RCA News Letter

THE SIXTH ISSUE | DECEMBER 2023

6th Issue of the RCA Newsletter

The 52nd Meeting of the General Conference Meeting of the National RCA Representatives was successfully held at the IAEA Headquarters in Vienna, Austria in September 2023. Delegates from 19 RCA GPs gathered at the meeting to discuss the issues related to the RCA governance and the programme. The main outcomes and follow-up activities of the meeting are captured in this issue. Stories on project activities regarding water resource management in China and NUTEC plastics in Indonesia provide snapshot of the efforts being made to address environmental issues. This issue also features the analysis of the RCA Programme and its contributions to the sustainable development in the Asia-Pacific region and the status of radiation and nuclear safety in Lao PDR. Further, the interview of a participant of the Regional Training Course on radiation safety and RCARO's establishment of the Policy and Information Center are included in this issue. To subscribe the newsletter, please contact rcaro@rcaro.org.

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RCA News

RCA Looking Forward: Enhancing the RCA Governance and Regional Cooperative Programme by the RCA Government Parties

The 52nd GCM, September. 2023, IAEA, Vienna, Austria

On 22 September 2023 in Vienna, Austria, the IAEA hosted the 52nd RCA General Conference Meeting (RCA GCM). Representatives from 19 RCA Government Parties (GPs), RCA Medium Term Strategy Working Groups (MTS WGs) and RCA Programme Advisory Committee (PAC) from the Asia-Pacific region and the IAEA representatives gathered at the IAEA Headquarters, Vienna, Austria to discuss and review RCA policy issues and the RCA Programme.

Ms Natascha Spark, RCA Chair, opened the meeting, representing Australia as the current RCA Chair from ANSTO (the Australian Nuclear Science and Technology Organisation). She reminded meeting participants of Australia's objectives during its year as Chair, namely to

- *support the restart of our RCA Programme after the long pause of the pandemic in an inclusive way, including reporting gender disaggregated data, respecting the different paces and different priorities of countries;*
- *bring the focus of discussions to the RCA Programme; and*
- *honour the RCA Treaty, including its mission, vision and consensus decision making.*

Ambassador Mr Ian Biggs, Australian Ambassador to Austria and Permanent Representative to the United Nations in Vienna, provided warm opening remarks. He said it was an honour and privilege for Australia to Chair the RCA. He congratulated the concerted efforts and commitment by key stakeholders of the RCA. He noted that the RCA is a special form that allows us to gather, cooperate and support each other on matters that are important to our region, countries and people. He announced Australia's extra-budgetary contribution of AU$150,000 to the RCA to be allocated to a social and impact assessment meta-evaluation of current RCA projects, which was highly appreciated by the participants of the RCA GCM.

Mr Hua Liu, IAEA Deputy Director General and Head of the Department of Technical Cooperation also welcomed participants on behalf of the IAEA Director General, Mr Rafael Mariano Grossi. He noted the successful progress in developing the future RCA Programme to address the priority needs of the RCA Government Parties and assured the continued support by the IAEA for the RCA. Based on the experience of the past 50 years, he congratulated the RCA for implementing the RCA Ministerial Declaration adopted in September 2022. He appreciated the three RCA social and impact assessments of the RCA projects on mutation breeding, non-destructive testing and radiotherapy, and encouraged further impact assessments be undertaken.

Dr Najat Mokhtar, IAEA Deputy Director and Head of the Department of Nuclear Sciences and Applications, also provided welcome remarks. She said the Asia and Pacific region is renowned for innovation and a commitment to progress, and noted the region is a leader in cooperation to advance sustainable development both within our region and beyond. She reminded participants that for over 50 years, the IAEA has been our reliable partner in developing practical technologies to help our region meet our development needs. She highlighted recent achievements in the RCA region in food security, water security, and ocean health, as well as through the IAEA flagship initiatives such as Rays of Hope, ZODIAC and NUTEC Plastics.

Discussions presented at the meeting were on the follow- up activities of the 45th Meeting of the National RCA Representatives (NRM) held in Sydney Australia in May 2023, the implementation of regional activities for 2023-2024, and progress with developing the RCA Programme for 2024-2025. In preparation for the 2026- 2027 cycle, the Meeting agreed to move forward with 22 pre-concepts to the next concept stage of development after merging proposals with similar subject matter. The meeting agreed that gender equality would be carefully taken into account in selecting the next RCA Technical Cooperation Programme round for 2026-2027.

The Meeting also discussed policies related to the RCA governance and its Programme. The recommendations of the RCA Chairs Committee for the rapid review of the RCA working groups, committees and strategic documents were approved. The report of the 2024-2029 MTS WG was reviewed and its work plan for the development of a strategic paper was endorsed. After taking note of the report of the 2018- 2023 MTS WG, the meeting appreciated the WG's contributions since 2016 as its term ends in 2023.

With regard to the activities of the RCARO, the meeting approved the work plan for the remainder of 2023 and the recommendations of the RCARO Standing Advisory Committee. As the term of the current RCARO Director Mr Pill Hwan PARK will end by the end of 2023, his efforts and leadership for the RCA were acknowledged and appreciated by all participants.

Following the 52nd GCM, the RCA Government Parties will develop project concepts for the 2026-2027 RCA Programme by the end of 2023 (for discussion at the next RCA National Representatives Meeting in 2024), submit RCA project progress reports, 2024/2025 RCA Programme project participation forms to the IAEA, as well as provide comments on the RCARO developed draft handbook on the Guidelines and Operating rules of the RCA and the RCA Working Group's draft strategic directions for the RCA for 2024-2029. The RCA Committee of Chairs will conduct a rapid review on the procedure and process for developing and selecting RCA Programme projects.

Taking advantage of the fact that the meeting was held one week prior to the 67th IAEA General Conference, the participants were encouraged to attend not only the plenary sessions, but also the various side events organized by the IAEA to share experiences and expertise on the peaceful uses of nuclear science and technology. Australia also invited all participants to a side event on impactful nuclear science and technology partnerships in the Asia-Pacific region.

RCA Policy Meetings

The National RCA Representatives of the 22 Government Parties (GPs) have two policy meetings each year; National RCA Representatives Meeting (NRM) and the General Conference Meeting (GCM).

RCA NRM

The NRM usually takes place in the first quarter in one of the RCA GPs to discuss and review matters related to RCA policy, the programme and other issues. The agenda includes follow up-actions of the previous GCM, review of the RCA Annual Report, implementation of RCA Programme, and activities of Working Groups and RCA PAC. The NRM officially elects the incoming RCA Chair at the beginning of the meeting. One day prior to the NRM, the RCA regularly organizes the meetings of the RCA Chairs and RCARO Standing Advisory Committee.

RCA GCM

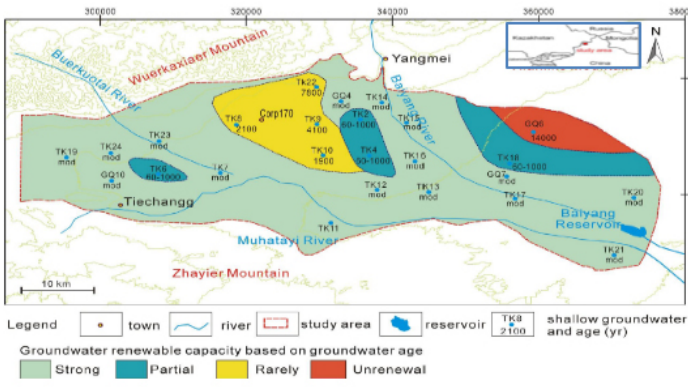
The RCA GCM is held at the IAEA headquarters annually, one week prior to the IAEA General Conference in September, to discuss the follow-up actions of the previous NRM and to consider matters related to the progress made on RCA policy, and the Programme. The meetings of the RCA Chairs and RCARO Standing Advisory Committee are held the day before the GCM.

RCA Projects

Mapping Groundwater Renewability in the Arid West China Using Tritium and Other Dating Tools

- **PANG Zhonghe** | Institute of Geology & Geophysics, Chinese Academy of Sciences, China, Lead Country Coordinator of RAS7035

The technical cooperation between China and IAEA in the project area of water resources as a part of the environment thematic sector began in 1987 when the first regional training course on isotope hydrology was held in China. Over the past 35 years, this cooperation has gone from strength to strength since its inception. China has participated in various regional projects implemented under the RCA for Asia and the Pacific region, which have strengthened and stimulated the application of nuclear science and technology to water resources over a wide range of areas, such as groundwater management, pollution prevention of groundwater, geothermal energy development, and more recently, the environmental impact of shale gas development.



