

FNCA



Forum for Nuclear Cooperation in Asia Newsletter

Contents

- p1 24th FNCA Ministerial Level Meeting
- p5 Introduction of Project Activities
- p15 23rd FNCA Coordinators Meeting
- p16 2023 Study Panel
- p17 Message from FNCA Coordinator
and Advisor of Japan
- p18 Activities in JFY2023 &
Outcomes of FNCA Activities
- p19 What's FNCA?



Photo on the upper left : Hands-on training at Tokyo University of Agriculture and Technology's research paddy fields
(Technical visit at FNCA workshop on Mutation Breeding in Japan)

Photo on the bottom right : Interim storage facility for radioactive wastes at Malaysian Nuclear Agency
(Technical visit at FNCA workshop on Radiation Safety and Radioactive Waste Management in Malaysia)



Discussion on the Contribution of Nuclear Science to Health and Medical Well-being FNCA Ministerial Level Meeting Held in Thailand

The 24th Ministerial-Level Meeting of the Forum for Nuclear Cooperation in Asia (FNCA), co-hosted by the Cabinet Office of Japan, the Japan Atomic Energy Commission (JAEC), and the Thai Institute of Nuclear Technology (TINT), was held in Bangkok, Thailand, in a hybrid format on November 28, 2023. Ministers in charge of nuclear science and technology and other officials from FNCA member countries gathered at the conference to report on the results of various efforts made by FNCA to date in the area of radiation utilization.

At the beginning of the meeting, the representative of Thailand, Mr. Permsuk SUJJAPHIWAT, Permanent Secretary, Ministry of Higher Education, Science, Research and Innovation, gave a welcome speech, emphasizing the importance of the peaceful use of nuclear energy, and expressed his hope that this meeting would be a meaningful forum to discuss the contributions of nuclear science in human health and medical well-being.

Ms. TAKAICHI Sanae, Minister of State for Science and Technology Policy, Japan, delivered remarks (read out by Dr. UESAKA Mitsuru, Chairperson of JAEC), noting that the research results obtained through FNCA's joint project activities are actually contributing to the sustainable development of the Asian region and that FNCA has the potential to become a place where

a wide range of new and diverse human resources can work. Singapore participated in this meeting as an observer for the first time.

■ Keynote Speeches

Dr. Najat MOKHTAR, Deputy Director General, Head of Department of Nuclear Sciences and Applications, IAEA, and Dr. May ABDEL-WAHAB, Director, Division of Human Health, IAEA, provided a video message entitled "IAEA Rays of Hope Initiative: Increasing Access to Cancer Care through Nuclear Applications." Dr. Kanokporn BOONSIRICHA, Manager of Nuclear Technology Research and Development Center, TINT, lectured on the topic of the development of radiopharmaceuticals in Thailand, and stated that her organization promotes the use of nuclear reactors and radiation technology, has R&D programs, and uses research reactors and cyclotrons to produce and supply a variety of pharmaceuticals.

■ Roundtable Discussion

Regarding the theme "Nuclear science contribution in human health and medical well-being (including Rays of Hope)," Dr. WAKATSUKI Masaru from QST Hospital, National Institute for



<National representatives (Online Participants)>

Photo above (from left to right): Mr. Alan BRINDELL, Director, Corporate Affairs, Australian Nuclear Science and Technology Organization (ANSTO); Ms. Mursalova GULMIRA, Deputy Director of Department of Atomic Energy and Industry, Ministry of Energy of the Republic of Kazakhstan; Mr. Sunhak CHO, Director-General, Space Policy and Nuclear Energy Bureau, Ministry of Science and ICT (MSIT) of the Republic of Korea; Dr. Renato Umali SOLIDUM, Jr., Secretary, Department of Science and Technology of the Philippines



<National representatives>

Photo on the left (from left to right): Dr. Lucille V. ABAD, Chief, Atomic Research Division, Philippine Nuclear Research Institute (PNRI); Dr. Rosli Bin DARMAWAN, Director General, Malaysian Nuclear Agency; Mr. HUANG Ping, Deputy Director General, China Atomic Energy Authority (CAEA); Prof. Ashoke Kumar PAUL, Chairman, Bangladesh Atomic Energy Commission (BAEC); Dr. Thawatchai ONJUN, Executive Director, Thailand Institute of Nuclear Technology; Mr. Permsuk SUJJAPHIWAT, Permanent Secretary, Ministry of Higher Education, Science, Research and Innovation of Thailand; Dr. UESAKA Mitsuru, Chairperson, Japan Atomic Energy Commission (JAEC); Dr. Mego PINANDITO, Deputy Chairman for Development Policy, National Research and Innovation Agency (BRIN); Mr. Manlajav GUNAAJAV, Secretary of the Nuclear Energy Commission and Head of the Executive Office, Executive Office of the Nuclear Energy Commission (NEC) of the Government of Mongolia; Dr. TRAN Chi Thanh, President, Vietnam Atomic Energy Institute (VINATOM); Mr. WONG Kang Jet, Chief Executive Officer, National Environment Agency of Singapore

Quantum Science and Technology, Japan provided a video message, as a lead speech, on the current status of palliative radiotherapy in Asian countries, and Dr. VU Xuan Huy from the Radiotherapy Department of Gastrointestinal and Genitourinary Cancers, Vietnam National Cancer Hospital, Vietnam gave a lecture on the current status of palliative radiotherapy in Vietnam, followed by a Q&A session and discussion.

■ Country Reports

Representatives from each country presented reports on recent developments in nuclear energy policies and initiatives, the status of palliative radiotherapy, and the use of radiation and radioisotopes in the medical field. Japan presented a report on its basic approach to the use of nuclear energy and trends in nuclear energy-related innovations (see p. 3 for details).

■ Joint Communique

As a summary of the meeting, a joint communique, as excerpted below, was adopted.

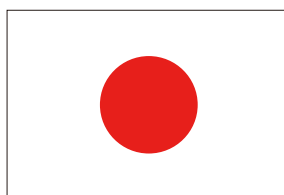
- Expecting that protocols for cancer treatment to be established by FNCA will be put to full use by each country

in the framework of IAEA's "Rays of Hope," we will seek future cooperation in activities related to "Rays of Hope."

- Based on each member country's policy to facilitate cancer treatment in the Asian region, we will promote FNCA's radiotherapy projects in member countries.
- Regarding the topic "Outlook of Next Generation Reactor including SMR" discussed at the 2023 Study Panel, we will focus on the exchange of information on the possibilities and outlook of technical, safety, and economic aspects in order to continue to share information on the development status of new types of reactors among member countries.
- The member countries will seek to achieve gender equality in the nuclear science and technology field through promoting gender balance and age diversity.
- We will continue to work on building up public trust on nuclear science and technology in the member countries and in the Asian region.

For details on the results of the Ministerial-Level Meeting,
https://www.fnca.mext.go.jp/english/mini/e_24_minister.html

Japan



In response to the current situation and changes in the environment surrounding nuclear energy, Japan revised for the first time in five years its Basic Policy for Nuclear Energy in February 2023 (the Cabinet has decided that the government should respect the Basic Policy), which outlines the government's long-term direction for nuclear energy policy. The Basic Policy has identified future priority initiatives such as reflection on and lessons learned from the accident at TEPCO's Fukushima Daiichi Nuclear Power Station; use of nuclear energy to contribute to stable energy supply and carbon neutrality; ensuring peaceful use of nuclear energy, nuclear nonproliferation, and nuclear security; and developing the use of radiation and radioisotopes.

The 2022 edition of White Paper on Nuclear Energy features trends in research, development, and innovation related to nuclear energy.

