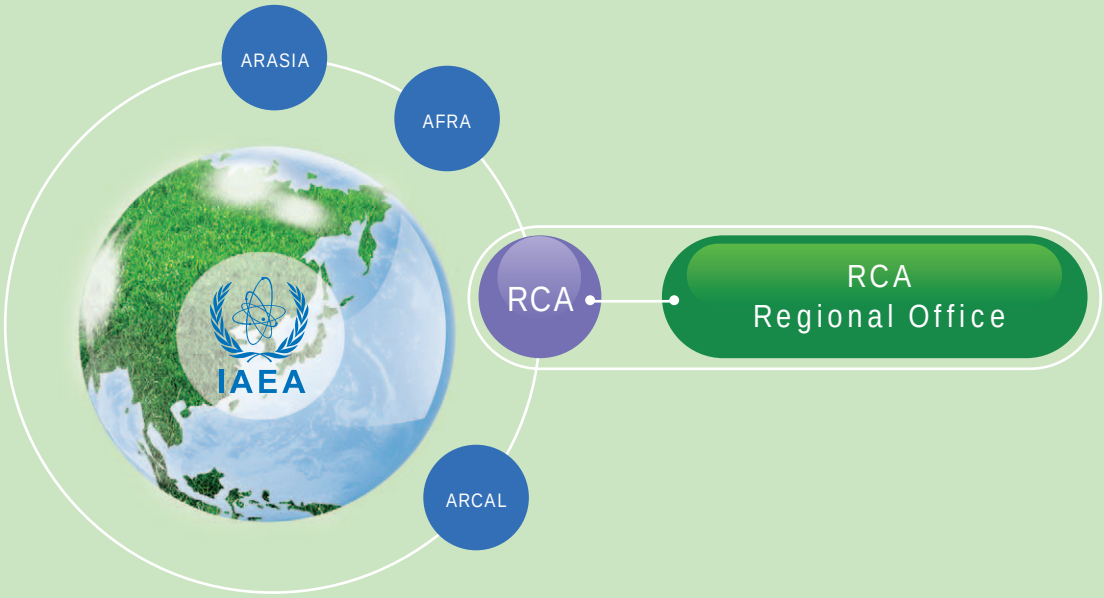


Introduction to RCA

RCA Member States

The following 17 International Atomic Energy Agency (IAEA) Member States in the Asia and the Pacific region are the current signatories to the RCA: Australia (AUL), Bangladesh (BGD), the Peoples' Republic of China (CPR), India (IND), Indonesia (INS), Japan (JPN), the Republic of Korea (ROK), Malaysia (MAL), Mongolia (MON), Myanmar (MYA), New Zealand (NZE), Pakistan (PAK), the Philippines (PHI), Singapore (SIN), Sri Lanka (SRL), Thailand (THA), and Vietnam (VIE).

What is RCA?

The RCA (Regional Cooperative Agreement for Research, Development and Training Related to Nuclear Science and Technology for Asia and the Pacific) is an intergovernmental agreement among IAEA Member States of South Asia, South East Asia and the Pacific, and the Far East that entered into force in 1972. While the RCA functions under the aegis of IAEA, the IAEA is not a signatory to the Agreement. The Agreement provides a framework for IAEA Member States in the Asian and the Pacific region to co-operate with each other and the IAEA in order to promote and coordinate cooperative research, development, and training projects in nuclear science and technology through the appropriate nuclear institutions within the Member States.

The RCA Regional Office was established on 27 March 2002 in Daejeon, Korea to provide enhanced visibility about the RCA and the RCA Programme as well as to develop partnerships

Milestones of RCA

- 1972: First regional cooperative agreement under the aegis of IAEA
- 1973: First RCA Representatives Meeting at IAEA Headquarters in Vienna, Austria
- 1973: First RCA Project launched (on preservation of fish and fishery products)
- 1979: First Meeting of National RCA Representatives held in Japan
- 1982: First UNDP/IAEA/RCA Industrial Project implemented
- 2002: The RCA Regional Office (RCARO) opened in Korea
- 2005: The RCARO full operation started beyond the interim operation
- 2006: The RCA Medium Term Strategy for 2006-2011 established
- 2009: The RCA Medium Term Strategy for 2012-2017 established

RCA Vision

The RCA shall be recognized as an effective partner in providing nuclear technologies that enhance socio-economic wellbeing and contribute to sustainable development in the region.

RCA Mission

- To identify and implement nuclear technologies that address regional needs
- To encourage sustainability of nuclear technology capacities in RCA Member States and to ensure transfer of those technologies and associated technical know-how to end-users
- To coordinate cooperative research in applications of nuclear science and technology
- To promote the benefits of nuclear technologies and identify partners and funding mechanisms
- To develop regional networks for exchange of technologies, training, and equipment

RCA Strengthens TCDC

The RCA is a vehicle for encouraging and stimulating Technical Cooperation among Developing Countries (TCDC) by enhanced networking and partnership among developing Member States. It also has flow-on effects to other organizations and regional partners.

RCA Strategic Directions

- Ensuring effective management of the RCA
- Achieving greater impact for the RCA projects
- Developing nuclear technology capacities in RCA Member States that are sustainable and address identified socioeconomic needs
- Enhancing the uptake of nuclear technologies and increasing the visibility of the RCA
- Ensuring that regional priorities guide the ongoing direction of the RCA

What are the IAEA/RCA Projects?

