Public Version

REGIONAL COOPERATIVE AGREEMENT

ANNUAL REPORT 2022

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List of Acronym

ANSTO	Australian Nuclear Science and Technology Organization
APCNDT	Asia Pacific Conference for Non-Destructive Testing
ASEAN	Association of Southeast Asian Nations
ASEANTOM	ASEAN Network of Regulatory Bodies on Atomic Energy
ASPAMARD	Asia-Pacific Marine Radioactivity Database
BMS	Breeding Management System
COVID-19	Coronavirus Disease 2019
CSI	Chief Scientific Investigator
CT	Computed Tomography
DIR RCARO	Director of the RCA Regional Office
EB	Electron Beam
EPR	Electronic Patient Record
FP	Focal Person
GCM	General Conference Meeting
GP	Government Party
IAEA	International Atomic Energy Agency
IRMS	Isotope Ratio Mass Spectrometers
IRPA	International Radiation Protection Association
KAERI	Korea Atomic Energy Research Institute
KIRAMS	Korea Institute of Radiological & Medical Sciences
LCC	Lead Country Coordinator
MARIS	Marine Radioactivity Information System
MTS	Medium Term Strategy
MTSC	Medium-Term Strategy Coordination
NDT	Non-Destructive Testing
NPC	National Project Coordinator
NR	National RCA Representative
NRM	Regional Meeting of the National RCA Representatives
PCMF	Programme Cycle Management Framework
PPAR	Project Progress Assessment Report
RCA	Regional Cooperative Agreement
RCA PAC	RCA programme Advisory Committee
RCARO	RCA Regional Office
RPF	Regional Program Framework
SAC	Standing Advisory Committee
SDGs	Sustainable Development Goals
STF	Special Task Force
TC	Technical Cooperation
TCDC	Technical Cooperation among Developing Countries
TO	Technical Officer
UNOSSC	United Nations Office for South-South Cooperation
WG	Working Group

SECTION 1 - OVERVIEW OF THE RCA PROGRAMME IN 2022

1. Summary of the RCA programme in 2022

There were eighteen (18) active projects in 2022; six (6) projects in the field of human health, three (3) projects in food and agriculture, four (4) projects in the field of environment, one (1) project on wetland management, two (2) projects in the industrial applications, one (1) project on radiation protection, and one (1) project in support of the RCA management. The highlights of all active projects are given in Section 2. Detailed information on them is available on the IAEA web-based platform Programme Cycle Management Framework (PCMF).

List of RCA projects in 2022 is shown in Annex 1.

The RCA celebrated its 50th Anniversary in 2022. Since its establishment in 1972 as the first regional agreement under the auspices of the IAEA, the RCA has served to promote regional cooperation and disseminate the peaceful use of the nuclear science and technology, contributing to socio-economic wellbeing of the Asia-Pacific region. RCA has implemented a total of 173 projects and trained over 10,000 professionals through more than 650 training courses with a total budget of USD 90 Million invested during the last five decades. The achievements were only possible through strong support and commitment of the RCA Government Parties (GPs) and the IAEA.

In celebration of the anniversary, the first ever RCA Ministerial Level Meeting was held during the 66th IAEA General Conference in September 2022. With participation of over 100 high level officials, the Ministerial Joint Declaration was unanimously adopted, highlighting the RCA's endeavour throughout the five decades and reassuring ownership and commitment of the RCA GPs for the future. RCA Awards have also been given to 28 experts/institutes for their contributions to the RCA Programme. A special exhibition was also held successfully to promote the achievement of the RCA and its impact in the region.

In 2022, about 43 RCA activities including meetings/workshops and regional training courses were initially planned but it was found that more than 50 regional activities were implemented in the year with expanded homebased assignments due to travel limitations. This shows that the RCA was responsive to the outbreak of the COVID-19 pandemic and continue being active to promote the peaceful uses of the nuclear science and technology and enhance socio-economic impacts of the RCA in the region.

As the travel restrictions have been lifted due to the COVID-19, project activities were implemented both physically and virtually. In detail, fifteen (15) regional meetings, consisting of project kick-off and progress review meetings, final review meetings and workshops, were held and a total of four-hundred-ninety-five (495) participants, including thirty (30) experts, participated in these events. In addition to the project-related and expert meetings, three (3) policy level meetings of the National RCA Representatives and high level officials, namely the RCA Ministerial Level Meeting, the 44th Meeting of National RCA Representatives and the 51st RCA General Conference Meeting, as well as four (4) preparatory meetings were held involving three-hundred-fifty-five (355) participants and sixty-nine (69) experts. As for regional training courses, twelve (12) regional training courses were held engaging a total of three-hundred-forty-six (346) participants, including twenty-three (23) lecturers and experts attended the training courses.

Participation by GPs in RCA events in 2022 is presented in Annexes 2a-b.