Focusing on achieving Green Transformation (GX), Japan emphasizes safety, energy security, economics, and the environment in its energy policy, and aims to achieve a 20% to 22% share of nuclear power in its energy mix by 2030.



Dr. TOKUMASU Shinji, Deputy Director General for Science, Technology and Innovation Policy, Cabinet Office of Japan (CAO)

The use and deployment of radioisotopes for medical use is very important in the utilization of nuclear energy, and Japan is working on it based on the Action Plan for Promotion of Production and Utilization of Medical Radioisotopes formulated in May 2022.

Regarding human resource development and exchange in the nuclear field, the development of the younger generation is a challenge, and the Ministry of Education, Culture, Sports, Science and Technology of Japan launched a project named the Advanced Nuclear Education Consortium for the Future Society (ANEC) in 2021 to maintain and strengthen the foundation of nuclear education.

Thailand



As for cancer radiotherapy in Thailand, about half of the radiotherapy-related facilities are concentrated in the capital city of Bangkok, and the number of radiotherapy facilities and the necessary human resources are on the increase. The incidence of cancer in Thailand is low, one-fifth that of Japan, but increasing every year. In particular, the number of breast cancer patients is increasing, and the mortality rate of breast cancer patients in Thailand is higher than that in Japan. This is probably a result of the inadequate deployment of radiotherapy equipment in Thailand and the long waiting times for treatment, which prevent adequate access to appropriate treatment.

Palliative radiotherapy accounts for one-third of all radiotherapy treatments, half of which are for patients whose cancer has



In front of the photo: Dr. Yaowalak CHANSILPA (Faculty of Medicine, Siriraj Hospital, Mahidol University)

Back of the photo: Dr. Kanokporn BOONSIRICHAI (Thailand Institute of Nuclear Technology)

metastasized to the bone or brain. Appropriate palliative radiotherapy is available in Thailand, but long waiting times at some medical facilities prevent adequate access to equally appropriate treatment.

Prof. Ashoke Kumar PAUL Chairman Bangladesh Atomic Energy Commission (BAEC)

Bangladesh has set a goal under Vision 2021 to supply about 10% (60,000 MW) of its total electricity generation from nuclear power by 2041, and aims to install two large reactors in 2024 and 2025, two more in 2031 and 2032, and two more in 2040 and 2041. In addition to these large reactors, the country is actively considering the introduction of small modular reactors (SMRs) and micro reactors with a view to 2030 and beyond.

Currently, the Rooppur Nuclear Power Plant (two units of Russian PWR (VVER-1200), each with an output of 1,200 MW) is scheduled to receive the first fuel for Unit 1 in October 2023, to conduct cold and hot tests in April 2024, and to be commissioned by the end of

2024. The major medical radioisotope facilities include the Institute of Nuclear Medicine and Allied Sciences (INMAS), the National Institute of Nuclear Medicine and Allied Sciences (NINMAS), and other nuclear medicine facilities, where PET-CT, SPECT-CT, cyclotron, and other equipment are installed.

As for palliative radiotherapy, 35% of the cancer patients received palliative radiotherapy in 2022. Among them, 40% had bone metastases, 30% had brain metastases, and 13% had superior vena cava obstruction due to lung cancer. In Bangladesh, 9 public and 12 private radiotherapy centers are providing hypo-fraction palliative radiotherapy.

Dr. Mego PINANDITO Deputy Chairman for Development Policy National Research and Innovation Agency (BRIN)

At the 26th Conference of the Parties (COP26) to the United Nations Framework Convention on Climate Change, Indonesia announced a government goal to achieve net-zero greenhouse gas emissions by 2060 or sooner in an effort to combat climate change. The government aims to introduce nuclear power plants between 2030 and 2034 as part of its energy policy.

The National Long-Term Development Plan for 2025-2045 has a four-stage energy transition plan, and the National Medium-Term Development Plan (RPJMN) for 2025-2029 calls for the development of nuclear energy. Indonesia will work to prepare regulation and establish the Nuclear Energy Program Implementing Organization

(NEPIO) to introduce nuclear power, strengthen regulatory systems and human resource development, and cooperate with the IAEA and other international organizations.

The introduction of SMRs, micro-reactors, and other reactor types is also being considered. Candidate construction sites are being considered mainly in Sumatra and Java for large nuclear power plants, and in Kalimantan and eastern Indonesia for SMRs. In addition, floating nuclear power plants (FNPPs) are being considered for construction on small islands and in remote areas, while micro reactors are being considered as an alternative to diesel power generation in remote areas.

Dr. Rosli Bin DARMAWAN Director General Malaysian Nuclear Agency (Nuklear Malaysia)

To promote the peaceful use of nuclear technology for the socioeconomic development of Malaysia, the Ministry of Science, Technology and Innovation (MOSTI) announced the National Nuclear Technology Policy (NNTP) 2030 in September 2023. Two important flagship programs have been included in the action plan as part of this policy initiative under the nuclear technology in focus areas of healthcare sector: the production and manufacturing of radiotracers and medical devices, and the enhancement of nuclear medicine services and radiotherapy.

The incidence of cancer is increasing in Malaysia, and Samarium-153, produced and supplied by the Malaysian Nuclear Agency, is being used to alleviate bone pain in patients. The Malaysian Nuclear Agency is also developing technology to utilize

lutetium-177 and can produce more than 600 mCi of lutetium-177 using the TRIGA PUSPATI reactor. Palliative radiotherapy in Malaysia plays an important role in the palliation of physical symptoms caused by advanced cancer. The statistics of radiotherapy cases in 2022 at the National Cancer Institute show that 34% of the patients received palliative treatment.

Radiation technology via NNTP 2030 has brought about a paradigm shift in Malaysian healthcare by offering numerous benefits in diagnosis, treatment, and research. FNCA's platform has enabled Malaysia to share knowledge, exchange information, and establish partnerships with FNCA member countries for further advancing nuclear technology in the medical and human health sector.

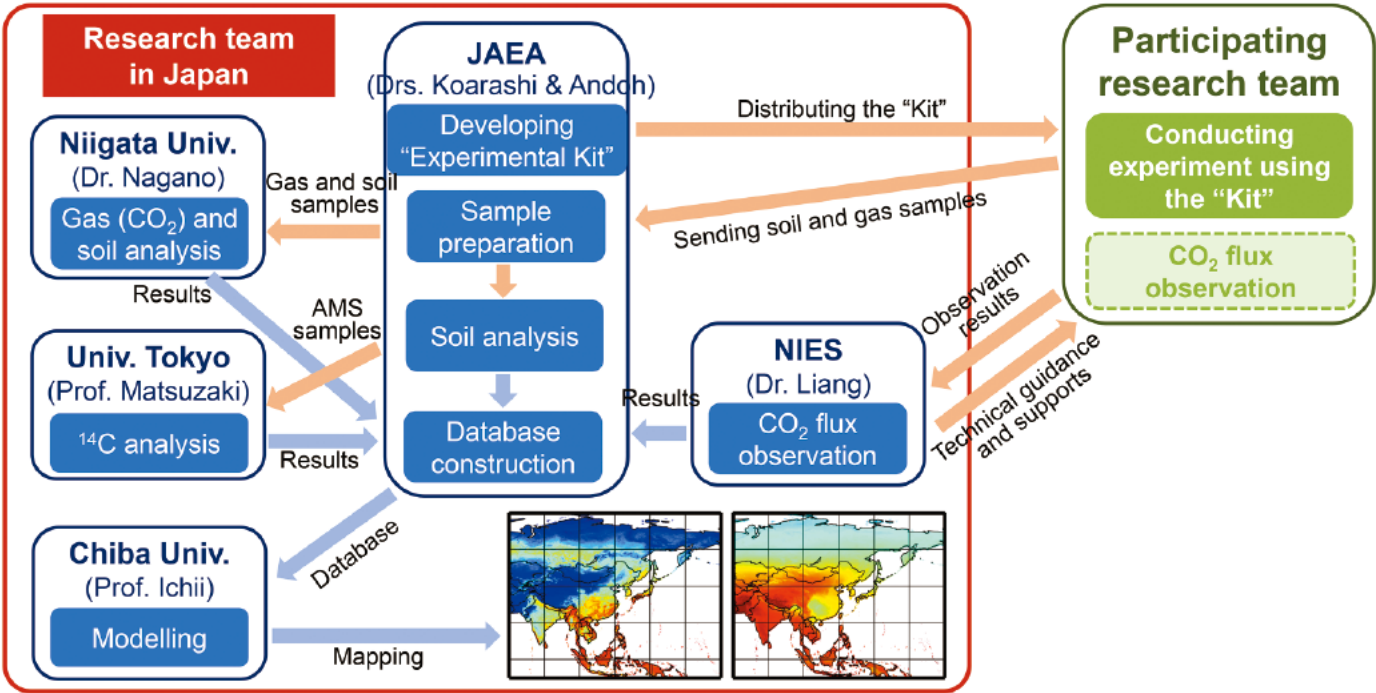
Soil Carbon Dynamics Revealed by Radiocarbon (¹⁴C) Soil Controls the Future of the Global Environment - Its Function and Role in the Global Carbon Cycle -