Over its lifetime, the RCA has received funding for its projects through extrabudgetary donations from many of its Member States as well as regional and international organizations, such as the United Nations Development Programme (UNDP), but the major source of funding has been from the IAEA's Technical Cooperation Fund (TCF). Almost all the RCA projects have been and are being implemented through the IAEA's Technical Cooperation (TC) Programme irrespective of the source of funding. Where required or when requested, the IAEA provides technical support and project management services, including planning, formulation, implementation, and evaluation. RCA projects implemented through the IAEA TC Programme are referred to as IAEA/RCA projects. The projects supported under the TC Programme should be aligned with the strategic goal of IAEA's Technical Co-operation (TC), which is *"to increasingly promote tangible socio-economic impact by contributing directly in a cost-effective manner to the achievement of the major sustainable development priorities of each country"*. The main objectives of the TC programme are:

- To produce sustainable benefits within the framework of national development plans;
- To gain recognition as a partner in resolving development problems through the cost-effective transfer of nuclear technologies;
- To increase the level of funding for technical cooperation activities, particularly from non-traditional sources, and to increase the number of opportunities for direct and "parallel funding" to help resolve development problems; and,
- To strengthen the capacity of institutions in Member States using nuclear technologies to become more technically and financially self-reliant.

The IAEA performs secretariat duties under the Agreement.

Critical Success Factors of the RCA Projects

The success factors for suitability of a project for inclusion in the RCA are:

- Projects should be 'needs driven' and benefit from regional cooperation;
- Projects should be of sufficient size to achieve high impact and measurable outcomes;
- Project design should include evaluation as a key component;
- Increasing use of regional networks and resources, wherever possible;
- Designed to enhance sustainability of national nuclear technology capabilities;
- Built on adequate national resources and infrastructure, and supported by national programmes;
- Choosing projects where a nuclear technique is a high value adding approach and technology transfer is a major focus;
- Taking into account the Technical Cooperation strategy and Millennium Development Goals; and,
- Avoiding duplication with other mechanisms (national projects, non-RCA projects, and other agreements).

IAEA/RCA Projects for the 2009-2011 Cycle

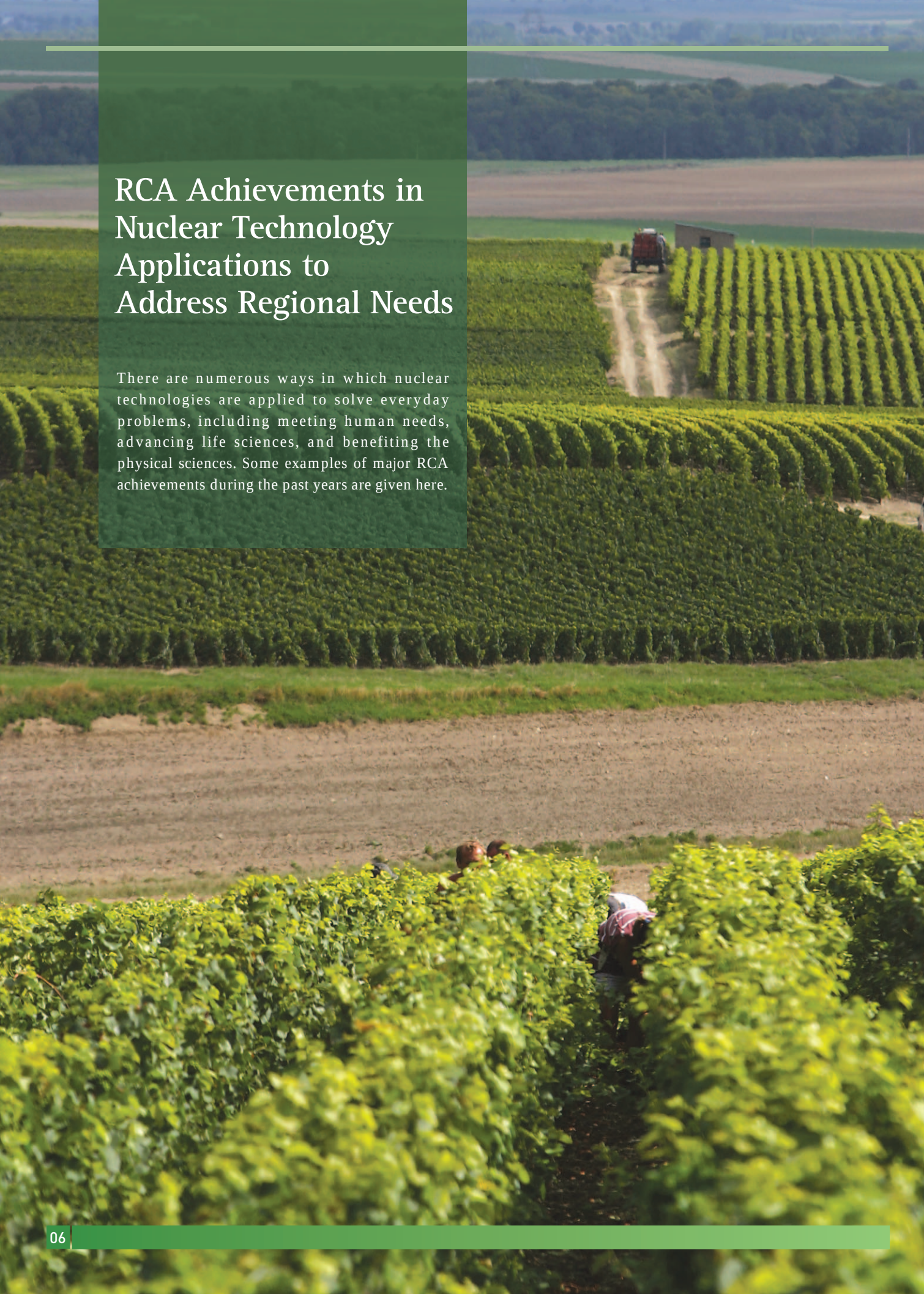
Area	Code	Title
Agriculture	RAS/5/045	Improvement of Crop Quality and Stress Tolerance for Sustainable Crop Production Using Mutation Techniques and Biotechnology
	RAS/5/046	Novel Applications of Food Irradiation Technology for Improving Socioeconomic Development
	RAS/5/050	Irradiation for Enhanced Sanitary and Phytosanitary Treatment of Regional Products for Export
Human Health	RAS/6/038	Strengthening Medical Physics through Education and Training
	RAS/6/048	Application of High-Precision 3D Radiotherapy for Predominant Cancers in the RCA region
	RAS/6/049	Strengthening Clinical Applications of PET in RCA Member States
	RAS/6/053	Improvement of Image Based Radiation Therapy for Common Cancers in the RCA Region
Environment	RAS/7/015	Characterization and Source Identification of Particulate Air Pollution in the Asian Region
	RAS/7/016	Establishing a Benchmark for Assessing the Radiological Impact of Nuclear Power Activities on the Marine Environment in the Asia-Pacific region
	RAS/7/019	Regional Harmonization of Nuclear and Isotopic Techniques for Marine Pollution Management
	RAS/8/108	Assessment of Trends in Freshwater Quality Using Environmental Isotopes and Chemical Techniques for Improved Resource Management
Industry	RAS/8/109	Radiation Processing of Polymeric Materials for Agricultural Applications and Environmental Remediation
	RAS/8/110	Applications of Advanced Industrial Radiography and Tomography in Industry and Civil Engineering.
	RAS/8/111	Diagnosis of Industrial Multi-phase Systems by Process Visualization Using Radiotracers and Sealed Sources
Radiation Protection	RAS/9/042	Sustainability of Regional Radiation Protection Infrastructure