Experts were also engaged in the RCA projects. A total of two (2) expert missions and fourteen (14) home-based assignments were implemented mostly in support of the virtual meetings and workshops. The total duration was one-hundred and forty-nine (149) days and seven (7) RCA GPs were involved in these assignments.

RCA home-based assignments in 2022 are listed in Annexes 2d.

2. Management and Implementation of the RCA programme in 2022

2.1 Summary of Financial and In-Kind Contributions

The budget allotment from the TC Fund for 2022 was €2,273,489. The encumbrances and actuals in 2022 were €2,122,991 at an Implementation Rate of about 93.5%.

GPs continued supporting the RCA programme through extrabudgetary contributions and in-kind contributions. In 2022, a total of €544,822 in extrabudgetary contributions were received from Australia, Malaysia and Philippines.

Allocations of extrabudgetary contributions to RCA projects 2015-2022 are shown in Annex 3.

In-kind contributions have been recognised since the RCA Agreement commenced in 1972. In line with TC practice, In-kind contributions are understood as cost-free goods and/or services provided by a Party (Donor) for the benefit of one or other Parties (Recipients) in the implementation of a specific project. The RCA GPs have agreed that for reporting purposes, the financial contribution of each RCA GP to the RCA programme be calculated based on an adopted and non-discriminatory measure of the In-kind contribution and presented in the RCA Annual Reports. The total amount of In-kind contributions made by the RCA GPs was calculated as €425,730 in 2022.

Detailed account of In-kind contributions per RCA GP is shown in Annex 4.

2.2 Planned Regional Events in 2023

In 2023, a total of eighteen (18) RCA projects are being implemented, including 1 project that initiates in the same year. As the travel restriction has been lifted, all events of the project activities, including project coordination and review meetings, workshops, and training courses, will be carried out physically as it was before the COVID19, with the aim to achieve the set objectives and complete according to the project timelines.

Indicative plan for RCA regional events in 2023 is given in Annex 5.

2.3 Progress Monitoring and Reporting

Progress monitoring and reporting of the projects was undertaken through the annual progress reports by National Project Coordinators (NPCs) and the consolidated Project Progress Assessment Reports (PPARs) were timely submitted by LCCs via the IAEA platform https://tcreports.iaea.org. To continue this good practice, NRs are requested to ensure that NPCs submit national reports to LCCs in time so that LCCs have sufficient inputs and time to consolidate and submit PPARs to the IAEA. NPCs are requested to submit annual project progress reports to LCCs in a full and timely manner, preferably by 10 January every year, so that LCCs have enough time for review and preparation for Project Progress Achievement Reports (PPARs) to be submitted on the TC Report platform (https://tcreports.iaea.org/) by 31 January every year.

The progress of the projects was reviewed at the 44th Meeting of the National RCA Representatives and the 51st RCA General Conference Meeting.

2.4 Challenges in Implementation

Since the outbreak of the COVID-19 pandemic, the implementation modalities for the RCA programme have been adapted to online platforms by mainly using IT tools. Most of the regional events were well carried out as planned and in line with the objective of the projects in 2022. This could be attributed to the pre-emptive work done by the project stakeholders to adjust the work plan of each project to the unprecedented circumstances and to the efforts of the GPs to adopt the new modalities in implementation of the Programme. As most of the project activities were

planned to be held virtually, RCA GPs are encouraged to volunteer to host regional events. The TC funds for the RCA programme saved from conduct of virtual activities in place of physical events were used in an appropriate way with the TC guidance for procurement of equipment and development of relevant training materials to support effective achievements of the project objectives. LCCs were requested to report on the utilization of equipment in the project progress reports.

However, some issues were raised while conducting activities through online tools, especially in regard to collecting digitized documents and online training materials. With a view to archiving the project outputs and strengthening information sharing, the GPs recognised the necessity to organize a common platform to store the RCA online resources and agreed to utilize the RCA website (www.rcaro.org) as the repository. Moreover, it was recommended to fully review issues of the intellectual property rights when developing online materials to avoid any potential copyright issues.

3. Policy Meetings in 2022

Three RCA Policy Level Meetings were held in 2022.

The list of National RCA Representatives in 2022 is shown in Annex 6.

The 44th Meeting of the National RCA Representatives (NRM), 19-21 April 2022, Virtual

The 44th NRM was held online on 19-21 April via video conferencing. The NRs endorsed the transfer of RCA Chair to Mr Tran Chi Thanh, the NR of Viet Nam and President of Vietnam Atomic Energy Institute (VINATOM).

At the start, the Meeting reported on the highlights of the results of the socio-economic impact assessment of the RCA programme on three (3) representative technologies, mutation breeding, non-destructive testing and radiotherapy, conducted in commemoration of the Anniversary.