Mapping groundwater renewability for improved water resources management in the Baiyang River Basin, Xinjiang Uygur Autonomous Region, China

In 2006, the IAEA provided a tritium enrichment system through the national project "CPR/8/018" to China, which was the most up-to-date technology at the time. It was installed at the Isotope Hydrology Laboratory at the Institute of Geology and Geophysics, Chinese Academy of Sciences (IGG-CAS). The laboratory participated in the inter-lab comparison exercise in 2008, TRIC2008 organized by the IAEA, and performed high-quality measurements on the test samples provided by the IAEA as blind samples. The lab was ranked in the top 5 for the exercise involving 74 laboratories globally.

The national project team at IGG-CAS then applied the system effectively in various subsequent RCA projects to support water resource programs both within China and with regional partners, producing excellent results for groundwater age determination. One example is the investigation of groundwater renewability for sustainable groundwater resource management in Xinjiang Uygur Autonomous Region of West China, which is one of the three driest regions on the planet. A part of national investigations in the RCA project RAS/7/022, tritium measurements provided age information that was used to delineate the renewability of groundwater in different aquifers (see figure). Another example is the investigation on groundwater recharge in the Mongolian Gobi Desert, as part of the national activities of Mongolia under RCA project RAS/7/030. The national team of China offered analytical services free of charge for measurements of tritium in water samples from Mongolia. This is a good example of Technical Cooperation among Developing Countries (TCDC). Recently China has become advanced in the Atom Trap Trace Analysis (ATTA) technology, so now tritium is being used together with ^{85}Kr to generate even more accurate young-groundwater ages such as the investigation of the interaction between groundwater and lake water in Ordos Basin in Northwest China, which was part of the national activities of China under RCA project RAS/7/030. More recently the

use of tritium to separate injected hydro-fracking water from that of the shale formation, was part of the national activities under project RAS/7/035.

Based on the age data, groundwater renewability was identified which has significant implications for the sustainable management of water resources. With this important information, priority targets for groundwater exploitation can be distinguished in aquifers with relatively higher renewability, from those that are renewable to a lesser degree. This information helped the local water resource managers to improve freshwater resource management by setting different development strategies for aquifers with different levels of renewability.

Last year the Chinese government issued new "Guidelines on Groundwater Water Resources Management", which prohibit the large-scale exploitation of non-renewable groundwater. It is expected that nuclear dating tools will be more widely used in the future.

NUTEC Plastics Activities in Indonesia

- **Tita Puspitasari** | Head, Research Center for Radioisotopes | National Research and Innovation Agency (BRIN), Indonesia

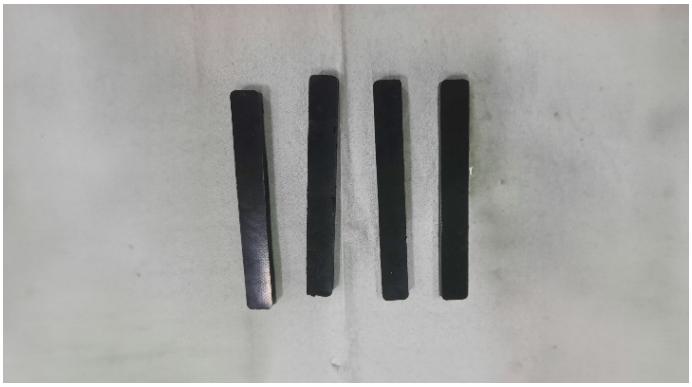
The destruction of ecosystems due to plastic pollution has proven to be one of the most pressing global concerns. Indonesia is the fourth-most populous country in the world, with a population of approximately 250 million people. Indonesia is also among the leading producers of plastic waste. In 2017, the country's plastic waste generation reached 14% of the total of 65.8 MMt. Moreover, 3.2 MMt of unmanaged plastic waste entered Indonesian waters, with a 2017 report estimating that 620 thousand tons of waste had entered the country's waters. Plastic waste is often mismanaged and ends up in unregulated landfills or open dumps, where it enters the ocean. Plastic waste pollution has a negative impact not only on the oceans but also on terrestrial environments such as soil and groundwater. Because of its durability and longevity, plastic does not decompose even when discarded. Once in the ocean, it can remain there for hundreds of years before it breaks down and turns into micro and nano plastics that enter the bodies of fish and accumulates through the food chain to impact on humans. This situation is estimated to increase significantly in the foreseeable future. Currently, the contribution of plastic waste in Indonesia is driven by the high demand for plastics, especially single-use packaging from the Food and Beverage (F&B) industry. This sector utilised almost 6 MMt of various plastic products in 2019—including polypropylene (PP) and polyethylene (PE)—resulting in a large accumulation of plastic waste in the environment. This worsened during the pandemic due to increased F&B delivery demands.

Generally, the causes of the plastic problem in Indonesia are mainly due to littering as public awareness of plastic pollution is still low, the many applications of single-use plastics because of their low-cost and versatility, and poor waste management practices due to a lack of integrated regulation. In light of this, Indonesia has formulated an ambitious target to reduce 70% of plastic waste and manage 70% of solid waste by 2025. To address these issues, compelling waste management strategies are required to enable Indonesia to achieve near-zero plastic pollution by 2040. Given this background, the government of Indonesia recently adopted Presidential Decree No. 97/2017 on National Policy and Strategy on Management of Household Waste and Household-like Waste (JAKSTRANAS) and Presidential Decree No. 83/2018 on Marine Debris Management [Plan of Action on Marine Plastic Debris 2017–2025]. Furthermore, the National Plastic Waste Reduction Strategic Actions for Indonesia have been formulated by the Ministry of Environment and Forestry (MoEF), the Government of Indonesia, and the Institute for Global Environmental Strategy (IGES) Center collaborating with the United Nations Environment Program (UNEP) on Environmental Technologies (CCET), and with Sustainable Waste Indonesia (SWI). It provides holistic and practical actions to accelerate the reduction of plastic pollution from land-based sources and achieve the national target of a 70% plastic reduction by 2025 through a circular economy, including the increased recovery and recycling of plastic waste as a medium-term strategic action.

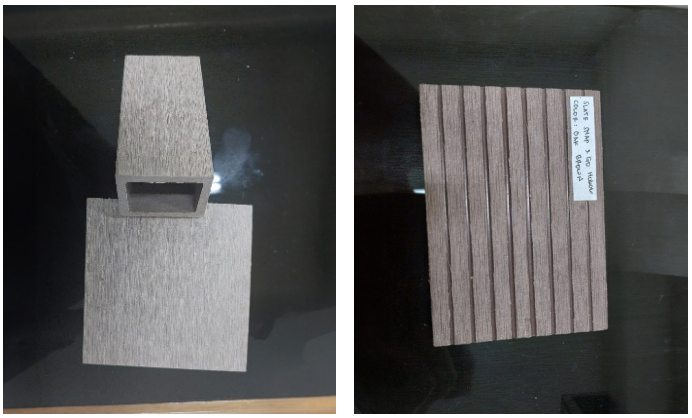
Moreover, the IAEA has launched the NUclear TEChnology for Controlling Plastic Pollution (NUTEC Plastics) Initiative to address this global challenge. NUTEC Plastics expands on the IAEA's efforts to combat plastic pollution through recycling and marine monitoring using isotopic tracing techniques. The NUTEC Initiative is divided into two parts: downstream (marine plastic monitoring) and upstream (plastic recycling). The IAEA has developed strategic, four-stage approaches for both components, with the ultimate goal of developing a network of laboratories for monitoring and assessing the impact of marine microplastics (for the downstream component) and constructing irradiation-assisted plastic recycling plants in selected countries, followed by ultimate technology upscaling for commercialization in collaboration with private partners (for the upstream component). Indonesia is one of the selected countries that has the opportunity to receive guidance and supervision from the IAEA in developing new materials based on recycled plastics using radiation processing as the implementation of the upstream component strategy.