RCA in Pursuit of Partnerships

Strategic partnerships have been and are being sought through collaboration with regional and international funding organizations. The goal for the RCA is to become an active partner in regional development and assist in developing joint projects and networks, with the aim of sharing more widely the benefits that can be derived from the applications of nuclear science and technology to the solution of significant problems. This mechanism ensures that RCA pursues regional collaborations with other organizations in a systematic and structured manner, and that RCA's partnerships at both national and regional levels are focused only on a few priority collaboration areas that can produce the greatest benefits. RCARO has been assigned with the mission to develop such partnership projects.

RCA Achievements in Nuclear Technology Applications to Address Regional Needs

There are numerous ways in which nuclear technologies are applied to solve everyday problems, including meeting human needs, advancing life sciences, and benefiting the physical sciences. Some examples of major RCA achievements during the past years are given here.



Meeting Basic Human Needs

Many developing countries in the region face enormous constraints in ensuring food security and safety. Efforts have been made to address those problems by enhancing Member State's capabilities and capacities to use nuclear technology in agriculture for improving management of land crop and livestock productivity, food safety, and overall quality.

To develop sustainable land and water management strategies, fallout radionuclides, which are present in the environment as a legacy of the above ground nuclear weapons testing programmes, have been used successfully to provide sensitive insights that have improved Member States' understanding of the behaviour of soils and their effects on water quality. Such knowledge contributes to the reduction of soil erosion and the improvement of soil and water quality in the Asia and the Pacific region. The RCA Project on "Sustainable Land Use and Management Strategies for Controlling Soil Erosion and Improving Soil and Water Quality" (RAS/5/043) was implemented between 2005 and 2008. The following are some of the resulting achievements made by the RCA Member States:

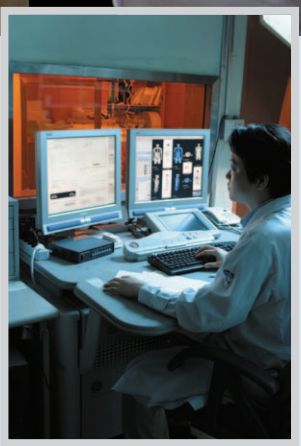
- Partnerships with end-users have been developed; these are important vehicles for the dissemination of information as well as the uptake of the use of fallout nuclides technology for the assessment of soil redistribution;
- Data on soil erosion and deposition over several spatial and time scales by combined use of Cs-137, Pb-210, and Be-7 were obtained via measurement; and,
- Relationships were identified between soil redistribution and soil quality under different land management practices.

To improve crop quality and stress tolerance for sustainable crop production using mutation techniques and biotechnology, the RCA Project "Improvement of Crop Quality and Stress Tolerance for Sustainable Crop Production Using Mutation Techniques and Biotechnology" (RAS/5/045) is being implemented between 2007 and 2010 and the following achievements have already been made:

- New techniques and methods were established such as screening methodologies for starch quality in rice (China), a mutation detection platform by capillary electrophoresis, advanced mutational analysis on important mutant genes (Australia), and papaya regeneration and early screening for Papaya Ring Spot Virus (Malaysia);
- Mutant populations and advanced mutant lines were developed. About 150 mutant lines were developed and partly recommended to regional multi-location trials for release; and,
- 24 new mutant varieties were released in Bangladesh, China, Korea and Vietnam.