The Meeting reviewed the report by the Committee of RCA Scholarship Programme on the benefits that the Scholarship Programme could bring in strengthening the human resources and achieving sustainable development. The Meeting agreed on the need to take an in-depth study of the programme before the programme is launched. The Meeting also agreed that based on the results of the feasibility study, an HRD project be developed in accordance with the RCA procedures stipulated in the RCA GOR.

For preparation of the 50th Anniversary of the RCA in 2022, the Meeting took note of the report by the Special Task Force on the progress of the preparation and agreed to the guidelines for selecting the RCA Awardees. The Meeting also requested the GPs to make necessary arrangements for the participation of Ministerial level officials to the Ministerial Conference.

The Meeting took note of the report by the RCA programme Advisory Committee (PAC) on the preparation of the RCA programme for 2024-2025 and welcomed AUL's extra-budgetary fund for a project on radiation oncology.

The Meeting took note of the report by the Working Group (WG) on RCA Medium Term Strategy (MTS) 2018-2023 Coordination and endorsed the recommendations made by the WG which include: developing options for future MTSs and Regional Programme Frameworks (RPFs) for better alignment with each other; new concept of RRUs; creation of a WG in 2024 for conducting a strategic review of the GOR; and others.

RCA Ministerial Level Meeting in Celebration of the 50th Anniversary of the RCA, 26 September, 2022, IAEA Headquarters

Looking back at the last fifty years and looking ahead to the next fifty years and beyond, the RCA GPs adopted by acclamation the RCA Ministerial Joint Declaration that recognizes the significant role of the RCA in achieving socio-economic development of the region and provides a roadmap to the successful future of the RCA. The declaration can be found the RCA website (https://www.rcaro.org/documents/view/id/22992#u). The RCA Awards ceremony was also held to award 28 individuals and institutes for their valuable contributions to the development of the RCA.

The 51st RCA General Conference Meeting (GCM), 23 September 2022, IAEA Headquarters

The 51st GCM was held physically for the first time in three years on 23 September 2022 at the IAEA Headquarters in Vienna.

Held in the previous week for the ceremonial events for the 50th Anniversary of the RCA, the Meeting took final note of the preparations for the events including the Ministerial Level Meeting and the RCA Exhibition. The Meeting expressed a deep appreciation to the STF for its hard work.

The Meeting took note of the report by the RCA-FP on the use of the unspent TC funds for procurement of equipment and tools and agreed that there should be an assessment of its impact. The Meeting also took note of the progress of conducting social and economic impact assessment of the projects in support of the 50th Anniversary of the RCA.

The Meeting took note of the report on the preparation of the RCA Scholarship Programme and agreed in principle the establishment of the Programme. However, as some queries on the feasibility and sustainability of the Programme, such as the funding and legitimization of the Programme under the operative rules of the RCA, remained unsolved, it was requested that the Committee should continue detailed discussions to address the GPs' concerns.

The Meeting took note of the report of the RCA PAC on the progress of preparation for the RCA programme for 2024-2025. In addition, the Meeting approved recommendation made by the WG on the RCA MTS 2018-2023 Coordination, particularly conducting the final review of the current MTS in early 2026 of which the result should be reported to the GCM in the same year, as well as the work plan for preparation of the next MTS proposed by the WG on Drafting RCA MTS 2024-2029.

The main decisions and outcomes of the policy level meetings are given in Annex 7.

4. Summary of the RCA Regional Office (RCARO) Activities Related to Promotional and other non-technical Activities in 2022

The year 2022 was a year for RCARO to fully demonstrate its capabilities and set up as an effective coordinator of cooperation both within and outside the RCA.

First, RCARO was engaged in a wide range of aspects of the preparation for the 50th Anniversary of the RCA as a member of the Special Task Force and successfully organized a special exhibition for the 50th Anniversary of the RCA with generous financial contribution by the Government of Republic of Korea. The special exhibition was held during the 66th IAEA General Conference in September 2022 and ceremonial activities were particularly effective in highlighting the achievement of the RCA over the half century. RCARO was also awarded a Special Award for its dedicated contribution to the development and expansion of the RCA.

The year 2022 was also the 20th Anniversary of the establishment of RCARO. In commemoration of the Anniversary, RCARO held an International Symposium in December in Daejeon, Korea, the city where the RCARO was hosted. It was attended by more than 250 delegates, including Mr Rafael Mariano Grossi, Director General of the IAEA, Mr Oh Tae-seok, 1st Vice Minister of

Science and ICT, Republic of Korea, Mr Tran Chi Thanh, the RCA Chair, and other renowned experts as speakers.

RCARO launched the RCA Integrated Information System, comprising of the RCA website, RCA E-CAMPUS, RCARO E-Management (ROEM) and DATA-HUB, in July to provide integrated information of the RCA and nuclear science and technology status of the GPs.