In collaboration with the International Atomic Energy Agency (IAEA), the National Research and Innovation Agency of Indonesia (BRIN) through the Research Organization for Nuclear Energy is preparing several action plans to combat plastic pollution. One of the actions implemented was the National Stakeholders Meeting (NSM) on Nuclear Technology for Controlling Plastic Pollution (NUTEC Plastics) in October 2022. This was a roundtable meeting empowering a NUTEC Plastics project to strengthen the downstream management of plastic waste, helping countries to integrate nuclear techniques into their plastic pollution strategies. In collaboration with the IAEA, the NSM is Indonesia's strategy, which aims to be a national movement to raise awareness among stakeholders. The NSM discussed Indonesia's policies to reduce plastic waste, the circular economy through plastic recycling in Indonesia, the prospects and challenges of the green industry of wood-plastic composites, the involvement of the Indonesian plastics industry in the management of plastic waste through corporate social responsibility (CSR), the recycling of plastic waste using radiation technology, and the monitoring of microplastics using nuclear technology in Indonesia. Through this, the involvement of all of the stakeholders in this meeting will facilitate their resourcefulness in making concrete solutions that could have a real impact on improving Indonesia's progress in addressing plastic pollution. More than 70 stakeholders, including the Ministry of Environment and Forestry of the Republic of Indonesia (KLHK), the Indonesian Plastics Recycling Association (ADUPI), private companies, universities and other stakeholders participated in the roundtable discussion.

Nuclear technology with radiation processing applications makes it possible to provide solutions for processing these single-use plastic wastes for further use as new product materials for other useful products. However, certain considerations must be taken into account when utilizing nuclear technology for very cheap materials such as plastic waste, for this technology to benefit countries and communities. First of all, we should try to capture the high demand for promising products that can use plastic waste as a raw material. Furthermore, to achieve a particular target, it is crucial to explore all the possible radiation processing techniques and then identify the most practical and straightforward method. It is essential to consider all possible alternatives and solutions to achieve the objective at a very early stage. Then, to achieve a specific goal, focus should be placed on specific techniques and optimize all the procedures. Finally, to achieve an efficient result, the feasibility of the technique and the economics must be considered.



WPC Specimen



WPC Products for Construction

Currently, the demand for Wood Plastics Composite (WPC) is increasing globally, as it is an eco-friendly substitute for wood materials. It is used in various industries like construction, building, and automotive engineering and has several advantages such as recyclability, water and termite resistance, and environmental friendliness. The use of recycled plastics instead of virgin plastic in WPC has recently become more popular due to increased awareness of circular economy principles among the community, government, and industry. Gamma radiation and/or other ionizing radiation technologies play an important role in the conversion of PP/PE-based plastic waste and biomass waste into Wood Plastics Composite (WPC). Therefore, the use of PP/PE plastics and biomass waste as the primary materials for WPC could contribute to the reduction of waste in the environment. On the other hand, the introduction of radiation technology for the reduction of WPC could improve its properties, thereby providing economic benefits for the industries. However, the quality of the WPC depends on the compatibility between the plastics and biomass. Poor physical or chemical attraction at phase boundaries reduces the quality of the composite. Thus, compatibilizers play a crucial role in enhancing the interfacial adhesion between the plastics and the biomass. The global market for plastic compatibilizers is projected to reach USD 286.3 million by 2026, growing at a CAGR of 6.3%

from 2021 to 2026. (https://www.coacechemi.com/Industry-news/global-compatibilizer-market-status); being a part of the circular economy, there is a possibility to develop new industries which can help to decrease unemployment rates.

Among all the radiation processing techniques, the surface modification technique via radiation oxidation was chosen by the Indonesian Project Team, as it is simple, chemical-free, and can be carried out at room temperature. This technique can be used to produce materials as a compatibilizer for the WPC industry. This technique is highly efficient, as the plastic waste as raw materials has undergone initial oxidation during manufacture, use, and disposal, facilitating the subsequent oxidation process.

The IAEA is expected to provide support for the improvement of human resource capabilities through expertise and training missions and also provide equipment to support and realize product development and implementation of radiation-induced wood-plastic composite fabrication technology in existing industries. The abundance of PP/ PE plastic waste and natural fiber resources in Indonesia as the main component would assure the sustainability of the recycling project. Specifically, ADUPI would ensure the availability of PP/PE plastic waste sources. Furthermore, the availability of biomass waste as cellulose sources such as oil palm empty fruit bunch (EFB), palm kernel shell, and mesocarp fiber at palm oil mills reached 48.4 million tons in 2019. Besides that, the commitment and involvement of stakeholders (as mentioned above) are the key success of this project and would allow gamma irradiators to contribute to the environmental conservation effort specifically to combat plastic waste. Moreover, the benefits achieved by all stakeholders would assure the sustainability of the plastics recycling project to produce WPC by utilizing radiation technology through plastics modification with the support of BRIN and IAEA. Through these activities, the empowerment of PP/PE waste by circular economies such as employment opportunities and affordable raw materials will be developed. The program has received unwavering support from universities, plastic waste recycling associations, industry, especially PT VIRO as WPC industry, and regulators, ensuring that the activities run smoothly and on track. The success of this program will have a significant impact, empowering communities, driving the development of the recycling industry, and enhancing plastic waste management processes, all in the name of environmental sustainability.

Featured Article

RCA Contributions to Development in Asia and the Pacific Region : Part I

- **Prinath Dias** | Chair, RCA Programme Advisory Committee | Former IAEA/RCA Focal Person

[Agricultural Sector]

The Regional Cooperative Agreement for Asia and the Pacific (RCA) has been engaged in supporting the development of agricultural, environmental, human health, and industrial sectors among the parties to the Agreement[1], through the use of nuclear techniques, since its inception in 1972. These activities were carried out with the assistance of the International Atomic Energy Agency, which has been providing technical, administrative, and financial support to the RCA. This is a brief description of the contributions made by the RCA Program to the development of agriculture in Asia and the Pacific Region.

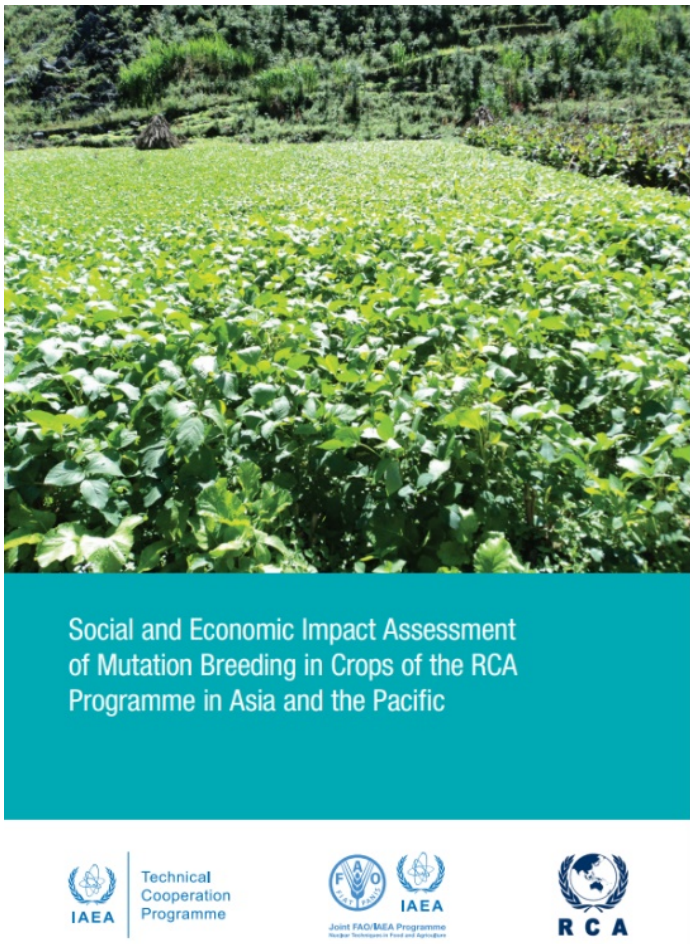
RCA activities in the agricultural sector can be broadly categorized into radiation-induced mutation plant breeding for the development of crops with higher yields and resistance to drought and diseases, use of radiation to reduce post-harvest losses (food irradiation), improvement of soil fertility, and addressing food safety issues.

1. Australia, Bangladesh, Cambodia, China, Fiji, India, Indonesia, Japan, Republic of Korea, Lao, Malaysia, Mongolia, Myanmar, Nepal, New Zealand, Pakistan, Palau, The Philippines, Singapore, Sri Lanka, Thailand and Vietnam

Mutation Plant Breeding

Five 4-year regional projects on radiation-induced mutation plant breeding have been implemented under the auspices of the RCA during the past fifteen years. They focused on improving crop quality and stress tolerance, adaptation to climate change, optimizing the productivity of marginal lands, development of green crop varieties, and speed breeding.