To make use of irradiation for sanitary and phytosanitary purposes, including technology transfer to RCA Member States, the RCA Project "Novel Applications of Food Irradiation Technology for Improving Socioeconomic Development" (RAS/5/046), which is being implemented between 2007 and 2010, has already achieved the following:

- Commercial food irradiation facilities were established in 8 RCA Member States (Australia, China, India, Indonesia, Malaysia, Pakistan, Thailand and Vietnam);
- Two Member States (Bangladesh and Sri Lanka) are in the process of establishing such facilities;
- Several RCA Member States have adopted harmonized regulations for food irradiation and developed common protocols for the use of irradiation for quarantine treatment. For instance, China approved new standards on food irradiation including one on identification of irradiated food (cleared in 2007) and another on guidelines for use of irradiation as a phytosanitary measure (cleared in 2008); and,
- The Philippines drafted a phytosanitary protocol for irradiation of agricultural crops.



Advancing Life Sciences

Human Health Sector has been benefited from applications of nuclear technology in numerous ways. The use of X-rays as a diagnostic tool is well known but a variety of radioisotopes can be effectively used in the diagnosis and treatment of many common diseases. The RCA region has shown rapid growth in the use of nuclear medicine and radiotherapy in recent years in tune with economic development. In most RCA Member States, emphasis is placed on diagnosis and treatment of cancer, early detection and treatment of other common non-hereditary and hereditary diseases, and identification of nutritional deficiencies.

To improve the treatment of cancer patients with less invasive diagnostic techniques in relation to tumor imaging using radioisotopes, the RCA Project (RAS/6/042), implemented between 2005 and 2008, has achieved the following:

- Most of the RCA Member States have acquired the capability of using more advanced imaging techniques such as SPECT (Single Photon Emission Computed Tomography) and PET (Positron Emission Tomography);
- A technique known as sentinel lymph node imaging introduced to the RCA Member States is now being routinely used by a number of Member States for early detection of breast cancer;
- Lipiodol labeled with the radioisotope Re-188 developed by Korea is effectively used for the treatment of liver cancer. This method has been introduced to China, India, Mongolia, the Philippines, Singapore, Thailand and Vietnam;
- Myocardial Perfusion Scintigraphy for diagnosis of coronary diseases was introduced to Bangladesh, Indonesia, Malaysia, Sri Lanka and Vietnam; and,
- All RCA Member States are using Iodine-131 for the treatment of thyroid cancer.

To upgrade the knowledge and skills of radiation oncologists and medical physicists in 3D conformal radiotherapy for the predominant cancers in the RCA region based on relevant IAEA documents, the RCA Project (RAS/6/048) has contributed to the training of radiation oncologists and medical physicists and specifically has achieved:

- Improvement of knowledge and skills of clinical practice of high-precision 3D radiotherapy for predominant cancers in Bangladesh, China, Indonesia, Singapore and Vietnam; and,
- Enhancement of quality assurance for medical service and the improvement of survival rate of patients.

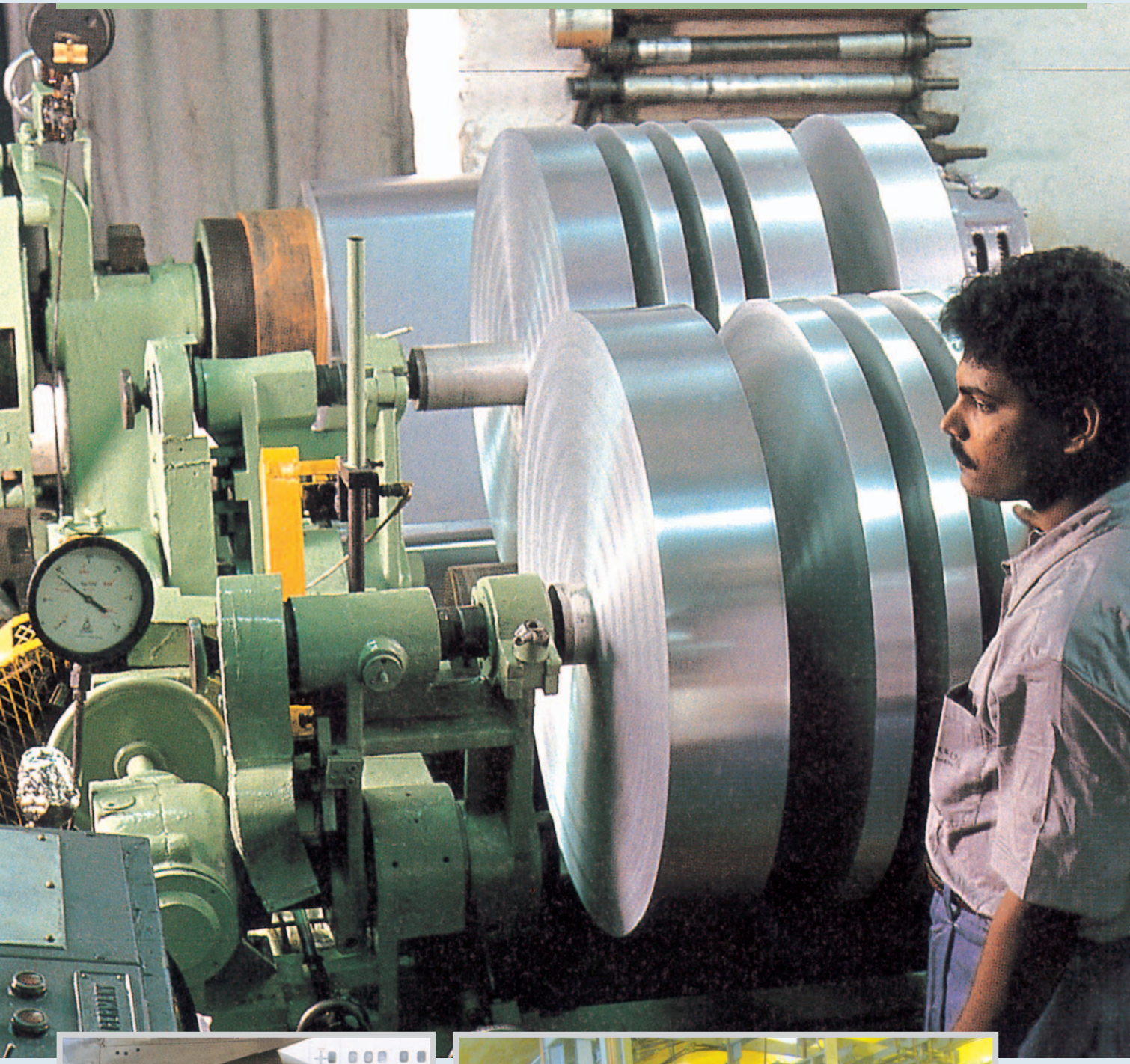
To improve patients' prognosis and quality-of-life through more effective and precise diagnostic techniques involving the clinical application of Positron Emission Tomography (PET), the project (RAS/6/049) has made following achievements:

- The physiological and biochemical aspects of PET images for more effective image interpretation and diagnosis, and the role of PET to enhance decision-making of therapeutic strategy especially in cancer patients were better understood; and,
- Regionally harmonized training on an effective operation of PET/PET-CT scanners with guidance on harmonized Quality Assurance and Quality Control (QA/QC) programmes was provided to nuclear physicians.

To improve the quality of nuclear medicine services in RCA Member States by raising the standard of basic training for technicians, with a focus on distance assisted training (DAT) for nuclear medicine technicians, the RCA Project (RAS/6/029) was implemented between 1997 and 2008, benefitting the RCA region as follows:

- DAT materials were provided to 8 Member States (Bangladesh, China, Malaysia, Myanmar, Pakistan, the Philippines, Singapore and Thailand);
- DAT part 2 training materials were developed by technical writers in UK/Australia;
- The DAT training materials are being taken up by other regions such as Africa and Latin America and,
- Modules have been refined and made available for Member States.

To evaluate the effectiveness of food-based dietary intervention programmes by using nuclear and isotopic techniques to improve bone mass and prevent bone loss especially in postmenopausal women, the RCA Project (RAS/6/041) was carried out between 2005 and 2008. This project has value especially given that bone health by dietary intervention can be assisted by isotope techniques to assess human body composition and nutrient intake such as vitamin and mineral absorption for the Asian population. Such methods are useful in determining the success of food supplementation programmes aimed at combating malnutrition. Several RCA Member States are now using nuclear and isotopic techniques to evaluate the effectiveness of food-based dietary intervention programmes in promoting enhancement of bone mass and prevent bone loss, the main cause of osteoporosis.



Benefiting from the Physical Sciences

Industrial applications utilizing radiation and radioisotopes are additional important areas benefiting from the use of nuclear techniques. Some prominent examples include: radiation processing for manufacturing new materials ; non-destructive testing for quality control; nucleonic control systems for quality control and mineral analysis; and, tracer and sealed source technology for problem analysis and process optimization.

To improve the capability of the RCA Member States to apply and routinely use advanced industrial radiography and tomography techniques for improvement of production quality and safety, the RCA Project (RAS/8/105) was implemented between 2007 and 2008 and assisted the RCA Member States in:

- Extending utilization of portable digital industrial radiography systems;
- Establishing quality management systems as per ISO standards;
- Extending application of portable Gamma Tomography Systems for in-situ applications in process and petrochemical industries; and,
- Facilitating implementation of harmonization schemes for Non-Destructive Testing certification as per ISO 17024.

To apply radiation processing to natural polymers in the health and environment sector, the RCA Project (RAS/8/106), which was implemented between 2007 and 2008, achieved the following:

- Different natural polymers available in the region were modified by radiation to synthesize new products such as hydrogel wound dressing, materials for tissue engineering applications including bone substitute, hydrogel for pain relief, drug delivery systems, and nanoparticles; and,
- Radiation processing technology for environment remediation was established: radiation-modified polymers for metal absorption, soil conditioning, etc.

To raise productivity in the coal minerals and petrochemical industries by using nucleonic analysis systems and radiotracers, the RCA Project (RAS/8/107), which was implemented between 2007 and 2008, achieved the following:

- Industrial application (oil/gas and coal exploration, mineral resources, water resource development) of nucleonic analysis systems was made in Bangladesh, Pakistan, Sri Lanka and Thailand;
- Tomography for scanning for visualization of scale deposits in geothermal and petrochemical pipes was developed in Indonesia; and,
- A single radioactive particle tracking technique and a 32-channel data acquisition system were also developed in India.