Initiated in April, RCARO published three issues of the RCA Newsletters. These publications have been successful in publicising RCA activities and showcasing their socio-economic impact in the region.

RCARO launched the second phase of the RCARO/ASEANTOM project, to be implemented for three years from this year, with the aim to scale up the EPR capabilities of RCA/ASEAN countries through building technical capacity in radiation monitoring and dose assessment and thus to ensure the radiation safety of the environment, the workers and the public during nuclear or radiological emergencies.

RCARO was successful in finding the new partner, Office of Radiological Security of the US Department of Energy/National Nuclear Security Administration, to co-host a workshop on e-beam/X-ray technologies. The Workshop was held in November for one week and provided actionable information in adopting machine-based technologies to 130 participants from 22 countries.

The RCARO activities related to promotional and other non-technical activities in 2022 are given in Annex 8.

SECTION 2 - DETAILS OF THE TECHNICAL PROGRAMME IN 2022

RAS0086	Enhancing the Management and Implementation of Activities under the Framework
Objective	To enhance the overall continuing development, improvement and sustainability of the RCA and its programme to support the RCA MTS 2018-2023 and the related UN Sustainable Development Goals (SDGs)

Project Activities in 2022

Event	Title	Summary of Purpose	Dates /Duration	Host Country
Meeting	44th NRM and its Preparatory Meetings	To discuss policy and management issues related to the RCA, as well as the operational matters on RCA programme planning and implementation.	18-21 Apr.	Virtual
Meeting	Regional Orientation Workshop on Capacity Building for Sustainable Energy Planning	To present the IAEA's technical cooperation and capacity building programmes on sustainable energy planning and introduce the IAEA's supply/demand energy modelling and integrated energy system planning tools.	19-21 Jun.	Virtual
Meeting	51st GCM and its Preparatory Meetings	To review and decide on the RCA programme as well as other RCA-related issues	22-23 Sep.	IAEA
Meeting	RCA Ministerial Level Meeting	To review the RCA's activities and strategicachievements in the last 50 years (1972-2022), and decide the way ahead	26 Sep.	IAEA
Expert	Home-Based Assignment	To conduct feasibility study of the RCA Scholarship Programme on nuclear science and technology and nuclear-related application	30 Days	Viet Nam

Project highlights for 2022

Throughout the year, the project supported activities of the National RCA Representatives, Working Groups and the Programme Advisory Committee to facilitate the RCA and its Programme. The 44th Meeting of the National RCA Representatives (NRM) was held in April via video conferencing, and the 51st RCA General Conference Meeting (GCM) was held in September at the IAEA Headquarters in Vienna in conjunction with the ceremonial events for the 50th Anniversary of the RCA including the first ever RCA Ministerial Conference and the RCA Exhibition. This project also supported the socio-economic impact assessment of the RCA programme conducted in commemoration of the RCA's Anniversary, which was acknowledged as a meaningful approach and great success of the RCA. In addition, an expert mission was carried out under this project for conduct of a feasibility study on the RCA Scholarship Programme on behalf of the RCA Scholarship Committee.

	
44th Meeting of National RCA Representatives, Apr., Virtual	RCA Ministerial Level Meeting, Sep. IAEA

RAS1022	**Strengthening Regional Capacity in NDT and Examination Using Nuclear and Related Techniques for Safer, Reliable, More Efficient and Sustainable Industries Including Civil Engineering**
Objective	**To improve regional in the application of NDT/E to support the requirements of industries, including civil engineering for sustainable industrial development**

Project Activities in 2022

Event	Title	Summary of Purpose	Dates /Duration	Host Country
Expert	Sponsored Participation	To participate on consultancy meeting on NDT applications in civil engineering	16-20 May.	Austria
Training Course	RTC on Radiographic Testing-Digital (RT-D) Level 3 for Certification	To train and qualify participants in RT-D Level 3	25-29 Jun.	Thailand
Meeting	Regional Workshop on Advances in Industrial Digital Radiography (DR) and Computed Tomography	To provide the participants with wide ranging technical deliberations on recent advances in industrial DR and CT technologies, practices, Guidelines and Standards as applicable to real-life complex and intricate NDT problems.	26-30 Sep.	Indonesia
Meeting	Final Project Review Meeting	To review the implementation of the project RAS1022, assess achieved results, discuss and agree on follow-on cooperative activities to ensure the sustainability of the achieved results of the project.	17-21 Oct.	Philippines

Project highlights for 2022

A regional training course was held in July physically in Thailand, involving twenty-eighty (28) participants from twelve (12) GPs. It successfully delivered DIR Level 3 training for certification which provided comprehensive information on the topics to be covered in RT-D Level 3 training as well as training for the examination.