By using nuclear technology to analyze natural radionuclides and isotopes, we gain insights into how the climate, geology, and terrestrial and marine environments have changed in the past and how they may change in the future. It is estimated that 1 to 2 trillion tons of carbon are stored in the world's soils in the form of organic matter, a part of which is continuously decomposed and released as carbon dioxide (CO₂) into the atmosphere. Soils have a function to sequester carbon and are thought to contribute significantly to stabilizing the atmospheric CO₂ levels.

The Climate Change (Evaluating the Carbon Emission from Forest Soils) Project was launched in FY2023, with the first three-year phase ending in FY2025 to measure carbon storage and emission from forest soils in Asia and assess how they contribute to global warming and climate change. The participants from Japan include the Japan Atomic Energy Agency (JAEA), the National Institute for Environmental Studies, the University of Tokyo, Niigata University, and Chiba University. From FNCA, 9 member countries plan to participate in and advance the project; Bangladesh, Indonesia, Japan, Kazakhstan, Malaysia, Mongolia, the Philippines, Thailand, and

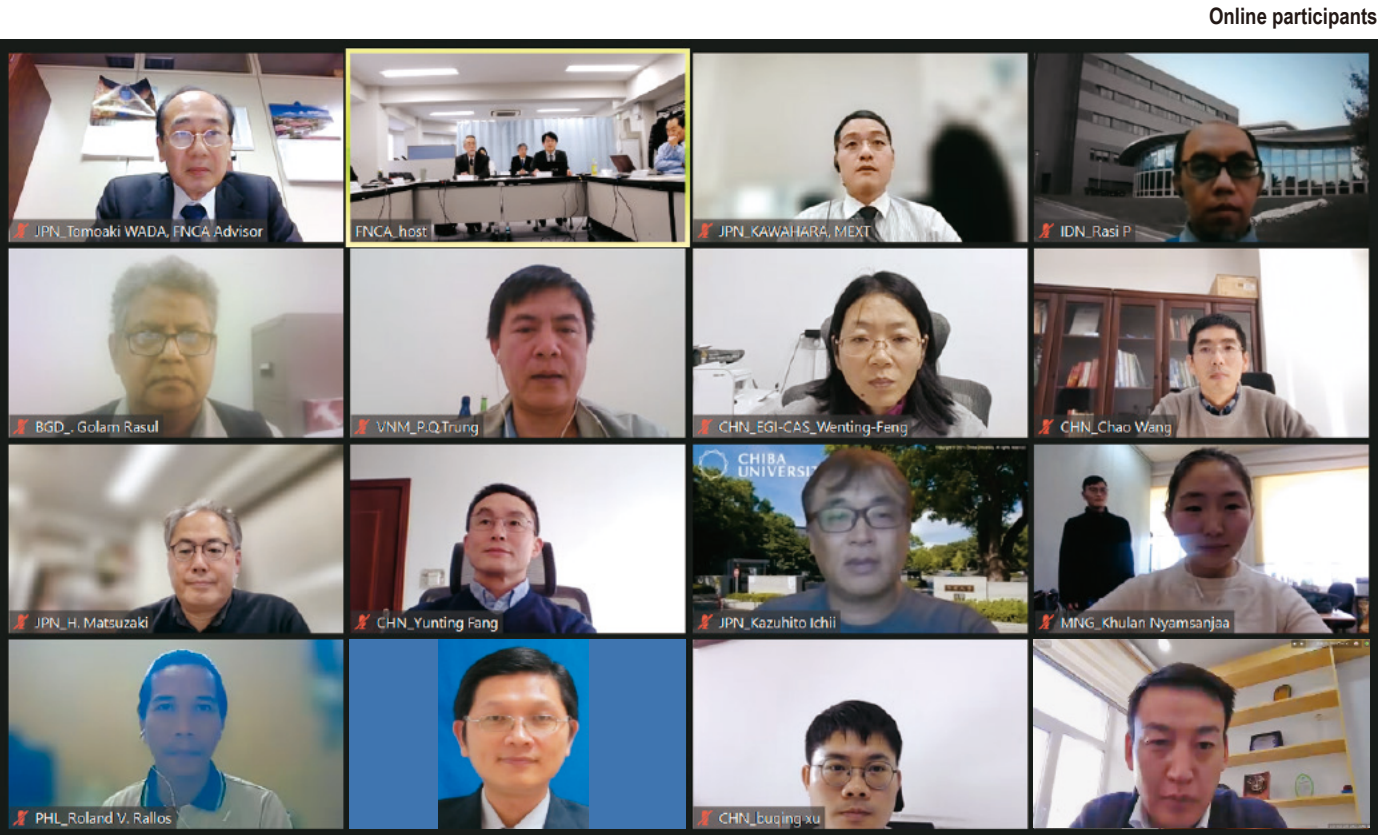
Vietnam. In this project, we will investigate the carbon emission from various forest soils across Asia and also quantify the response of the carbon emission to increasing temperature. This enables us to evaluate the impact of global warming on the ability of soils to store carbon on an Asian scale, which contributes to improving the accuracy of future predictions of climate change.

The FY2023 workshop was held online on December 12. The project leader, Dr. NAGAI Haruyasu from JAEA, gave an overview of the project. Afterwards, the leaders of the member countries reported the current status of the project and the responses to the preliminary questionnaires (regarding forest type, soil type, candidate research sites, etc.) sent to each country prior to the workshop. This was followed by about an hour of discussion, during which project member Dr. KOARASHI Jun from JAEA mentioned that an experimental kit for this project was being developed, and once developed, it would be distributed to each country. He also requested soil and gas sampling at selected sites using this kit, and sending the samples to Japan for analyses.








Organization of the Research Team and Research Flow of the Project

- The following five research items will be conducted in this project.
1. Measuring CO₂ emission rates from different forest soils (0 - 20cm surface layer) across the Asian region.
 2. Determining the physicochemical, mineralogical, and organic matter properties of soils, including ¹⁴C isotopic ratio, which is an indicator of the turnover of soil organic matter.
 3. Establishing an Asian scale database.
 4. Analyzing the relationship between CO₂ emission rates and soil properties to investigate factors that control the rate of CO₂ emissions from forest soils.
 5. Developing a model to assess CO₂ emissions from Asian forest soils and their impact on future global warming.