Addressing Environmental Issues

Environmental issues need to be addressed, since many populations are facing serious economic and health problems due to degradation of the terrestrial and marine environments as a result of pollution. A wide range of nuclear techniques can be used to measure pollution levels and, in some instances, can be used to identify the sources of pollutants to assist in the implementation of mitigation measures. A number of RCA Member States have acquired the capability to use these techniques, which are being applied to address environmental issues in their respective countries.

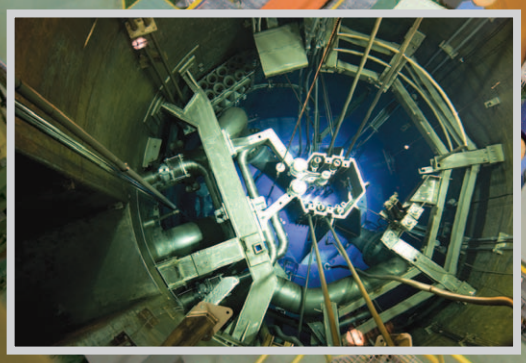
To help manage freshwater resources in the Member States, the RCA Project (RAS/8/10) continues to provide assistance in using isotopic and chemical techniques to assess water and pollutant flows on the surface and underground. The information from these assessments has been used in collaboration with relevant national authorities in the RCA Member States to improve the management of water resources. The project also aims to establish a regional database on water quality parameters with information on pollution control measures.

To assist in improving air quality in the RCA region by utilizing advanced nuclear analytical techniques for air particulate matter pollution assessment, in particular by providing information on the type, level, and main source of pollution, the RCA Project (RAS/7/015) which is being implemented between 2007 and 2011, has so far achieved the following:

- A regional database on the levels of key pollutants in the main urban and industrial areas in the region is being established using the data from this project;
- Close links with the national authorities responsible for controlling air-pollution were strengthened, and information from the RCA Project was also provided to facilitate regulation of the sources of pollution in their countries such as measures taken to ban vehicles with two-stroke engines in Bangladesh; and,
- The future sharing of information from the RCA Project with the Clean Air Initiative for enhancement of a database on better management of air quality in the region is being discussed.

To establish a benchmark for assessing the radiological impact of nuclear power activities on the marine environment in the Asia and Pacific region, the RCA Project (RAS/7/106) is being implemented between 2007 and 2010 and has so far achieved the following:

- Accredited quality management systems at institutional, national, and international levels and/or participation in QA/QC activities were established; and
- Coordinated efforts were made on the identification of transfer factors and dose assessment for marine organisms from contaminants as well as the application of agreed nuclear techniques to measurement of nuclear contaminants in marine systems.



▲ HANARO Research Reactor, Korea

Other RCA Endeavors

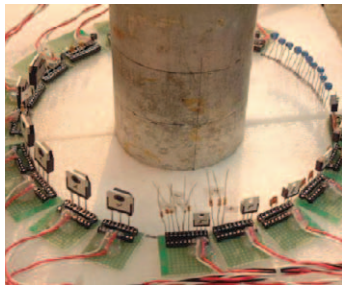
Areas on sustainable energy development, research reactors, and radiation protection have also been successfully addressed through the RCA Programme.

To formulate sustainable energy development strategies in the context of climate change, the RCA Project (RAS/0/045), which was carried out between 2007 and 2008 made the following achievements:

- A cost benefit analysis related to introducing nuclear power was conducted;
- Regional seminars were held to establish a sustainable energy strategy of participating Member States; and,
- Comparative assessment on energy sources of electric power was incorporated into the long-term national planning of China, Pakistan, and Korea.

To assist RCA Member States in sustaining their radiation protection infrastructures and maintaining standards of radiological measurements, the RCA Project (RAS/9/042), which is being implemented between 2007 and 2010, has achieved the following:

- Radiation protection sessions were organized at the 4th Conference of the Asian Interventional Cardiovascular Therapeutics, and the Asian Network of Cardiologists in Radiation Protection and the Asia Region ALARA Network were formed, and thus a skilled man-power base in the region through a regular programme of regional training and exercises has been maintained;
- Information structure for the web platform of the Radiation Safety Regulators' Network was developed; and,
- Methods and mechanisms were refined for regional cooperation in radiation protection regulatory infrastructures, occupational exposure control, medical exposure control, public exposure control, and emergency planning and preparedness, which lead to regional self-reliance, regional networking, and regional mutual support.



History of the RCA Regional Office

1997 — The need for an RCA regional office was strongly recommended and supported at the National RCA Representatives Meeting.

2000 ~ 2001 — Korea offered to host the office and the offer was agreed by the RCA Member States.

2002 — The RCA Regional Office (RCARO) was inaugurated in Daejeon, Korea.

2003 — The RCA adopted the Resolution on the RCARO so as to provide it a legal framework.

2005 — The RCARO entered into full operation from its previous interim status.

2007 — The RCA adopted the Resolution concerning RCARO acting on behalf of the RCA.

RCA Regional Office

Mission

The RCA Regional Office was established to contribute to the development of the RCA programme by increasing RCA awareness and promoting partnerships.