A regional workshop on advances in DR and CT for NDT&E was held in September in Indonesia, which was attended by nineteen (19) participants form eleven (11) GPs. The workshop served as a platform to discuss and share experiences on recent advances in RT-D and CT technologies, practices, guidelines and standards. It is regarded to have paved a way for collaboration among the GPs.

As the last activity of the RAS1022, the Final Project Review Meeting was held in October in the Philippines, participated by attendees from seventeen (17) out of a total of twenty-one (21) participating GPs. In addition to assessing the achievements as well as deliverables and finalizing the activities of the project, the discussed the work plan for the follow-up project, RAS1029, to be commenced in 2023.

Despite the challenges and limitations caused by the COVID-19 pandemic, the project succeeded to train personnel exceeding the indicators of the targeted outputs. In result, the project achieved its intended objectives and outcomes based on the assessment result that its activities at the regional, and subsequently, at the national level have provided benefits in the region.

RTC on DIR Level 3 for certification, Jul., Thailand

Final Project Review Meeting, Oct., Philippines

RAS1028	**Improving the Quality Management Practices in Radiation Processing Facilities for Better Performance and Applications**
Objective	**To improve the level of competitiveness and customer satisfaction of radiation processing facilities of the RCA GPs**

Project Activities in 2022

Event	**Title**	**Summary of Purpose**	**Dates /Duration**	**Host Country**
RTC	Regional Training Course on the Guidelines and	To train participants in the application of the guidelines and standards of	28 Nov-02 Dec.	Malaysia

	Standards of Quality Management for Radiation Processing Facilities	quality management for radiation processing facilities		
Meeting	Virtual First Project Coordination Meeting of RAS1028	To review the national capacity and plan of RCA GPs in the application and development of quality management practices in radiation processing facilities, set up the project baseline from which the project success can be measured, discussed and agreed on workplan for 2022-2025.	28-31 March.	Virtual
Expert	Home Based Assignment	To assist in the preparation, organization, implementation and reporting on the first project coordination meeting	10 days	Malaysia

Project highlights for 2022

Initiated in 2022, the project RAS1028 began with the First Coordination Meeting held in March virtually, attended by twenty-five (25) participants including the LCC, NPCs and senior officials from fourteen (14) GPs. The meeting provided the participants with details of the project such as the background, objectives, logical framework matrix and the work plan. It also reviewed the capacity and national plans in the application and development of quality management practices in radiation processing facilities of each country. The participants shared the project's baseline for monitoring and evaluation of the project progress and agreed upon national and regional work plan for the first two years including procurement requirements derived from the COVID-19 pandemic.

The first regional training course was held physically in November in Malaysia, attended by twenty-five (25) participants from thirteen (13) GPs as well as experts from the region and Romania. A total of twelve (12) lectures were successfully delivered encouraging interactive communications of the participants. They were also given an opportunity to visit a number of facilities, including Secondary Standard Dosimetry Laboratory (SSDL), RAYMINTEX, a Gamma irradiation facility for latex vulcanization, MINTEC-Sinagama, another Gamma irradiation facility, and ALURTRON, an e-beam irradiation facility. During the visit, a mock audit exercise was held simultaneously at the three radiation processing facilities, where the participants were divided into groups and acted as auditors. They presented their summary of the mock audit exercise and drew conclusions from the overall activities in the end of the training course.

Project Coordination Meeting, Mar., Virtual

RTC on the Guidelines and Standards of Quality Management for Radiation Processing Facilities,

	Nov.-Dec., Malaysia
RAS5087	**Promoting Food Irradiation by Electron Beam and X-ray technology to Enhance Food Safety, Security and Trade**
Objective	**To enhance food safety and trade in the region through developing and promoting electron beam and X-ray technologies for food irradiation**

Project Activities in 2022

Event	Title	Summary of Purpose	Dates /Duration	Host Country
Meeting	IAEA/RCA Regional Workshop on Food Irradiation Using Electron Beam /X-ray Technology	To exchange knowledge and experiences on application of EB/X-ray for food, share and contribute the achievements from resource countries and partnerships tothe project success.	01-05 Aug.	Australia

Project highlights for 2022

A regional workshop on "Food Irradiation Using Electron Beam/X-ray technology" was held physically on 1-5 August in Cairns, Australia, attended by twenty (20) participants from twelve (12) GPs. The participants discussed the achievements as well as difficulties and challenges in performing national work plans during the COVID-19 pandemic. Thankfully, most of the NPCs tried to follow and complete their national activities and gained notable outputs. For instance, national dosimetry trials were completed in Australia, India, Malaysia, Korea, Thailand and Viet Nam, while the dose inter-comparison are being done in Malaysia, Thailand and Viet Nam. National seminars were also held in some GPs to promote the collaboration of food manufacturers and food irradiation facilities for facilitating the global and regional trade of fresh fruits.