Future Schedule of the Project

	2022	2023	2024	2025	2026	2027	2028
	Preparation	Phase 1			Phase 2		
Organize project teams							
Approach 1: Asian-scale database of SOC characteristics							
	Soil sampling and analysis						
	Construction of prototype database			Upgrade and integration of database			
Approach 2: soil CO ₂ emission model							
	Transfer of Field/laboratory experiments			Field/laboratory experiments			
	Development of soil CO ₂ emission model			Universalization and application of model			
MEXT research exchange program							
	Soil sampling and analysis	Field/laboratory			experiments, model development		
Output			Prototype database		Asian-scale database		
			Soil CO ₂ emission model		Universal soil CO ₂ emission model		
Publication in journals		1	1	1	1	1	2



TUAT's research paddy fields
(photo taken by a drone camera)

Workshop Held at QST Takasaki Institute for Advanced Quantum Science and Tokyo University of Agriculture and Technology

The aim of the Mutation Breeding Project is to contribute to increasing food production and crop quality in the Asian region by using breed improvement technologies that employ the irradiation of gamma rays, ion beams, and other radiation to develop new varieties of crops that are highly needed in Asian countries (e.g., sorghum, soybeans, orchids, bananas, and rice). The project has focused on rice, an important crop in Asia, since FY2013. Through activities with attention to contribution to climate change issues of growing global concern, as well as to sustainable agriculture, new varieties that are highly resistant to various environmental stress, including resistance to disease, drought, and salinity, have been developed in many member countries.

During the current phase, which started in FY2018, the focus has expanded beyond rice to include other major crops in high demand in relevant countries. Activities have begun to contribute to the promotion of sustainable agriculture by developing new varieties that can adapt to environmental changes caused by climate change and that produce high yields even with low input

of chemical fertilizer and pesticide.

The project team accomplished substantial outcomes in line with the objectives of the current phase, such as the release of rice varieties adapted to cultivation under low-input conditions and soybean varieties resistant to dry climates, and the elucidation of the molecular characteristics of mutation caused by ion beams. Their achievements were also recognized in the FNCA Award, earning the team the Best Research Team of the Year Award and the Excellent Research Team of the Year Award more than once.

The workshop in FY2023 took place in two locations in Japan: the Takasaki Institute for Advanced Quantum Science of the National Institutes for Quantum Science and Technology (QST) in Takasaki; and the Tokyo University of Agriculture and Technology (TUAT) in Fuchu. The event was attended by 27 people from 8 countries (including virtual participants).

The workshop included presentations by representatives from each country on the Mutation Breeding of Major Crops for Low-input Sustainable Agriculture under Climate Change.

Mutation Breeding of Major Crops for Low-input Sustainable Agriculture under Climate Change

Against the backdrop that FY2023 is the final year of the five-year phase (which was extended to six years due to the impact of the pandemic), round table discussions were held on the direction of future research and the possibility of further cooperation among member countries.

Based on the discussions, a subproject for the next phase was proposed: Mutation Breeding of Major Crops and Application of New Technologies toward a Sustainable Agriculture.

On the second day of the workshop, participants visited three sites of the Takasaki Institute for Advanced Quantum Science: the Takasaki Ion Accelerators for Advanced Radiation Application (TIARA), the Electron Beam Irradiation Facility, and the ⁶⁰Co Gamma-ray Irradiation Facilities.



Tour of the accelerators in TIARA

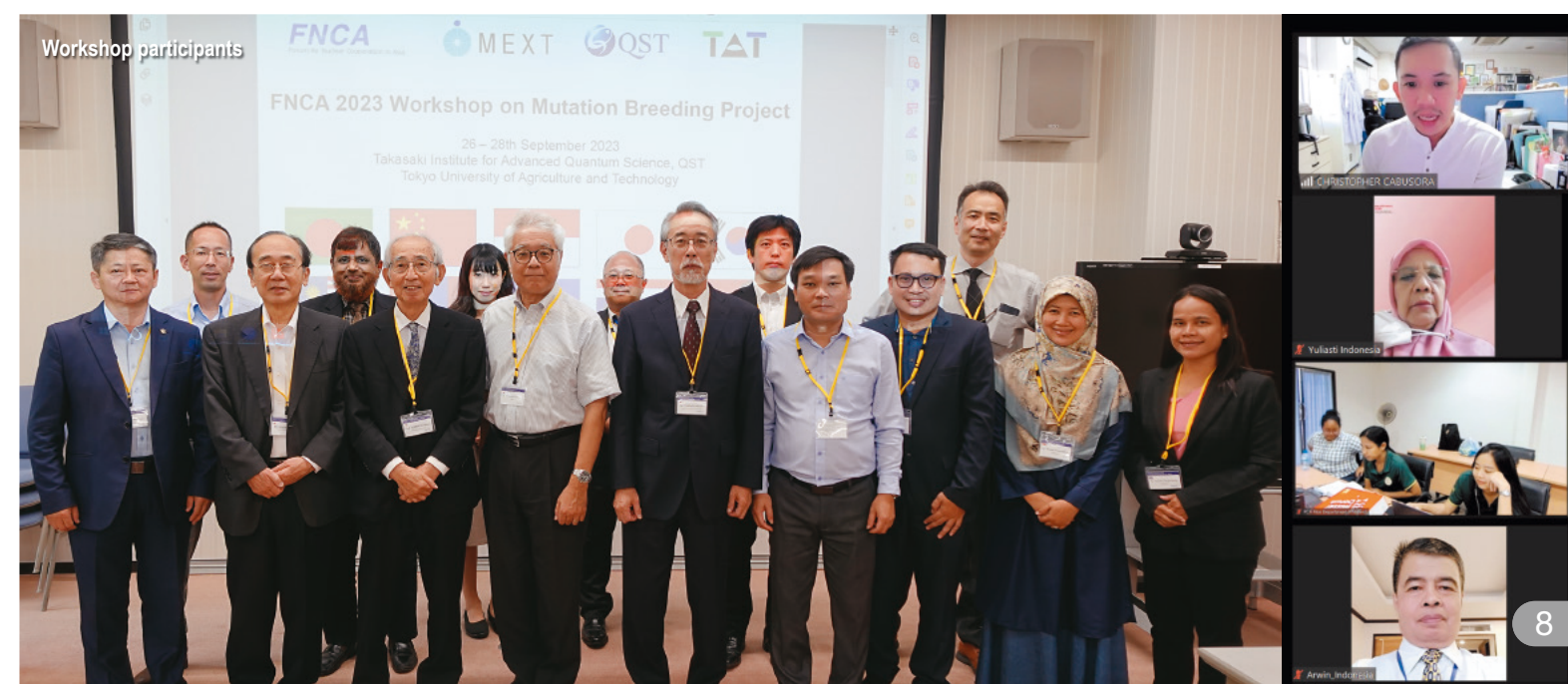
On the last day of the workshop, hands-on training was conducted in the paddy fields in TUAT's Field Museum Hommachi in Fuchu. Participants were briefed on phenotyping technology aimed at estimating rice yields by using a smartphone.

Accurately assessing crop productivity is essential in crop breeding. The widely used methods to evaluate crop productivity has been to harvest multiple plants by hand and measure the weight of the harvest, but that takes substantial time and effort. To solve this problem, TUAT and its research group collected nearly 5,000 digital images of rice canopy at harvest time taken around the world (with various yield levels and varieties) and yield data from actual harvesting surveys, and input these data into a convolutional neural network (CNN), a typical deep learning method, and trained it to develop a technique that can easily estimate yield from the image data. With this technology, people can predict yields by simply downloading an app and taking a photo of rice canopy at a specified height with a smartphone.