- To increase RCA awareness: visibility
- To promote partnerships for RCA Program: viability

Milestones of RCARO

- In 1978, the need to have an RCA Office in the region was first mentioned at the RCA Representatives Meeting in Vienna.
- In 2000, at the 22nd Meeting of National RCA Representatives in India, Korea offered to host the RCA Regional Office in Korea. RCA Member States supported this proposal.
- In September 2001, at the 30th RCA General Conference Meeting in Vienna, RCA Member States agreed on the establishment of a RCA Regional Office in Korea.
- On 27 March 2002, the RCA Regional Office was officially opened for three-year interim operation in Daejeon, Korea.
- In September 2003, the 32nd RCA General Conference Meeting adopted an RCA Resolution on the Establishment and Management of the RCA Regional Office in Korea.
- In April 2005, the 27th Meeting of National RCA Representatives in Malaysia decided on full operation of the RCARO. The 27th NRM also appointed the new Director of RCARO.
- In September 2007, the RCA adopted the resolution on RCARO acting on behalf of the RCA.
- In April 2009, the new Director of RCARO was appointed by the 31st NRM held in Japan.

Roles and Functions of the Director of RCA Regional Office

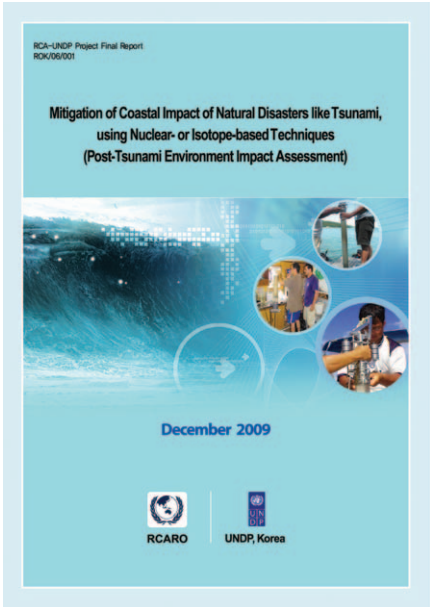
- To pro-actively seek out opportunities for the RCA to participate in projects being formulated and designed by major regional and international donors, including international agencies
- To negotiate and secure funding for RCA projects,
- To promote the peaceful uses of appropriate nuclear technology to assist in addressing regional and national needs,
- To provide enhanced visibility for the RCA at regional and national fora, and
- To implement the directives of the RCA Member States as agreed at the Meetings of National RCA Representatives.

RCARO Standing Advisory Committee

The RCARO Standing Advisory Committee was constituted in April 2005 in conjunction with the full operation of RCARO. Members consist of one representative from each Member State occupying the position of past, current, and future RCA Chair, the representative of Korea (host state of the RCARO), and the RCA Focal Person.

Programme Initiated by the RCA Regional Office

The RCA Regional Office has initiated several new projects in order to support RCA Member States in their nuclear capability building as well as their nuclear knowledge preservation endeavors.



RCA/UNDP Project on Post-Tsunami Environment Impact Assessment

In partnership with the United Nations Development Programme, RCARO successfully completed the RCA/UNDP Project on Mitigation of Coastal Impacts of Natural Disasters such as Tsunamis using Nuclear or Isotope Techniques. This project was implemented between July 2006 and December 2009 with the participation of 14 RCA Member States and had a total budget of USD 370,000. The Project Final Report was published and distributed to stakeholders and end-users. The following conclusions were made for each of the following key objectives:

- Sediment studies: In general the coastal marine sediments did not show any significant increase of toxic metal concentrations resulting from the tsunami backwash, but revealed a redistribution of particle size in the coastal sediments as a result of the tsunami event.
- Water/soil contamination: The results from isotopic hydrology studies indicated that the recovery rate from salinity contamination in groundwater and soil was significantly variable depending on local geology of the coastal areas.
- Coral reefs: Experimental studies with some tracer metals on the coral samples indicated the toxicant levels caused by sediment re-suspension exceed the water quality guidelines, and were thus capable of acutely impacting coastal biota.

The project demonstrated that nuclear and isotopic techniques were effective tools to understand the impact of tsunami in the coastal marine environment. These techniques are applicable not only for the tsunami hazard but also for other natural disasters facing coastal areas such as storm surges, typhoons, sea warming, and sea level rise.

A new partnership project with UNDP as a follow-up project is being developed on the following two project concepts, which were approved by the National RCA Representatives at the 38th RCA GCM in 2009:

- Promoting and accelerating new and evolving nuclear nano-molecular imaging technologies and related cyclotron technologies in the region; and,
- Electron beam applications for food preservation, treatment of environment pollutants, etc.

RCARO/KAIST Master's Degree Programme on Nuclear Energy and Quantum Engineering Course

To train leading scientists and engineers of RCA developing Member States in nuclear energy and quantum engineering fields, RCARO, in cooperation with the Korea Advanced Institute of Science and Technology, has implemented this Programme since 2002. To date, 22 students from 8 RCA Member States have participated. RCARO provides selected students with financial assistance, including tuition, monthly stipends, medical insurance, airfare, etc. For more information, go to www.kaist.edu.

RCARO/KAERI Regional Training Programme on Nuclear Science and Technology

In partnership with the Korea Atomic Energy Research Institute, RCARO has implemented this Programme to assist RCA Member States in nuclear applications and relevant technology development as well as the sharing of experience and technical expertise in nuclear science and technology such as research reactor utilization and radiation applications.

RCARO/ARCCNM Joint Training Course

RCARO has provided financial assistance for training courses in the nuclear medicine area organized by the Asian Regional Cooperative Council for Nuclear Medicine, supporting 25 trainees from Member States to participate in courses in 2008 and 2009, respectively. Each course was held in cooperation with the Asian School of Nuclear Medicine and was attended by about 100 participants.