In parallel, two new electron beam/X-ray facilities were installed and operated for multi-purposes including food irradiation in Viet Nam and one facility for food irradiation was installed in Thailand. More facilities are planned to be built in Viet Nam, India, Indonesia, Malaysia and the Philippines.

Regional Workshop on Food Irradiation Using EB/X-ray Technology, Aug., Australia

National Forum on Irradiation Treatment as Quarantine Treatment of Viet Nam Pomelos to USA, Viet Nam

RAS5088	Enhancing Crop Productivity and Quality through Mutation by Speed Breeding
Objective	To improve food security in the Asia Pacific region through faster release of mutant varieties with improved crop productivity and quality

Project Activities in 2022

Event	Title	Summary of Purpose	Dates /Duration	Host Country
RTC	Regional Training Course on Double Haploidy for MbyS toward Crop Improvement	To provide the basic knowledge on double haploidy as a preparatory training for a follow-up intermediate level training	15-16 Mar.	Virtual
RTC	Virtual RTC on Application of Genomics, Genotyping and Marker-Assisted Selection in MbyS	To provide basic and systematic knowledge of bioinformatics and genomics for application of genomics, genotyping and marker assisted selection in MbyS.	10-14 Oct.	Virtual
RTC	Regional Training Course on Application of Double Haploidy for Mutation by Speed Breeding (MbyS), Toward Crop Improvement	To provide knowledge, experience and skills in the application of double haploidy for mutation by speed breeding in crops	5-9 Dec.	Jakarta, Indonesia
Expert	Home Based Assignment	To Recruit Expert Lecturer for Virtual Regional Training Course on Double Haploidy for MbyS toward Crop Improvement	5 days	India

Project highlights for 2022

In 2022, two training courses were held, both focusing on Double Haploidy for Mutation by Speed breeding (MbyS) toward Crop Improvement. Due to the prolonged restrictions imposed by the COVID-19 pandemic, the first RTC was held virtually for two days on 14-15 March. It mostly covered the theoretical aspects through presentations by experts on the basic knowledge, classic cases and frontier progress on double haploidy for MbyS. The latter RTC was held on 5-9 December physically in Malaysia as the epidemic situation improved. It focused on hands-on experiences which enabled the participants to put the previously learned theory into practice.

In addition, the MbyS techniques were utilized in some of the participating GPs. A speed breeding laboratory using LED light combinations was established in Malaysia; necessary data were collected on the effect of LED light photo-period on the growth and reproduction of tomatoes; and researchers were able to get two generations within one year in Mongolia of which the efficiency has been

doubled. Mutants and promising lines in diversity crops with improved traits are in the pipeline of multi-location trials.

RTC on Double Haploidy for MbyS toward Crop Improvement, Mar., Virtual

RAS5091	**Assessing and Mitigating Agro-Contaminants to Improve Water Quality and Soil Productivity in Catchments Using Integrated Isotopic Approaches**
Objective	**To improve agricultural catchment, water, and soil management practices in the Asia–Pacific region by enhancing the capacity of countries to assess and mitigate agricultural contaminants.**

Project Activities in 2022

Event	Title	Summary of Purpose	Dates /Duration	Host Country
Meeting	First project coordination meeting	To review the national capacity and plan of RCA GPs in the application of isotopic techniques to agricultural water and soil management, setup the project baseline from which the project success canbe measured, discuss and agree on workplan for 2022- 2023.	21-24 Mar.	Virtual
RTC	Virtual Regional Training Course on Research Design and Sampling Strategy	To provide training for basic understanding of research project design and use of isotopic and complementary techniques for soil and water research.	3-5 Aug.	Virtual
Expert	Home Based Assignment	To be an expert lecturer and assist in the preparation and implementation of the first RTC of RAS5091	5 days	Australia
Expert	Home Based Assignment	To be an expert lecturer and assist in the preparation and implementation of the first RTC of RAS5091	5 days	China

Expert	Home Based Assignment	To assist in the preparation, organization, implementation and reporting on the first project coordination meeting of RAS5091	10 days	Australia

Project highlights for 2022

The first Coordination Meeting was held from 21-24 March 2022. This first meeting was a success, with many countries coming together to discuss the project and to establish NPTs and workplans. Australia, China and Japan led this meeting, with very good attendance and engagement. The meeting was hosted via videoconferencing and productive discussions were held to review and agree on revisions to the workplan and necessary measures that needed to be taken to ensure the project is implemented in an effective and efficient manner to achieve the project objective. Since then, communication and reporting has been excellent from several countries including Bangladesh, China, Indonesia, Malaysia, Mongolia, Sri Lanka, and Vietnam providing timely reports on their national workplan progress. Several countries have volunteered to host future RTCs and meetings, including Vietnam, India, Japan, and New Zealand.