At the regional training courses conducted under these projects, a total of 456 participants from RCA Government Parties received training on using mutation breeding techniques for improving tolerance to salinity, drought and heat stress; improving protein and starch quality; improving resistance to diseases; the use of molecular markers;



assessment of fertilizer and water use efficiency; the use of C-13 in soil organic matter studies; and in-vitro techniques in mutation breeding of bioenergy crops. They also received training on water and nutrient management for marginal lands; methodologies for screening against abiotic stresses; tissue culture techniques; and speed breeding.

Expert services for the implementation of these projects were provided by experts from Australia, the People's Republic of China, Indonesia, India, and Pakistan

A review of the socioeconomic impact of the RCA Projects on radiation-induced mutation breeding was recently carried out by the IAEA. (https://www.iaea.org/sites/default/files/20/11/social-and-economic-impact-assessment-of-mutation-breeding-in-crops-of-the-rca-programme-in-asia-and-the-pacific.pdf (iaea.org)). According to this review, RCA projects have significantly contributed to the speed of development and commercialization of new varieties of crops, which has

resulted in a 32.7% increase in the yield, an increase of food supply by 34.8 million tonnes from 2000 to 2019, and a 21% reduction in the use of fertilizer.

The RCA Projects on radiation-induced mutation breeding have made it possible to produce a large number of new varieties of rice, sorghum, barley, wheat, papaya, mung bean, soybean, and tomato, with higher yields, greater tolerance to diseases and other stresses, and reduced fertilizer and water use. A number of these new varieties have been released to the farmers resulting in an increase in yield and a reduction in fertilizer and water use, as observed in the above-mentioned review.

Use of Radiation to Reduce Post-Harvest Losses (Food Irradiation)

Five RCA projects on Food Irradiation have been implemented during the past fifteen years. They focused on the use of irradiation for sanitary and phytosanitary purposes, the use of electron beams for irradiation, the adoption of regulations on food irradiation, enhancing trade in irradiated food products, and the use of X-ray technologies for food irradiation.

IAEA Video on RCA Project related to Food Irradiation and the Changing the Climate (RAS5071)

At the regional training courses conducted under these projects, a total of 131 participants from RCA Government Parties received training on the use of electron beams for the irradiation of fruits and frozen foods; phytosanitary applications for economically important fruits; commercial applications of irradiation technology for food safety; security, and global trade; and on use of x-ray technology for food irradiation. In addition, quarantine inspectors of the RCA Government Parties received training on different aspects of food irradiation.

Expert services for the implementation of these projects were provided by experts from Australia, the People's Republic of China, Malaysia, New Zealand, the Philippines, and Thailand.

Many of the RCA GPs have established new electron beam and gamma irradiation facilities for food irradiation as a result of these projects. These projects also made it possible to significantly increase the tonnage of irradiated food in RCA Government Parties (GPs) and to adopt regulations on food irradiation. Several GPs have been able to find new export markets for irradiated food.

Improvement of Soil Fertility

Three RCA projects on soil fertility have been implemented during the past fifteen years. They focused on using nuclear and isotopic techniques to help control the impact of land-use practices on land degradation, assess and improve soil and water quality, implement best agricultural practices to minimize land degradation and enhance crop productivity, and assess and mitigate agro-contaminants to improve water quality and soil productivity.

At the regional training courses conducted under these projects, a total of 157 participants from RCA Government Parties received training on the use of compound-specific isotope analysis (CSIA) for the identification of land degradation hot spots; for integrated soil conservation practices to mitigate soil erosion; for the use of FRN (fallout radionuclides) and stable isotopes to investigate soil quality and soil erosion; and on the application of stable isotopes to investigate soil and water quality

Expert services for the implementation of these projects were provided by experts from Australia, the People's Republic of China, New Zealand, Pakistan, and Vietnam.

As a result of these projects, the capability to use nuclear and isotopic techniques to assess and manage soil fertility was developed for RCA GPs who participated in these projects, a regional database on isotopic signatures of crop and soil compounds was established, and a soil organic carbon detection kit for field analysis of soil fertility was developed.

Food Safety

Only one RCA regional project on Food Safety has been implemented in the recent past. It focused on enhancing consumer confidence and increasing trade by establishing a robust and independent means of verification of the origin of foodstuffs.

At the regional training courses conducted under these projects, a total of 105 participants from RCA Government Parties received training on the use of nuclear techniques for verifying food authenticity and on data handling and data analysis.

As a result of this project, a network of laboratories for the authentication of food was established, and awareness was raised among policymakers and regulators. The project also produced training materials on the use of nuclear techniques for food authenticity, which can be downloaded from the IAEA website (https://nucleus.iaea.org/sites/nafa-projects/RAS5081/SitePages/Home.aspx). The resources available include 82 lectures, 10 Standard Operating Procedures, several tutorials, and two complete lab manuals with teaching experiments.

Further details can be found in the report on past RCA Projects. (RCA Regional Office (rcaro.org)) and in the RCA Success Stories RCA Regional Office (rcaro.org)

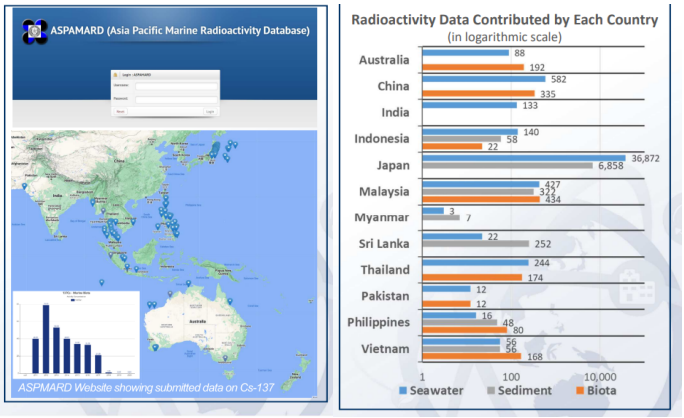
[Environmental Sector]

RCA activities in the environmental sector can be broadly categorized into issues related to the marine and coastal environment, monitoring air pollution, and the development of water resources.

Marine and Coastal Environment

Six regional projects related to the marine and coastal environment were implemented under the auspices of the RCA during the past fifteen years. Their duration varied from two to four years. They focused on the assessment of the vulnerability of coastal landscapes to sea-level rise and climate change, marine radioactivity monitoring, assessment of the potential impact of radioactive releases from nuclear facilities on marine ecosystems, sustainable marine ecosystem management, assessment of the possible impact of the releases of radioactivity from the Fukushima Daiichi nuclear power plant on the marine environment, and on establishing a benchmark for assessing the radiological impact of nuclear power activities on the marine environment.

At the regional training courses conducted under these projects, a total of 516 participants from RCA Government Parties received training on the use of isotopic techniques to assess coastal geomorphic change, measure radioactivity and stable isotope fractionation in sediments and organic material, data analysis and interpretation of information from the radiometric and isotopic analyses, analysis of strontium-90 and tritium in seawater, rapid assessment of radionuclides in the marine environment, dose assessment and risk analysis modeling, interpretation and statistical analysis of nuclear and isotopic data in addressing climate change issues, and monitoring the radiological impacts of nuclear discharges to pacific island marine ecosystems.



Asia-Pacific Marine Radioactivity Database (ASPAMARD)

Experts from RCA Government Parties, Australia, Bangladesh, Indonesia, India, New Zealand, Pakistan, and the Philippines provided expert services for the implementation of these projects.

The RCA Projects on marine and coastal environments have provided a significant amount of data on radionuclides in seawater, sediment, and biota to the Asia-Pacific Marine Radioactivity Database (ASPAMARD), developed an understanding of the impact of climate change on the marine ecosystem, verified that there was no impact from Fukushima accident releases in territorial waters beyond Japan, established international and bilateral partnerships, and obtained QMS accreditation for monitoring the impacts of nuclear activities in the marine environment. They also led to the establishment of new marine radiochemistry and/or radioecology laboratories in 12 Government Parties of the RCA.

Monitoring Air Pollution

Three four-year RCA projects on monitoring air pollution have been implemented during the past fifteen years. Their duration varied from two to four years. They focused on the use of nuclear analytical techniques for monitoring air pollution, characterization, and source identification of particulate air pollution, and assessment of the impact of particulate matter on urban air quality.