RCARO Temporary Staff Fellowship Programme

RCARO invites a total of 3~4 temporary staff from RCA Member States each year for three months respectively, to support the RCA and the RCARO activities. As of the end of 2009, a total of 14 temporary staff members had completed assignments at the RCARO. More information can be found at the Opportunities with RCARO menu on the RCARO website (www.rcaro.org).

Enhancing Awareness of RCA

Another important mission of RCARO is to enhance the awareness of RCA. Below are some of the major activities accomplished by RCARO.

Promotion of RCA at International Events

Over the past years, RCARO has promoted RCA activities through presentations, exhibition booths, and publications at international events, as outlined below:

- East Asian Seas Congress 2006 (December 2006, Hainan): presentations and co-convening of a session on applications of nuclear techniques to marine area
- 50th Anniversary of IAEA Cooperation with ROK (July 2007, Seoul): presentations
- 6th International Conference on Isotopes (May 2008, Seoul): presentations and exhibition
- 16th Pacific Basin Nuclear Conference (October 2008, Aomori): presentations
- 2nd Asian Congress of Radiation Research (May 2009, Seoul): presentations and exhibition
- 8th Vietnamese National Conference on Nuclear Science and Technology (August 2009, Nha Trang): presentations
- East Asian Seas Congress 2009 (November 2009, Manila): presentations and exhibition

Web Service for Information and Communication

The RCARO website (www.rcaro.org) has been upgraded and updated to enhance information flow on the RCA Programme and to promote RCA activities among RCA Member States, stakeholders, end-users, and the general public. The Members Only Homepage was recently incorporated into the website.

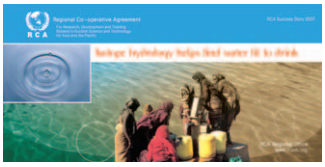
In a bid to facilitate communication on RCA information, a database has been developed on an enlarged number of RCA stakeholders and end-users, with preparation of the data collected from RCA stakeholders and other sources including lists of participants in previous RCA meetings. RCARO is also preparing to provide an enhanced information service on RCA projects.

Publication of RCA Success Stories

A total of 9 RCA Success Stories were published in leaflet form on the achievements of relevant RCA projects. The success stories are available on the RCARO website at www.rcaro.org.

Contributing to search for fresh water

Applications of isotope hydrology technique have resulted in more accurate assessment of groundwater behavior, providing better information on the search and management of clean drinking water resources. Use of this technique has also contributed to informed decision-making on water policy and control in the region.



Alleviating air pollution

Through the RCA projects on the application of nuclear techniques to the study of air pollution, local agencies now are able to better monitor environmental and understand air pollution. This provides them with important information to assist on the introduction of better control of plant emissions from industries and other sources. The projects have resulted in the development of a database to provide information about air pollution in the region, including source, distance, and trans-boundary aspects.

Assistance to medical infrastructure

The RCA took the initiative to help national agencies build up their capabilities as well as their training and physical infrastructure for the sterilization of tissue graft materials using nuclear techniques. This has resulted in that tissue grafts become much more affordable, widely available and widely used in RCA Member States. This success story has served as a role model for other regions.

Assisting in training at distance

The RCA Programme has provided regional skills in nuclear medicine, the demand for which is high in the region as both economies and welfare systems expand. An increasing number of Member States are showing interest in distance training and hundreds of students from many Member States have passed the pilot studies. Other regions are now taking up the use of these training materials.

Enhancing materials properties

The RCA projects have facilitated transfer of radiation processing technology and helped develop the capabilities to produce new and innovative products and deliver them to markets. An example is radiation processed polymer (Chitin), which is being developed for medical uses.

Improving crop productivity

The RCA is helping countries in Asia and the Pacific to acquire nuclear technology to breed new varieties of crops with higher yield rates, greater resistance to drought, salinity, disease and pests, and improved quality for consumers. Several high performance varieties of soybean, groundnut, mungbean, wheat, and sesame have already been released into the market, and a number of other new crop varieties are being field-tested prior to commercial release.

Alleviating marine pollution

A recently completed RCA project has helped Member States improve their regional capacity to deal with aquatic pollution at coastal areas, where local hydrologists learned to use nuclear and conventional tools to sample and analyze the composition and impact of water-borne pollutants. The data, together with relevant hydrodynamic models, provide criteria for probabilistic risk assessment by computer simulation tools.

Strengthening skills in Non-Destructive Testing

The NDT techniques use penetrating radiation (i.e., gamma- or x-rays) to examine the internal state of materials (such as identification of defects) that are widely applied in industry. A total of 300 personnel from 14 Member States were trained through the RCA projects. In turn, these individuals provided training within their countries and disseminated NDT knowledge and technology at the national level. The current RCA project aims to harmonize the region's NDT qualification and certification process, which is to be finalized by 2012.

Exploring geothermal power

In the search for sustainable energy sources, some RCA Member States have been developing geothermal power, which has now reached a collective capacity of about 3,500MWe. RCA has provided assistance in the search for suitable geothermal sources through the utilization of isotopic techniques, including natural isotopes and artificial radiotracers. These techniques have provided valuable information on reservoir characteristics especially when the reservoirs are subject to changes in pressure, temperature, and fluid flow. Over the course of the RCA project, participating Member States have carried out isotope investigations on 33 new geothermal prospects (about 130 geothermal springs). These have contributed to the development of several geothermal power plants in RCA Member States such as the India, Indonesia, and the Philippines.

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2010 Edition