During this hands-on training, participants were given a lecture on phenotyping technology and then actually experienced it by using their smartphones after downloading the App.



Using the App to estimate yields



Developing Optimal Radiotherapy for the Asian Region

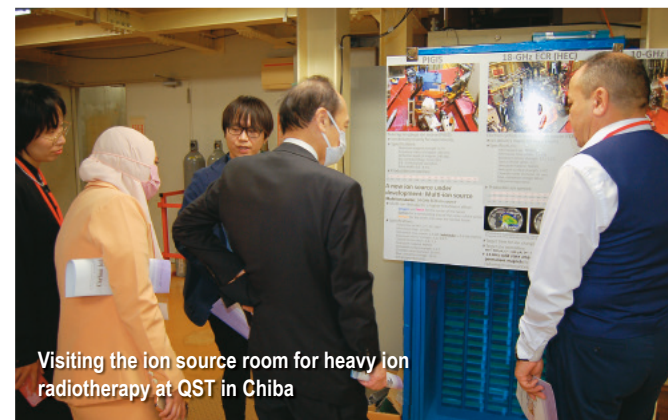
Workshop Held in Japan, at QST (Chiba) and Saitama Medical University

In the Radiation Oncology Project, the team has been conducting clinical trials of radiotherapy and chemotherapy for cervical cancer, nasopharyngeal cancer, and breast cancer, which are common in the Asian region, for more than 20 years, together with 11 FNCA member countries. As the joint clinical trials take into account country-specific medical infrastructure and systems, protocols established through the studies have been applied in hospitals in each country.

An annual workshop was held at the National Institutes for Quantum Science and Technology (QST) in Chiba and at the Saitama Medical University from October 25 to 28, 2023, bringing together the members of the joint clinical trials from member countries. During the academic sessions in the first half of the workshop, the progress of ongoing clinical trials for cervical cancer, nasopharyngeal cancer, and breast cancer was reported. With regard to breast cancer, it was noted that a paper on the initial outcomes of the clinical trial had been published in an international journal. As part of reports of dose surveys to ensure quality assurance (QA) and quality control (QC) in cervical cancer treatment, the results of surveys conducted in Indonesia and Malaysia in FY2022 were presented.

Regarding the Research Study on Palliative Radiotherapy for Bone Metastasis, a newly launched in 2023, the results of the first survey conducted at hospitals where team members work were reported. In many Asian countries, palliative radiotherapy for bone metastases of cancer has not been established yet, and this study is expected to help assess each country's medical resources and treatment practices and to propose optimal therapies. Regarding the Palliative Radiotherapy for Brain Metastasis, for which a new clinical trial began in parallel with the one for bone metastases, the schedule for enrollment of clinical cases was presented, and project members were encouraged to conduct application procedures for the clinical trial in each country. There is also an ongoing IAEA/RCA project to standardize palliative radiotherapy for bone metastases, which provides a

potential for a partnership with FNCA through information sharing. These reports in the workshop and the papers written on the clinical trials have been summarized into an evaluation report as the outcomes of the current phase (FY2020-2023). At the end of the first half of the workshop, three successors to the current clinical trials were proposed: the 6th clinical trial for cervical cancer, stereotactic body radiation therapy (SBRT), and radiotherapy for rectal cancer. The project will discuss on these proposals more specifically in the next fiscal year and beyond, and developed plans for the next phase (FY2024-2026).



Visiting the ion source room for heavy ion radiotherapy at QST in Chiba

In the second half of the workshop, participants visited the ion source room, which is essential for heavy ion radiotherapy, and emergency exposure medical treatment facilities at QST, followed by a tour of Radiation Oncology Department at the Saitama Medical University International Medical Center. On the last day, an Open Lecture was provided for the medical students of the Saitama Medical University. It consisted of five lectures addressing the topics of activities at FNCA, major diseases and the national healthcare system in the Philippines, Thailand, Bangladesh, and Japan, and the way radiotherapy is used. The initiative was intended to inform medical students about the situation in Asian countries and thereby help them develop international perspectives.



An Open Lecture at Saitama Medical University's Moroyama Campus



Tour of the Saitama Medical University International Medical Center

Promoting Multipurpose Use of Research Reactors in Asian Countries

Research reactors have been operated in many Asian countries over years and utilized in a variety of fields. In the Research Reactor Utilization (RRU) Project, countries share information on characteristics, usage status, etc., of their research reactors with aims of improving the research base and technical skills of researchers and engineers in FNCA member countries.

The topics addressed at the project's workshops include isotope production including new isotopes in FY2020, new research reactors in FY2021, and small modular reactors (SMRs) and neutron scattering in FY2022, in addition to neutron activation analysis (NAA). Many countries focus on the development of SMRs, amid growing attention to nuclear power as an option in their decarbonization initiatives, through which they strive to reduce greenhouse gas emissions. Making reactors smaller and modularized is expected to increase their safety and lead to lower costs and greater economy.

The project's three-day workshop took place in Bangkok, Thailand, from October 17 to 19, 2023, and was attended by 12 countries. The RRU group exchanged information on the aging of research reactors, a new topic, in addition to the existing topics. The NAA group exchanged information on environmental monitoring using Instrumental NAA (INAA) and other measurement techniques for a wide range of samples, including air pollutants as well as contaminants in soil, rivers, lakes, and oceans.

INAA is a non-destructive method that can determine and



Radioisotope Center, Thailand Institute of Nuclear Technology (TINT)

analyze a large number of elements simultaneously. This analytical method takes advantage of the high penetrability of neutrons and gamma rays emitted after activation. Its ability to quantify whole solid samples is an outstanding feature not found in other analytical methods. INAA was even used to analyze particles that the Hayabusa2 space explorer brought back to Earth from asteroid Ryugu.

The RRU project covers a wide range of topics, and with new topics flexibly added to meet the needs of member countries, workshops held every year represent good opportunities for network building. The next phase will also address a variety of topics, including new ones like the aging of research reactors which was proposed by the Republic of Korea at the 23rd FNCA Coordinators Meeting, management of spent fuel, and strategic planning and cooperation for research reactor utilization. The NAA group intends to pursue further technological improvements in the implementation of activation analysis methods based on the results of past activities and strive to disseminate their functional superiority to competing frontal analysis methods.



Thai research reactor TRR-1/M1

Completion of the Consolidated Report on NORM & TENORM

The Radiation Safety and Radioactive Waste Management Project aims to improve safety in the handling of radiation and radioactive waste in the Asian region by exchanging and sharing information and experiences related to radiation safety and radioactive waste management.

In recent years, the project issued a report titled “FNCA Consolidated Report on Low Level Radioactive Waste Repository (Interim Report)” (2020), which describes in details the problems found in member countries’ plans to build low-level radioactive waste disposal repositories and each country’s situation and challenges for the implementation of the plan. During the current phase (FY2021-2023), the member countries have collected information on Naturally Occurring Radioactive Materials (NORM) and Technologically Enhanced Naturally Occurring Radioactive Materials (TENORM), and shared and exchanged country-level information through workshops. The results of activities were compiled into the “FNCA Consolidated Report on NORM and TENORM” and issued in March 2024.

This fiscal year’s workshop was held in Malaysian Nuclear Agency in Malaysia, from November 7 to 9, 2023, and was attended by 9 FNCA member countries. Workshop participants presented the current situation in their countries with respect to NORM and TENORM, and held discussions needed to prepare a consolidated report on NORM and TENORM. They also



Group discussion

discussed outcome of the activities of the current phase and plans for future activities. It was proposed that the main theme in and after FY2024 should be environmental radiation and radioactivity around radioactive waste facilities.