At the regional training courses conducted under these projects, a total of 134 participants from RCA Government Parties received training on the use of nuclear analytical techniques to monitor air pollution, harmonization of data and source components, use of back trajectory schemes to link pollution transport across the region and beyond, quality assurance of fingerprint and source apportionment data, utilization of x-ray fluorescence spectrometers for air particulate matter (APM) analysis, and synchrotron radiation techniques for advanced studies on air pollution.

RCA Success Story on Improving Air Quality in the Asia Pacific Region

Experts from RCA Government Parties, Australia, Bangladesh, Indonesia, New Zealand, and Thailand provided expert services for the implementation of these projects.

A large number of air samples were collected by the 16 countries participating in these projects, which were analyzed using nuclear techniques (X-ray fluorescence, ion beam analysis, and neutron activation analysis) and the first regional database for Asia and the Pacific Region containing data on fine and coarse air particulate matter was created. The projects also made source identification and apportionment possible. There was a very good uptake of the results by regulators (end-users) in RCA countries demonstrating the relevance of data and results for policy-making processes.

Development of Water Resources

Six RCA projects on the development of water resources have been implemented during the past fifteen years. Their duration varied from two to four years. They focused on the use of environmental isotope analysis to improve water management practices, management of deep groundwater resources using nuclear techniques to investigate groundwater dynamics and measure recharge rates and assessing trends in freshwater quality using environmental isotopes.

At the regional training courses conducted under these projects, a total of 247 participants from RCA Government parties received training on the use of isotopically calibrated models for surface and groundwater management, the use of isotopic techniques to determine the sources and fate of groundwater pollution, groundwater dating, assessing groundwater quality and on the application of isotope and geochemical techniques to investigate surface water-groundwater interactions and contaminant transport.

Experts from RCA Government Parties, China, Japan, India, New Zealand, Pakistan, Sri Lanka, and Thailand provided expert services for the implementation of these projects.

As a result of these projects, the RCA Government Parties developed capabilities for using isotope techniques to model water resources, improved surface and groundwater management practices, and established a regional database of water-quality parameters for ground waters and surface waters comprising isotope and chemical constituents.

Further details can be found in the report on past RCA Projects. (RCA Regional Office (rcaro.org)) and in the RCA Success Stories RCA Regional Office (rcaro.org)

Articles by GPs

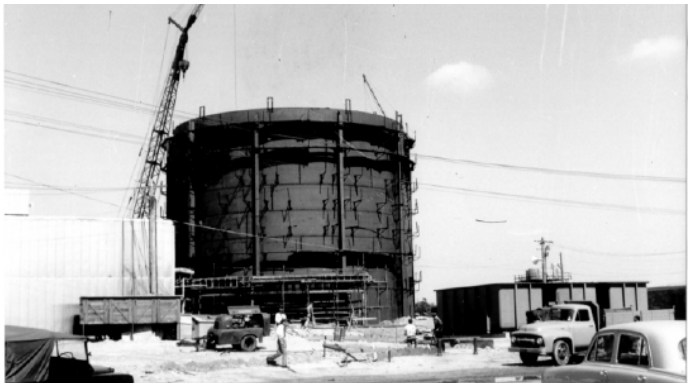
ANSTO Celebrating 70 Years of Nuclear History and Accomplishment in Australia

- **Natascha Spark** | RCA Chair, Senior Manager, International Affairs, Australian Nuclear Science and Technology Organisation (ANSTO)

In 2023, Australian Nuclear Science and Technology Organisation (ANSTO) is celebrating 70 years since Australia began developing the nation's nuclear capabilities through ANSTO's predecessor the Australian Atomic Energy Agency (AAEC).

Over those seven decades, Australia's capabilities have evolved. Today ANSTO is seen as a highly sophisticated and complex nuclear organisation.

ANSTO operates Australia's leading nuclear facilities including OPAL multipurpose research reactor; the Australian Synchrotron; nuclear medicine production facilities and many other significant landmark facilities.

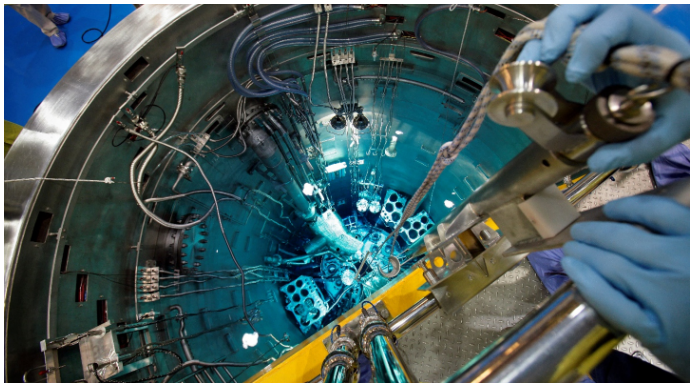


The early HIFAR reactor under construction in 1957

It has been an extraordinary journey from the 1950s. Today the accumulated learning of the last 70 years has formed the ANSTO of 2023 based on the development of knowledge, skills and capabilities over that time.

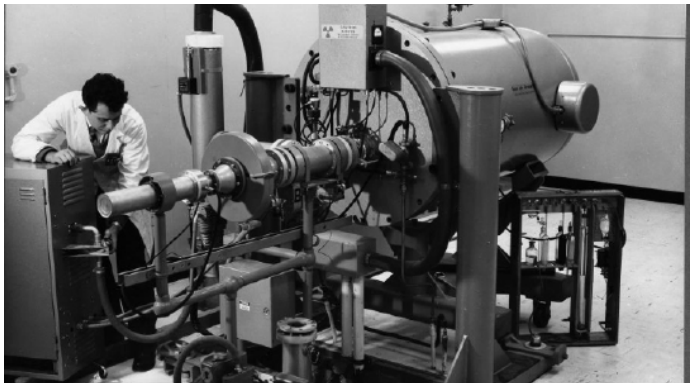
The nuclear infrastructure that has been developed is world leading but is only part of the story. Add in the talented people at ANSTO today, young emerging scientists and engineers, collaborations with our valued partners around the world and the picture is more complete.

The OPAL multipurpose reactor is one of the most efficient and advanced reactors of its type in the world.



The OPAL multipurpose reactor of ANSTO

Today ANSTO is advancing science through the use of modern nuclear and accelerator research techniques at world-leading facilities. These include the Australian Centre for Neutron Scattering - a global centre for research enabled by our multipurpose reactor – OPAL. The Centre uses neutrons as a powerful tool to determine the atomic structure and properties of materials. Other national landmark infrastructure includes the Australian Synchrotron, the



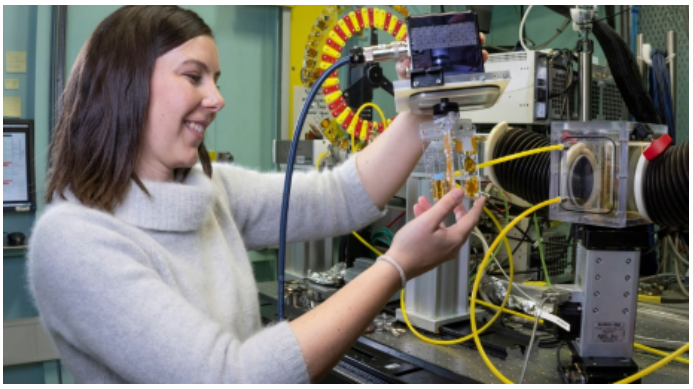
The Van der Graaff accelerator was a workhorse in the early days of ANSTO

The modern control room at the Centre for Accelerator Science

Centre for Accelerator Science and National Deuteration Facility. Thousands of academics, representatives from other organisations and industry access these facilities every year.

For many decades, ANSTO has undertaken research on the environment, human health (particularly the beneficial uses of radiation) as well as nuclear fuel, waste and nuclear technologies.

An electron microscope was used in materials research



Modern materials research using the Soft X-ray spectroscopy beamline at the Australian Synchrotron

And through ANSTO, Australia is an established producer of nuclear medicine. It is also the global leader in the supply of neutron transmutation doped (NTD) silicon.

ANSTO is driving innovation in waste treatment technologies through the development of ANSTO Synroc® that minimises environmental impact, reduces disposal volume, lowers lifecyle costs and is reliable and safe.

A Synroc-Molybdenum (SYMO) Waste Treatment Facility, 'first of a kind' plant, is progressing towards commissioning at the Lucas Heights campus outside Sydney.