RTC on Integrated Isotopic Approaches to Monitor Sources of Agro Contaminants in the Environment, originally planned to be hosted as a two-week RTC in China has been delayed until 2023 due to COVID-19 travel restrictions to China. It is now planned for 24-28 July 2023, to be hosted by Vietnam. RTC on advanced data analysis for isotopic approaches to assessment and tracing of agro-contaminants in catchments is planned for 21-25 August 2023, to be hosted by China. A workshop on soil-water management practices to reduce agro-contaminants and improve water quality is planned for 11-15 September 2023, to be hosted by India.

The project has experienced some delays due to COVID-19 travel restrictions. However, if multiple RTCs can be completed in 2023 and NPTs can progress well in future years, then we will be on schedule to achieve the overall outcome by Q4 2025.

RAS6093	**Strengthening Capacity to Manage NCDs Using Imaging Modalities in Radiology and Nuclear Medicine**
Objective	**To enhance the regional capacity diagnosis and treatment of non-communicable diseases (NCDs) in adult and paediatric patients, using various imaging modalities of nuclear medicine and radiology**

Project Activities in 2022

Event	Title	Summary of Purpose	Dates /Duration	Host Country
Meeting	Project Progress Review Meeting	To review project progress, discuss and agree on the workplan for 2022-2023, taking into consideration the Covid-19 situation in the region.	11-13 Apr.	Virtual
RTC	IAEA/RCA Regional Training Course (RTC)on Paediatric Nuclear	To train the participants on clinical nuclear medicine applications including theranostics and their appropriate use in diagnosis, follow-	5-9 Sep.	Japan

	Medicine and Theranostic	up, therapy monitoring and planning in paediatric patients.		
RTC	RTC on pediatrics & neurology on diagnosis& treatment of NCDs for radiologists and nuclear medicine physicians	To provide the participants an overview and various aspects of clinical application in Paediatrics & Neurology on diagnosis & treatment of NCDs	17-21 Oct.	Indonesia
Meeting	Final Project ReviewMeeting	To review the project and provide final and updated information on diagnosis & treatment of NCDs for Radiologists and Nuclear Medicine Physicians	28 Nov.- 02 Dec.	Thailand

Project highlights for 2022

The Project Progress Review Meeting was held for three days in April virtually, attended by twenty-one (21) participants from seventeen (17) GPs. The participating NPCs that the previously planned Regional Training Courses will be re-organized to establish the train-the-trainers capacity for ongoing training needs of the GPs related to managing NCDs imaging modalities in radiology and nuclear medicine, which will be demonstrated through follow-on national training events. Expert Missions were also revised in response to the needs of the GPs.

The Final Project Review Meeting in conjunction with a workshop on e-learning modules was held in a hybrid mode from 28 November to 2 December 2022, hosted by Chulalongkorn University of Thailand. A total of twenty (20) participants from fifteen (15) countries took part in the event. The participating NPCs agreed that the project activities would be jointly reviewed and evaluated for a concise summary of the project outputs and outcomes. As one way, the GPs will describe how their ability to manage NCDs using imaging modalities in radiology and nuclear medicine has improved through the project and to what extent the project has contributed to these developments. The NPCs are also expected to offer their personal assessment of project performance, shortcomings and remaining challenges.

Project Progress Review Meeting, Apr. Virtual

Final Project Review Meeting, Nov. Thailand

RAS6096	**Empowering Regional Collaboration among Radiotherapy Professionals through Online Clinical Networks**
Objective	**To ensure that cancers in RCA low- and middle-income countries (LMICs) are treated in line with internationally accepted standards of care and tailored to the individual patient and to local resources to improve survival and quality of life of cancer patients**

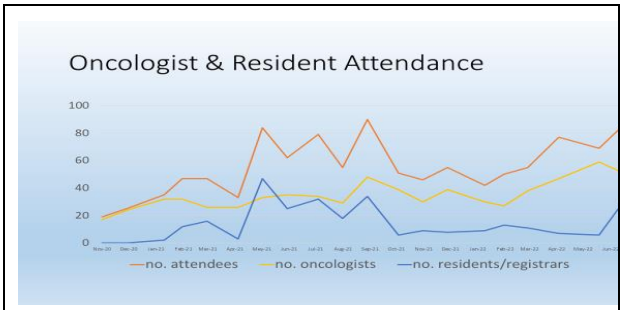
Project Activities in 2022

Event	Title	Summary of Purpose	Dates /Duration	Host Country
Meeting	Project Progress Review Meeting of RAS6096	To review the progress of the project, discussand agree on opportunities to improve Virtual Tumour Boards and educational activities for oncologists, RTTs and physicists, sustainability of activities beyond the endof the project, and a workplan for 2022-2023	14-16 Sept.	Virtual

Project highlights for 2022

This project aims to support the practice of radiation oncologists in the Asia-Pacific region through Virtual Tumour Boards (VTBs). In the third year of the project, regular multidisciplinary virtual educational sessions as well as other sessions targeting specifically at radiation oncology medical physicists and radiation therapists commenced. A license was acquired for the software platform Proknow, which increased the educational value of those sessions by displaying radiation treatment plans and target volumes.