During the poster session, Thailand, the Philippines, and Malaysia made presentations on their current topics. In a forum held at the Malaysian Nuclear Agency, Japan, Thailand, and Malaysia delivered lectures. On the last day, the participants made a technical visit to the Malaysian Nuclear Agency’s radioactive waste facilities, where they toured facilities for borehole disposal, storage, etc.

Visit to radioactive waste facilities in Malaysian Nuclear Agency at the Workshop



Low Level Effluent Treatment Plant



Borehole disposal Facility



Mobile Tools Kit Facility

Contributing to Capacity Building for Nuclear Security and Safeguards in the Asian Region

The Nuclear Security and Safeguards Project was launched in FY2011. Together with nuclear safety, “nuclear security” for protecting nuclear and radiological materials from malicious acts (e.g., theft or unauthorized access) and “safeguards” for protecting nuclear materials from being diverted to the production of nuclear weapons are essential to promoting the peaceful use of nuclear energy. The Nuclear Security and Safeguards Project is strengthening nuclear security and safeguards in the Asian region through measures such as the sharing of relevant experiences, knowledge, and information and the promotion of human resource development in those countries.

One of the key challenges in the field of nuclear security is nuclear forensics, which analyzes the origin and transportation routes of nuclear materials seized and collected by investigative authorities. Development of a nuclear forensics capability will also assist the investigative activities of law enforcement agencies and will have the effect of deterring nuclear terrorism. During the current phase, table-top exercises (TTX) on nuclear forensics were conducted in the workshops held in FY2022 (in Thailand) and in FY2023 (in Indonesia). Not only workshop participants but also personnel from the host country’s police, military, customs, research institutes, etc., joined the TTX to

share ideas on the national systems needed to build nuclear forensics capabilities and how the responsible organizations should work together. In addition, each member country has developed a stakeholder matrix to get an overall picture of the national nuclear security posture and to identify the human resources needed to strengthen nuclear security, with the aim of promoting human resource development related to nuclear security. As part of this initiative, FNCA, the Integrated Support Center for Nuclear Non-Proliferation and Nuclear Security of the Japan Atomic Energy Agency (ISCN/JAEA), and the Indonesia National Research and Innovation Agency (BRIN) jointly organized an open seminar on the nuclear security stakeholder matrix in Indonesia in FY2023 to promote collaboration and cooperation among relevant organizations in the country.

In the area of safeguards, the project has been addressing the IAEA’s Additional Protocol (AP) for strengthening the safeguards agreements on nuclear nonproliferation that each member country has concluded with the IAEA. Online exercises were conducted on complementary access (CA) in FY2020 and on export control in the AP in FY2021. The member countries also shared information on good export control practices in implementing the AP and deepened discussions on future cooperative activities among them.



Workshop in Indonesia



Table-top exercise on nuclear forensics in Indonesia



Open seminar on the nuclear security stakeholder matrix in Indonesia



Visit to emergency operation center in Indonesia

Extensive Use of Radiation Processing Aiming to Develop New Agricultural, Medical, and Environmental Products

The Radiation Processing and Polymer Modification Project pursues activities aimed at promoting the development and practical use of new agricultural, environmental, and medical products, through the wide utilization of radiation processing with electron beams and gamma rays.

Member countries have advanced the practical use of various products that meet their own needs. In the field of agriculture, plant growth promoters, super water absorbents, and biofertilizers based on naturally derived materials have been developed and put to practical use. It is expected that these achievements will contribute to the promotion of sustainable agriculture, and help respond to climate change.

Applying the results obtained in the research and development of plant growth promoters, studies are also being conducted on fish farming and poultry growth promotion.

In the medical field, wound dressings, three-dimensional cell culture substrates, and hemostatic materials have been developed. In the environmental field, the products developed are widely used in people's daily lives for metal adsorption, toxic metal removal, wastewater treatment, and other applications.

In FY2023, a workshop was held in Manila, the Philippines from January 23 to 26, 2024. The face-to-face workshop was attended by 26 participants from 10 countries. On the first day of the workshop, an open seminar titled "Radiation Processing Technology: Contribution to Wealth Creation and Sustainable Development in Asia" was held at the Philippine Nuclear Research Institute (PNRI), followed by a technical tour of PNRI-



Scene of technical tour

related facilities.

The Radiation Processing and Polymer Modification Project started a new phase (FY2022-2024) of activities in FY2022. In this workshop, presentations from each country and group discussions were held to share and discuss research results related to the eight research themes of the project: (1) Degraded Chitosan for Animal Feed, (2) Hydrogel for Medical Application, (3) Environmental Remediation, (4) Synergistic Effect among Plant Growth Promoters, Super Water Absorbents, and Biofertilizers, (5) Plant Growth Promoters and Super Water Absorbents, inclusive Process Development, (6) Mutation Breeding of Microbe Using Radiation, (7) Sterilization and Sanitization Using Radiation, and (8) Recycled Plastic.



Participants of the workshop

Fingerprinting Analysis for Food Provenance Surveys Finally Started

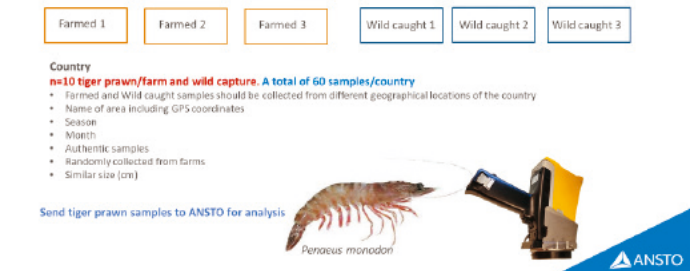
A new FNCA project, Combating Food Fraud using Nuclear Technology (CFF), was launched in 2022 under the leadership of Dr. Debashish MAZUMDER of the Australian Nuclear Science and Technology Organization (ANSTO), with a planned duration of 4 years. This project aims to conduct research to establish a technology platform for identifying food provenance and a database of key food products in order to mitigate food fraud in the supply chain.

In JFY2023, the project's second workshop (training workshop) was held online on Tuesday, December 5, with approximately 40 participants from 9 FNCA member countries. Japan participated in the workshop as an observer. Other than Australia, 7 countries, i.e., Bangladesh, Indonesia, Malaysia, Mongolia, the Philippines, Thailand, and Vietnam, participate in this project. As this was the second year of the project, specific plans for food selection, sample collection, and analysis methods were discussed. The workshop also included a training and knowledge-sharing session to discuss the application of nuclear technology to food fraud mitigation.

In the second session, the participants were provided with a clear picture of the ANSTO technology, which was developed through several years of research in collaboration with Australian universities and industry. This was followed by a detailed explanation from Dr. MAZUMDER on the collection, analysis, and reporting of food samples to be analyzed in 2024. The research process involves collecting samples, analyzing them, creating and testing a database of fingerprints, and solving the issue of tracing provenance based on the data. Then, 7 countries participating in this project presented their current status and the foods to be analyzed.

Dr. MAZUMDER further presented 2 options for sample

Research design and sampling strategy for seafood, tiger prawn (*Penaeus monodon*)



collection. Option 1 involves collecting samples of marine products and foods to be studied from 6 sites (3 for wild and 3 for cultured samples), collecting 10 samples per site, resulting in a total of 60 samples. Option 2 involves collecting 10 samples from each of 6 different sites, whether wild or cultured, for a total of 60 samples.

8 countries participating in this project presented foods they wished to have analyzed. Of the 8 countries, 7 (Australia, Bangladesh, Indonesia, Malaysia, the Philippines, Thailand, and Vietnam) selected tiger prawn as a target product. The other products selected include honey (Mongolia and the Philippines), mango (Malaysia, the Philippines, and Thailand), and rice (Vietnam and Indonesia). Subsequently, all countries selected option 1 presented by Dr. MAZUMDER as the sampling method. Dr. SUZUKI Yaeko, who participated as an observer from Japan's National Agriculture and Food Research Organization (NARO) declared that she could provide information on rice and honey since a database was already available from previous studies.