Through ANSTO, Australia is also a leader in the development of radiation detection technologies with the launch of CORIS 360® the world's most advanced radiation imaging system. It uses compressed imaging technologies to provide fast, accurate information in places where radiation is present. CORIS 360® was the technology behind the successful and fast retrieval of the radioactive source in Western Australia desert earlier this year.

For more than 65 years, Australia has been a committed partner of the International Atomic Energy Agency (IAEA) in promoting and providing access to the peaceful uses of nuclear technology within our own region, and to the world at large.

Australia played a key role in the formation of the IAEA in 1957, and ANSTO's long-held ties with the IAEA continues to be globally recognised today.

"Into the future, I am confident ANSTO will keep doing what we've always done well, and that is to provide the technical solutions and expert advice to support social and economic outcomes for the benefit of Australia and the region," said ANSTO CEO Shaun Jenkinson.

The Current Status on Radiation and Nuclear Safety in Lao PDR : Part II

- **Phanousone PHOUIYAVONG** | Deputy Director of Radiation and Nuclear Safety Office, Department of Science, Ministry of Education and Sport, Lao PDR

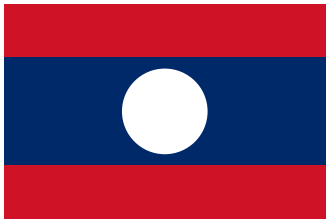
Radiation and Nuclear Safety

At the present, a radiation management system is being implemented to provide regulatory control over the import, export, transit, inspection, and use of radiation sources such as notification and authorization, licensing, inspection, and record keeping in Lao PDR. The Government aims to establish an adequate infrastructure to regulate radioactive materials and radiation sources in the country by appointing the MoES to coordinate with government agencies to address the issue.

Ensuring an adequate and sustainable level of radiation safety to protect workers, patients, the public and the environment, in accordance with international standards, as well as promoting safety culture is a national responsibility. The establishment of the necessary national infrastructure for radiation, radioactive waste, and transport safety, in compliance with the requirements of the international basic safety standards for protection against ionizing radiation and for the safety of radiation sources, is an important condition for the sustainable development of nuclear and radiation-based technology in all areas of technical cooperation with other countries. The Government's ongoing efforts focus on establishing the relevant institution framework, with an effective regulatory body, an updated national register of radiation sources, and a system for notification, authorization, inspection and enforcement.

The Radiation and Nuclear Safety Office (RNSO), Department of Science (DoS) was established in 2018 under Ministry of Science and Technology (MOST). The Lao PDR has been engaged in reorganizing the governmental structure since 2020 and under these reforms, some of the roles and responsibilities of the Department of Science have been transferred to another Ministry. However, the work related to radiation and nuclear safety will continue to be managed by the Department of Science.

Staff at the RNSO are currently very limited in terms of number, capacity and experience working in the management agencies to fully implement their assigned functions. There are only 6 persons working at the RNSO, covering 5 units:



International Cooperation, Licensing, Inspection, RN Research and Development, RN Inventory.

Currently, we are raising awareness of radiation and nuclear safety and security via a booklet and radiation safety webpage for the public while also brainstorming with other relevant sectors. In particular, we are promoting the peaceful and beneficial uses of radiation and nuclear technology.

After the Radiation Protection and Safety Law is enacted, we will issue licenses to import radioactive sources and conduct safety and security inspection at facilities. Laos is also establishing a regional early warning radiation monitoring network and data exchange platform with ASEAN countries.

Furthermore, the RNSO plans to establish a licensing system for the use, export, import, transit and transport of radiation and nuclear materials with a national inventory system to strengthen RN regulatory and enforcement bodies and acquire sufficient human resource capabilities and equipment for detection of RS at borders and public events. We will implement a RN risk assessment methodology and process for decision makers, planners and first responders using a TOT approach. We will also establish academic/institution bodies and networks for accreditation of a training curriculum, raising awareness of RN and risk among policy makers, senior officials, stakeholders and the public. An EPR team and equipment for radiological emergency response will also be established.

Industry

In 2020 the Non-Destructive Testing Center (NDT) was established under the Dept. Of Standardization and Metrology (DoSM) at the Ministry of Industry and Commerce. The NDT is responsible for inspection of parts and equipment for industry and factories such as: metal, pipe, pressure tube, turbines, engines, and valves. Civil engineering projects are particular focus, such as: Hydro Power-Plants, Thermal Power-Plants, Road-Bridges and Railways that use steel construction with component analysis using Non-Destructive Testing and Nuclear Techniques such as Radiographic Testing (RT), Ultrasonic Testing (UT), Magnetic Particle and Penetration Testing (OT) which do not destroy the properties of the sample. This includes any industrial maintenance parts, repairs or checks for corrosion, cracks or deflection of welding and casting to ensure it will be of good quality.

An important aspect is quality assurance, compliance with standards, safety and protection of people, property, and the environment while contributing to national socio-economic development using modern techniques to make high quality products.

Currently, they have received some equipment support from VINATOM and IAEA. Due to the lack of capacity, they have only inspected some of the industrial sectors by using Radiographic (RT) and Liquid Penetration Testing (PT), such as Namta 1 Hydro Power-Plant and also gold and elemental analysis in our laboratory. However, in Lao PDR there are many parts that need to be inspected by NDT methods, in particular: hydro and thermal power-plant (there are approximately 200 hydro and 1 thermal plant), Industrial Factory (turbines, pressure tanks, valves) civil engineering systems (road-bridges and railways), industrial mines and Lao Airline.

Environmental

The Natural Resources and Environment Research Institute is directly under the Ministry of Natural Resources and Environment, responsible for the implementation of policies, strategies, laws, regulations and guidelines on research. The Institute is also responsible for dissemination of information on natural resources and environment by establishing detailed programs and projects as well as researching funding sources for further consideration and approval in order to implement each phase successfully.

Developments such as mining, hydropower, agriculture (banana, sugarcane, rubber cultivation) have affected the environment and human health, especially water pollution resulting in residual and harmful chemical contamination, loss of ecosystems, and reduced aquatic life. Based on the Five-Year Plan for the natural resources and Environment Sector, the protection of natural resources and the environment has been integrated into the green and sustainable development goals that ensure the three pillars of development are balanced and sustainable (economy, environment and society).

We have developed a national program under the IAEA TC project and three national personnel were trained on the application of isotopic techniques for better groundwater management as part of increasing capabilities and Human Resources in this area. The procurement of equipment and training of local personnel has led to enhanced capabilities for groundwater analysis and understanding dynamics of contaminants. Overall, the activities have achieved outcomes that contribute to the overall objective of managing surface and groundwater resources by analyzing the dynamics of radioactive and other contaminants using isotopic and chemical investigations.

Human Health

As in other countries of the region, cancer is a major public health burden in Lao PDR. The five most common cancers in Laos are liver, lung, gynecological (cervix uteri. Corpus uteri and ovary), breast and hematological malignancies. Since most cancer patients require radiotherapy treatment, appropriately equipped facilities will be needed along with qualified radiation oncology staff including clinical radiation oncologists, medical physicists, radiation therapy technicians, and radiation oncology nurses. At present there is no operating national infrastructure for nuclear medicine such that services are still not readily available within the country.

The Mittaphab Hospital in Vientiane capital is considering the establishment of nuclear medicine facilities. Although the first radiation oncology center was established in early 2016 at the Mittaphab Hospital, it is directly under the Ministry of Health. The radiotherapy center belongs to the Radiology Department at Mittaphab Hospital and the number of dedicated staff is limited as they have only ten staff including three radiation oncologists, two medical physicists, two radiation therapists and three nurses.

Therefore, the most common treatments at the single radiotherapy center in Lao PDR are cervical, Breast and bone metastasis. There is only one LINAC machine and no other bunkers. There is only one CT simulator, and the planning treatment system (TPS) includes one license of planning and contouring. There is no service and maintenance contract for the CT simulator. Currently, the number of patients is increasing, especially cervical cancer, breast cancer, head and neck cancer.

The radiotherapy center has set a plan to install brachytherapy in 2026 and increase number of radiation oncologists, medical physicists and radiation therapists and will be supported by IAEA.

Agriculture

The agricultural sector is a major part of the country's economic development. The country remains largely an agrarian economy with most of the population dependent on agriculture. The strategy is articulated around the following overall main objectives (1) increasing agricultural production, (2) improving competitiveness in terms of quality, (3) enforcing standards and regulations.

The National Agriculture and Forestry Research Institute (NAFRI) has the Plant Genetic Resource Collection dedicated to the conservation and utilization of traditional rice varieties and other cash crop varieties (maize, soybean, mungbean, peanut, cassava, taro and other tuber corps) in the National Gene Bank with over 16,000 specimens. NAFRI aims to breed for climate resilience in rice and cash crop varieties with high yields, good eating quality, and resistance to biotic and abiotic stress. They have released over 30 rice varieties since 1993, two maize varieties, and one soybean variety, while supporting farmers to release 15 varieties. Research on Agronomy and IPM has introduced best-management practices for rice production and integrated cropping systems to improve productivity and climate resilience, while increasing resistance to pests . Research has introduced mechanization for saving labor and production costs and also post-harvest technologies to reduce loss during harvesting, processing and storage.

Energy

Energy demand is closely linked to economic growth. Lao PDR has a considerable hydropower potential, which allows the country to export hydropower electricity to countries in the region, particularly Thailand, Viet Nam, Cambodia, Singapore and China. However, hydropower accounts only a small part of the overall energy supply for Laos, and the country is still heavily dependent on biomass and fossil fuels as the primary energy sources. Lao PDR does not have a research reactor or nuclear power plant. While Laos has cooperation with ROSATOM, we do not have plans to establish a nuclear power plant. The possibility of cooperation and a MOU framework between Laos and Russia is still in the discussion process.

The Department of Policy and Energy Plan under the Ministry of Energy and Mines has cooperated with other organizations such as USAID and IAEA with the aim of establishing a sustainable energy development plan and comprehensive energy strategy as Lao PDR moves towards a future energy transition to achieve zero-carbon emissions by 2050. IAEA provides modelling tools and methodologies for integrated energy planning and programs such as MEAD and MESSAGE.

Education

In the Department of Physics, Faculty of Natural Science, National University of Laos (NUoL), there are 4 BSc programs (including Physics, Geophysics, Material Science, and Nuclear Physics), 2 MSc programs (including Applied Physics and Renewable Energy) and one PhD program in Applied Physics.

The Nuclear Physics Unit belongs to the Department of Physics, Faculty of Natural Science, NUoL. The Bachelor of Science in Nuclear Physics Curriculum has been established and has run courses since the 2014-2015 academic year to build human resources in nuclear science and technology to achieve academic excellence and follow the academic development program of the Lao Government. In addition, the bachelor's degree program in Nuclear Physics is expected to address labour market needs in key sectors, such as health, agriculture and industry.

Nowadays, nuclear science and technology plays an important role in socio-economic development and is applied to many fields, ranging from health, agriculture, and industry applications to environmental resource management and monitoring. However, universities, research institutes, governments and the private sector in Lao PDR lack education and experts on nuclear science and technology. For instance, there are insufficient human resources with nuclear science backgrounds in medical fields, resulting in limited application of nuclear and radiation medicine in the country. There is a lack of utilization of radiation for genetic alterations to improve crop varieties, mutation breeding, and nutrition. There is no effective management and measurement of radiation in the environment, including soil, water, and air, in hazardous areas such as mining and industries in the country. However, technical capacities and educational facilities for teaching nuclear science and technology in Lao universities are very limited.

The BSc curriculum in Nuclear Physics was developed at

the National University of Laos in the 2014-15 academic year. The course provides very basic modules with limited experiments. Textbooks and guidelines on nuclear sciences for BSc students are also limited. Therefore, there is a need to enhance and improve the teaching capacities and curriculum of the bachelor's program to correspond with the current development of nuclear science and technology. Research on nuclear sciences and technology in Laos is also limited.

Challenges/Issues

Lao PDR has limited human resources for capacity building, especially staff working at the RNSO currently are limited in terms of quantity, capacity and experience in the management agencies to fully implement their assigned functions.

In particular, lack of experience and equipment, limited knowledge and competent staff, have limited regulation enforcement and compliance with the safe and secure use of radioactive materials. The lack of public awareness has presented difficulties in cooperating with stakeholders and related sectors.

Since 2014, when we signed the first CPF, we have benefited significantly from participating in many TC project activities. Although the IAEA provides the equipment, there has not been any maintenance or calibration of the equipment since we received the radiation detector supported by the IAEA. Some equipment is not fully functional due to insufficient training for the staff who carry out the activities and we therefore need more comprehensive training on specific equipment for appropriate servicing and maintenance.

What's More

Reflections: Sharing Experience in Participating in the RCARO-ASEANTOM Regional Training Course on Radiation Safety

A Memorable RTC Course at KRISS, Daejeon, South Korea, August 2023

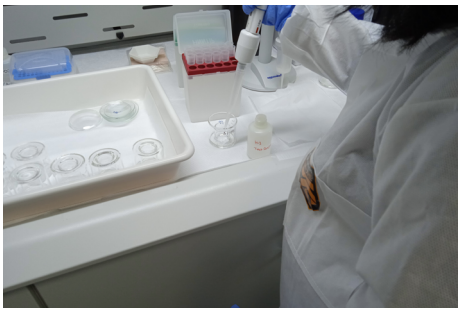
- **Yii Mei-Wo** | Senior Research Officer, Radiochemistry and Environment Group, Malaysian Nuclear

Hello (안녕하세요), my name is Yii Mei-Wo from Malaysia. Currently I am working at the Malaysian Nuclear Agency (Nuklear Malaysia), the only government institution in Malaysia that conducts research related to the use of nuclear technologies. I have a Master's degree in Chemistry from Universiti Putra Malaysia (UPM). I joined the Malaysian Nuclear Agency in 2002 as a research officer and am currently working in the Radiochemistry and Environment Group (RAS) under the Waste Technology and Environmental Division, Research and Technology Development Program. The role of our group is to measure radioactivity levels in food and the environment. In addition to that, we also provide measurement services to other government departments and private parties. In the event of a radiological emergency, our group will have direct responsibility for measuring radioactivity in samples sent by staff from other groups as well as the other government authorities. In addition, our group is also the only laboratory in Malaysia accepted in the IAEA-ALMERA (Analytical Laboratories for the Measurement of Environmental Radioactivity) network. As such, this "Regional Training Course on Enhancing technical capabilities on radioactivity measurements for environmental radiation monitoring during radiation emergencies" program is indeed closely related to the role and routine tasks of the group, especially to myself as the group leader at this moment.

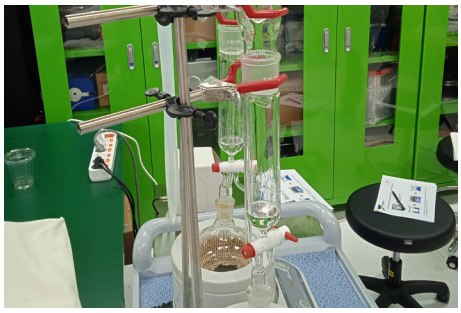
I was informed about this RTC program by the National RCA representative in the middle of June and was asked to fill in the nomination form after considering the suitability of my role based on the provisional program provided. My nomination was then sent to the institution Training Committee for screening and evaluation of the suitability to participate. After being supported by the committee, the

form was endorsed by the National RCA representative before submission to the RCARO for consideration. On the first week of July, the RCARO sent an offer letter to inform the acceptance of my participation to this RTC. Before participation into this program, it was hoped that I would be able to gain advanced knowledge in the measurement of radioactivity involving the usage of Gamma Spectrometry System equipment and Liquid Scintillation Counter. I also hoped to learn the work culture practice in South Korea as well as new ideas to improve the laboratory operations at my workplace.

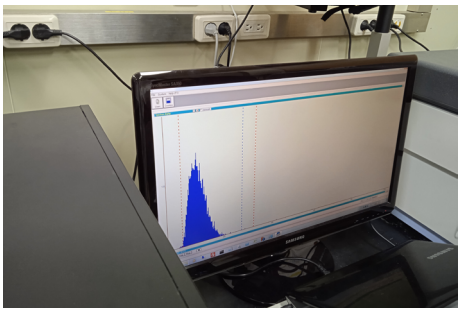
The four-day RTC program was attended by 14 participants from six RCA Government Parties belong to the ASEAN and it emphasized the radioactivity measurement of gamma emitters and tritium using two main measurement instruments, the Gamma Spectrometry System and the Liquid Scintillation Counter. The program includes three components that consist of lectures, hands-on practical sessions and exercises, and laboratory visits. Three main lectures were delivered; Lecture 1: Introduction to Radioactivity standards, uncertainty and traceability; Lecture 2: Gamma-ray Spectrometry and Lecture 3: Liquid Scintillation Counting Methods; For the practical session, the participants were divided into two groups due to the constraints of facilities and equipment; There were altogether seven practical and hand-on training sessions including; Uncertainty evaluation, Liquid scintillation counter calibration, Pre-treatment of environmental samples for gamma-ray spectrometry, HPGe detector calibration, Tritium radioactivity analysis, Data



Laboratory Practice 1



Tritium Distillation



Tritium Measurement

Laboratory Practice 2

Innovative Gamma Counting Container

Gamma Measurement

analysis using Gamma Vision and Data analysis using Genie 2K; The program is compact but comprehensive enough to enable participants understand and able to perform measurements of gamma emitters and tritium in samples when back at their home countries. Besides this, some innovative products shown to us during the visit were also found to be very useful.