Scene of workshop



Online participants



Group photo of participants



Adoption of New Climate Change Project Aiming to Establish a Database in Collaboration with Member Countries

The Cabinet Office of Japan and the Japan Atomic Energy Commission (JAEC), in cooperation with the Ministry of Education, Culture, Sports, Science and Technology (MEXT), held the 23rd FNCA Coordinators Meeting in Tokyo in a hybrid format on June 21, 2023. The meeting was attended by representatives from 12 FNCA member countries (i.e., Australia, Bangladesh, China, Indonesia, Japan, Kazakhstan, the Republic of Korea, Malaysia, Mongolia, the Philippines, Thailand, and Vietnam) as well as from the IAEA/RCA Regional Office.

■ Summary of Results of the Meeting

The results of the meeting are summarized as follows.

- Based on the Joint Communique of the 23rd FNCA Ministerial Meeting, the participants agreed to further accelerate FNCA activities related to agricultural development, food safety, environmental protection, health application, nuclear security, and human resource development. The participants also agreed to make utmost efforts to quickly normalize FNCA project activities and regular meetings under the current situation of coronavirus infections.
- The results of 7 ongoing projects were reported: i.e., Mutation Breeding, Radiation Processing and Polymer Modification, Combating Food Fraud, Radiation Oncology, Research Reactor Utilization, Radiation Safety and Radioactive Waste Management, and Nuclear Security and Safeguards. The progress of the projects was discussed and it was confirmed that the projects have been successfully implemented with the cooperation of the

member countries.

- The project proposed by Japan, "Radiocarbon-based approach to evaluating the CO₂ emission from forest soils in Asia," was adopted without any objections in the final evaluation of newly proposed projects. The project is currently named "Climate Change (Evaluating the Carbon Emission from Forest Soils)". The meeting agreed to launch this project in FY2023. Meanwhile, it was recommended that the project "Performance and Lifetime Management Program (PMP) of Research Reactors for Continued Operation" proposed by the Republic of Korea should be continuously discussed at the next Research Reactor Utilization workshop.
- The meeting agreed that FNCA should promote cooperation with the IAEA/RCA in the hope that synergies and broader experience be shared between FNCA and RCA.
- At the meeting, it was agreed that the FY2023 project workshops would be organized by the government of each applicable member country, based on the draft plan for the workshops.
- The next meeting will return to the pre-pandemic schedule and is scheduled to take place in February or March 2024. It will include a final evaluation of 5 projects: Mutation Breeding, Radiation Oncology, Research Reactor Utilization, Radiation Safety and Radioactive Waste Management, and Nuclear Security and Safeguards.

Discussion on the Prospects for Next Generation Reactors Including SMRs

The Cabinet Office of Japan and the JAEC hosted the 2023 Study Panel in a hybrid format in Tokyo on June 20, 2023. The meeting was attended by representatives from 12 FNCA member countries (i.e., Australia, Bangladesh, China, Indonesia, Japan, Kazakhstan, the Republic of Korea, Malaysia, Mongolia, the Philippines, Thailand, and Vietnam), as well as experts from the Japan Atomic Energy Agency (JAEA) and the International Atomic Energy Agency (IAEA). In welcoming remarks at the beginning of the meeting, Dr. UESAKA Mitsuru, JAEC Chairperson, stated that Japan's nuclear energy policy has recently been reviewed and that the development of next-generation innovative reactors will be promoted.

Under the theme of the meeting "Outlook on Next-Generation Reactors Including SMRs", there were keynote speeches by the professionals, and presentations from some of the member countries. In the keynote speeches, Dr. KAMIDE Hideki of the JAEA introduced the Generation IV International Forum (GIF), which is conducting research on next-generation reactors through international cooperation, and Dr. Dohee HAHN of the IAEA presented the global status of SMR technology development and commercialization, as well as the activities supported by the IAEA.

In the case study session, 6 countries (i.e., Malaysia, Australia, Thailand, Vietnam, Indonesia, and the Republic of Korea) reported on social challenges, expectations, and technical requirements for next-generation reactors based on their own experiences. After the presentations, a lively discussion relating to the entire session was held, which included the expectations and areas of emphasis for each country. The discussion revealed that all member countries recognize the usefulness of nuclear power generation and have particularly high expectations for next-generation reactors, including SMRs. Also



Online participants

highlighted were the wide differences in priorities among countries, depending on their geographical (land area, population, whether they are island or landlocked nations), political (nuclear energy policy, public acceptance, etc.), and economic (economic size, economic growth rate, etc.) circumstances, and the necessity to make considerations in accordance with such situations. On the other hand, some common challenges have been identified, such as public acceptance and stakeholder engagement.

■ Summary of the Meeting

The chairperson of the meeting, Mr. SANO Toshio, Commissioner of JAEC, made the following remarks.

- Next-generation innovative reactors, including SMRs, have many advantages. At the same time, there are challenges. Innovative reactors, including SMRs, can be game changers in the history of nuclear technology. The window of opportunity in this area is now wide open. But that window may not stay open for long. Now is the time to do everything we can to innovate.



Scene of the meeting

TAMADA Masao, FNCA Coordinator of Japan



“My Expectations for the FNCA Projects”

I assumed the position of FNCA Coordinator of Japan following the designation at the 12th meeting of the Atomic Energy Commission of Japan on April 4, 2023. I have been involved in international cooperation relating to radiation processing of polymers through the IAEA/RCA and FNCA for more than a decade. This experience made me strongly aware of the importance of partnerships among the member countries and

the high potential of radiation utilization. FNCA is a framework for international cooperation through which the 12 member countries aim to make socioeconomic contributions by leveraging the superiority in nuclear technology and radiation utilization in various application fields such as agriculture, environment, healthcare, analysis, and human resource development. At present FNCA carries out 8 projects international workshops of which are held annually by bringing together the experts involved. There, the experts share achievements and exchange opinions and the projects aim to accomplish the goals set respectively. In FNCA's activities, we should continue to focus on accurately understanding the underlying needs of member countries and maintain commitment to promoting R&D and human resource development in a way that utilize the characteristics in nuclear technology and radiation utilization. In such a situation, I am determined to strive to ensure that we can disseminate outcomes in a way that reflects the uniqueness of each project and that we can further develop diversified fields of applications.