As an old timer who has been working with the radioactivity measurement for such a long time, not all contents of this program were new to me. Nevertheless, there were still new things that I can learn through this RTC such as the uncertainty calculations lecture which reminded me a lot on the calculation formulas. The knowledge gained can be used to review the uncertainty formulation currently that being used in my workplace. Also, the Genie 2K calibration curve correction approach learned during this RTC was also something new to me. This approach can also be adapted in my laboratory. Apart from that, the tritium distillation method and the chemicals used were slightly different from the practice at my workplace. It can also be further explored to be adapted into existing procedures at my workplace. In addition to that, the step-by-step gamma software operating notes were very helpful and can also be referred to improve existing work procedures in our laboratory. On top of this, preparation and characterization of Reference Material (during the lab visits) is also a way forward to consider back at my home institution.

Since the program implemented was quite compact and the participants' levels were different and with different educational backgrounds, some participants were facing difficulty to catch up especially during the practical and training sessions. Therefore, during these sessions, I always shared my experience and knowledge with other participants so that they could better understand the process. For example, I had the opportunity to explain the uncertainty calculation example to the other participants who were confused by the complicated formulas. I also explained to another participant how to prepare a calibration certificate and working library during the hands-on practice with the Genie 2K software. In addition, during the laboratory sessions, I also had the opportunity to show the correct way to use shoe covers before entering the laboratory, how to use pipettes (especially for participants who have never used them before) and how to clean the vials of the LSC before sending for counting. The purpose of sharing with others is not to show that I am smarter or more experienced, but intended to make them understand better and to help them follow the training program. I always believe, when we are not stingy to share knowledge and experiences with others, we ourselves will also learn something from them at the same time. Moreover, the notes I took home from this RTC would also be shared with my institution colleagues.

This RTC provided good a exposure to the member countries. The program design is very compact and comprehensive. Speakers and instructors have deep knowledge in the related field. The introduction to the operation of the Gamma Spectrometry System as the main core of this program is good because it is the basic radionuclide measurement equipment that is easy to handle and can identify many

radionuclides simultaneously. If a similar program is proposed to be implemented in the future by the RCARO/KRISS, it is recommended that it should be held for about two weeks and the exposure to measurement techniques and the main equipment should be done in stages and not simultaneously in order to allow newcomers/slow learners to understand the concept of a piece of equipment systematically before proceed to another main equipment. In addition, it also gives the participants more time to spend on the practical training session in the classroom in a more orderly manner and have the opportunity to discuss the results with the instructors. In doing so, for instance, in the first week, participants can learn all about the gamma spectrometry system and, and the second week about the liquid scintillation counter.

Finally, I would like to thank RCARO for choosing me to participate in this RTC program and also giving me the opportunity to contribute this article in the RCA Newsletter. Also, not forgotten to the organizers, KRISS who had prepared a comprehensive training program. Through this program, I was able to make my first visit to South Korea and meet new friends as well as have the opportunity to meet some old friends as well. Thank you RCARO / KRISS. 감사합니다.

Searching for a Route Towards the New Horizon: The Policy & Information Center of the RCA Regional Office

- **Sooyoul Oh** | Head, Policy & Information Centre, RCA Regional Office

As we approach to where we once perceived as the horizon, we would realize that the horizon is moving away, like a rainbow. We would look back on the route from where we were before to where once the horizon was, i.e., here now. With the lessons learned, then we would look for a route from here to the new horizon, still envisioning beyond the horizon.

Last year, dear readers, we together celebrated the 50th anniversary of the RCA and 20th anniversary of RCA Regional Office (RCARO). During the international symposium celebrating the RCARO's Anniversary, many participants thankfully recognized the Regional Office's contribution so far. At the same time, they emphasized the need to expand its functions towards a new horizon - mostly by taking a leading role as a think-tank and vitalizing the information regarding R&Ds and dissemination of nuclear science and technology (NS&T) in the region. In response, the Regional Office reformed its organization and launched the "Policy & Information Centre" as a part of the Regional Office in early 2023. For the operation of the Centre, the Office secured a separate fund from the Korean Government in addition to the existing financial support to the Office.

The primary mission of the Policy & Information Centre is to assist the IAEA Secretariat, RCA Committees and Working Groups by providing vitalized information and policy analysis. The policies could be specific to a few RCA Government Parties (GPs) or common to the whole RCA framework.

The information referred to here means policies that are relevant to NS&T and includes national policy goals, priority issues, ongoing and planned R&D topics including the status of R&D institutions and areas of international collaboration that GPs want. 'Vitalized,' implies a thorough collection of information, analysis of the collected information, and open access for all stakeholders. Such information must be the basis for understanding regional needs and developing effective polices and implementing strategies. The information will be provided mostly in the form of reports.

Concerning a policy, I hesitated but took the courage to introduce a bit to you. At the top-tier, there are policy goals. Note that the policy goals are supposed to be already set up in each RCA GP. A policy is, say, a set of principles and guidelines to achieve the policy goals. Once a policy is adopted, implementation mechanisms are put in place to ensure compliance with the policy, followed by the implementation itself and evaluation of the results. For instance, suppose that a policy goal is to reduce fatality due to cancer. Then decision makers could adopt a policy that promotes early diagnosis as a first priority before, for example, enhancing the treatment process of a patient. Tax exemptions for the purchase of diagnosis equipment, subsidizing personal payments for diagnosis, and so on could be the implementation mechanisms.

Returning to the P&I Centre, its main efforts to meet abovementioned mission include:

- *Identification of regional challenges and needs for which potentially NS&T can provide resolutions;*
- *Development of policies and NS&T cooperation strategies;*
- *Facilitation and promotion of efficient cooperation in R&Ds and technology transfer through, for instance, strengthened networks of research communities; and*
- *Dissemination of information through an integrated platform.*

It is worth noting that we will also provide RCA GPs with consultation services in both technical and non-technical areas, even regarding policy goals upon request. Aiming high, but keeping our feet on the ground: As the first step, we are reviewing the information that RCARO has accumulated so far. One example of this review is a systematic analysis of the trend of Technical Cooperation Projects including all available pre-concept proposals even those that have not been adopted.

Towards a new horizon, the Centre pursues three core values: the quality of information, the usefulness of suggested policies, and vitality of cooperation networks. These values are self-explanatory, as you will understand. In order to reach the core values, it is clear that active participation of the RCA GPs is indispensable. I would like to kindly invite you to join the activities of the P&I Center in preparing the exploration of the next fifty years of the RCA and also to accompany the exploration. Being a tourist won't be enough.

RCA at a Glance

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 the IAEA Member States that are located in South Asia, South East Asia and the Pacific, and the Far East.**

Establishment

1972

Membership

Member States of the International Atomic Energy Agency (IAEA) in the Asia and the Pacific Region. Current membership 22 states.

Objective

To cooperate with each other and the IAEA in the use of nuclear techniques to contribute to the socio-economic development of the members (Government Parties) of the RCA (Regional Cooperative Agreement for Asia and the Pacific).

Thematic Areas

Agriculture, Environmental Protection, Human Health, Industry, Radiation Protection, Energy Planning and others

No. of RCA Projects Implemented

173 (up to 2022)

Number of persons trained in regional training courses

Approximately 10,000.

Financial Resources

Technical Cooperation Fund of the IAEA and the Extra Budgetary contributions of the RCA Government Parties for regional activities, RCA Government Parties for national activities and partner organizations.

Role of the IAEA

To provide financial, administrative, and technical support to the programs and projects of the RCA.

Governance

By National RCA Representatives appointed by the Government Parties at two annual meetings.

Project Implementation

By national project teams functioning under National Project Coordinators, led by a Lead Country Coordinator

RCA website

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