WADA Tomoaki, FNCA Advisor of Japan

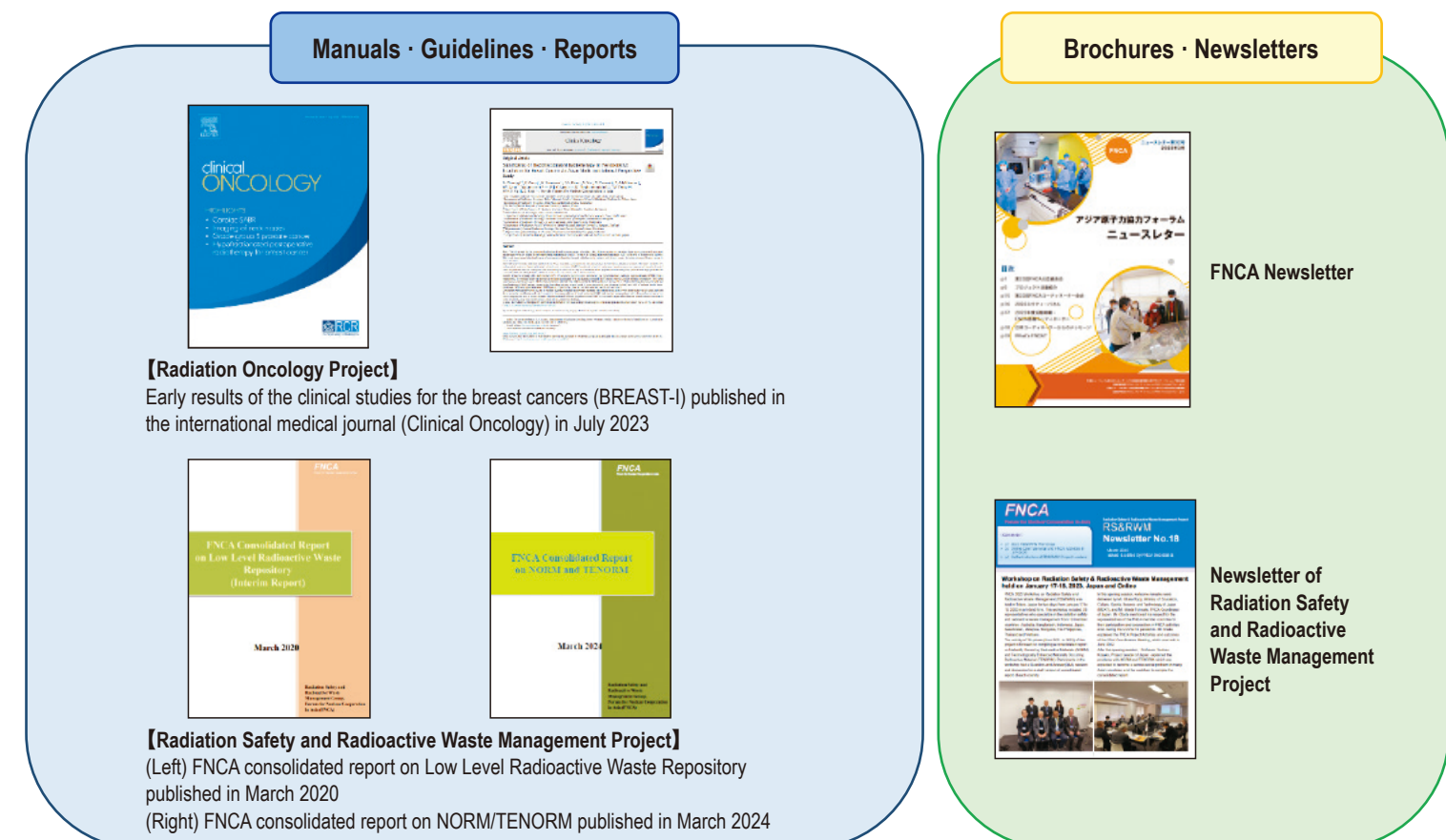
In 2015, the United Nations (UN) established 17 goals with 169 targets to be achieved by 2030, which are known as the Sustainable Development Goals (SDGs). The UN conducted an interim assessment of the progress in 2023, at the midpoint of the period. The assessment has found that only 12% of the 169 targets are on track for achievement by 2030, while about 30% have experienced little progress or, even worse, regression. The situation is very pessimistic particularly in the areas of zero hunger, transition to renewable energy, and access to education. The IEA reports that energy-related CO₂ emissions reached a record high of 3.7 billion tons in 2022, and the latest prediction by the UN shows that CO₂ emissions in 2030 will be only 0.3% below the 2019 level. According to a consortium of researchers, the world is now on track for a 2.7°C temperature rise, as opposed to the 1.5°C target in the Paris Agreement. The situation has been worsening particularly since Russia's invasion of Ukraine, with the G20 countries having more than doubled financial support for fossil fuels between 2019 and 2022 and increasing investments in new fossil fuel development.



Unlike FNCA, which is pursuing R&D in energy, agriculture, CO₂ cycles, and other fields to apply advanced nuclear technologies to curve global warming, many others in the world seem to be moving backwards. Nevertheless, in such a challenging time, it is certainly more important than ever that we, as members of the nuclear community, work together to achieve the SDGs and Paris Agreement targets.

Activities		Date	Venue
The 24 th FNCA Ministerial Level Meeting		November 28, 2023	Thailand (hybrid)
2023 FNCA Senior Officials Meeting		July 19, 2023	Online
The 23 rd FNCA Coordinators Meeting		June 21, 2023	Japan (hybrid)
The 24 th FNCA Coordinators Meeting		March 12 - 13, 2024	Japan (hybrid)
2023 Study Panel		June 20, 2023	Japan (hybrid)
2024 Study Panel		March 11, 2024	Japan (hybrid)
Radiation Utilization Development	Mutation Breeding WS	September 26 - 28, 2023	Japan (hybrid)
	Radiation Processing and Polymer Modification WS	January 23 - 26, 2024	the Philippines
	Combating Food Fraud WS	December 5, 2023	Online
	Climate Change (Evaluating the Carbon Emission from Forest Soils) WS	December 12, 2023	Online
	Radiation Oncology WS	October 25 - 28, 2023	Japan (hybrid)
Research Reactor Utilization Development	Research Reactor Utilization WS	October 17 - 19, 2023	Thailand (hybrid)
Nuclear Safety Strengthening	Radiation Safety and Radioactive Waste Management WS	November 7 - 9, 2023	Malaysia
Nuclear Infrastructure Strengthening	Nuclear Security and Safeguards WS	August 1 - 3, 2023	Indonesia (hybrid)

Outcomes of FNCA Activities



What's FNCA?

What is FNCA (Forum for Nuclear Cooperation in Asia)?

FNCA is a framework for international cooperation for the peaceful use of atomic energy, led by the Cabinet Office and Ministry of Education, Culture, Sports, Science and Technology of Japan. Twelve countries, i.e. Australia, Bangladesh, China, Indonesia, Japan, Kazakhstan, Korea, Malaysia, Mongolia, the Philippines, Thailand, and Vietnam, are conducting collaborative activities under equal partnership for joint research on nuclear science and technology, information exchange, and support for nuclear power infrastructure development.

The FNCA Framework



FNCA Ministerial Level Meeting

A meeting of ministerial level representatives who are in charge of science and technology policy and supervising nuclear energy and radiation uses. FNCA's cooperation policies and nuclear energy policies of the member countries are discussed in this meeting.

FNCA Senior Officials Meeting

Senior officials from member countries have preliminary discussion on the agenda for the Ministerial Level Meeting.

FNCA Coordinators Meeting

A coordinator is appointed for each member country to oversee FNCA project activities in various nuclear fields. Coordinators gather to assess the progress of individual projects and discuss their results, evaluations, future policies and discuss their results, evaluations, future policies and general management of FNCA.

Study Panel

In the Study Panel, senior officials and experts from the FNCA member countries discuss on nuclear policy/technical matters of both power and non-power areas of nuclear energy with a view to applying such knowledge to domestic and international activities.

Projects

For eight projects in four areas associated with radiation utilization and nuclear power infrastructure, the FNCA member countries take turns holding a workshop or an open seminar to discuss achievements and the plans of activities.

FNCA
Forum for Nuclear Cooperation in Asia



**International Affairs & Research Dep.,
Nuclear Safety Research Association (NSRA)**

5-18-7, Shimbashi, Minato-ku, Tokyo, 105-0004 JAPAN
TEL: +81-3-5470-1983 / FAX: +81-3-5470-1991

FNCA Search
<https://www.fnca.mext.go.jp/english/index.html>



This newsletter is issued by Nuclear Safety Research Association (NSRA) under the contract with the Ministry of Education, Culture, Sports, Science and Technology (MEXT) of Japan.