The number of oncologists and cancer centres participating in VTBs continues to increase. To date, all presenting clinicians experienced support in their clinical decision-making and discussion resulted in changes to management in 60% of presented patients. Currently challenges include increasing the numbers of participating countries and trainees. The third Project Coordination Meeting was held in September 2022 virtually where the participants discussed and developed the strategies to address these challenges and ensure that the virtual activities that would follow after the completion of the project at the end of 2023.



umber of oncologists and residents participating in VTBs

RAS6097	**Enhancing Capacity and Capability for the Production of Cyclotron-Based Radiopharmaceuticals**
Objective	**To enhance disease control in the Asia Pacific region through strengthening capacity and capability for qualified cyclotron produced radiopharmaceuticals for imaging and treatment**

Project Activities in 2022

Event	Title	Summary of Purpose	Dates /Duration	Host Country
RTC	IAEA/RCA RTC on Good Manufacturing Practice (GMP) and Radiation Safety Aspects of Radiopharmaceutical Production Using Medical Cyclotron	To provide participants an overview and various aspects of GMP in the production of radiopharmaceuticals (precursors, irradiation, production, QC, QA, batch release, follow up, etc.) as well as radiation safety consideration during all steps in a medical cyclotron project.	16-20 May.	Virtual
Meeting	Virtual Project Progress Review Meeting	To review project progress, discuss and agree on the workplan for 2022-2023, taking into consideration the Covid-19 situation in the region.	5-7 Apr.	Virtual
Expert Mission	Expert Mission	On the production and quality control of 18F- FMISO	10 days	Japan
Expert	Home Based Assignment	To assist in the preparation, organization, implementation and reporting on the Project Progress Review Meeting of RAS6097	6 days	Korea

Project highlights for 2022

The Project Progress Review Meeting was held in April 2022 virtually, attended by twenty-two (22) participants from fifteen (15) RCA GPs and the IAEA. During the meeting, it was agreed that the Regional Training Courses would be re-organized to establish train-the-trainers capacity for the ongoing training needs of the participating GPs related to cyclotron-produced radiopharmaceuticals for medical imaging and treatment for the benefit of the relevant groups, including managers, radiochemists and radiopharmacists. The training courses will be implemented through follow-on national training events. Expert Missions were also revised in response to the needs of the GPs for training on various aspects of the production of new radiopharmaceuticals and establishment of cyclotron facilities.

A Regional Training Course was held in May 2022 virtually, attended by forty-one (41) trainees from fifteen (15) GPs. With the objective to increase the understanding of the participants on the current manufacturing technology know-how and GMP rules catered on radiopharmaceuticals, the training course provided lectures on GMP and radiation safety aspects of radiopharmaceutical production

using medical cyclotron. The training on synthesis technology as well as preclinical and clinical evaluation of new drugs for treatment in the post-COVID-19 era were also provided during the course. This course supported the advancement of the synthesis and production technology of cyclotron-based radioactive drugs in the Asia-Pacific region especially by improving infrastructure and technology in Thailand, Malaysia, Mongolia and Singapore.

	
Project Progress Review Meeting, Apr. Virtual	RTC on GMP and Radiation Safety Aspects of Radiopharmaceutical Production Using Medical Cyclotron, May, Virtual

RAS6098	**Standardizing Radiotherapy in Palliative Care**
Objective	**To improve quality of life for cancer patients in the RCA region**

Project Activities in 2022

Event	Title	Summary of Purpose	Dates /Duration	Host Country
Meeting	First Project Coordination Meeting	To review the national quality of palliative radiotherapy and plan of RCA GPs in standardizing radiotherapy in palliative care, set up the project baseline from which the project success can be measured, discuss and agree on workplan for 2022-2023	22-25 Mar.	Virtual
RTC	Virtual Regional Training Course on a Basic Palliative Radiation Therapy for Bones and Brain Metastases	To provide training on basic palliative radiation therapy for bones and brain metastases	6-9 Dec.	Virtual

Expert	Home Based Assignment	To assist in the preparation, organization, implementation and reporting on the first project coordination meeting of RAS6098	10 days	Japan

Project highlights for 2022

In 2022, the first coordination meeting was held on 22-25 March to review the status of the palliative radiotherapy and plan of the participation countries and set up baseline for the project to monitor the project progress and agree on the work plan for 2022-2023. The first regional training course on a basic palliative radiation therapy for bones and brain metastases was held on 6-9 December inviting forty-seven (47) participants from fifteen (15) participating countries. All materials presented at the RTC were shared amongst NPCs and collected for development of practice guidelines for palliative radiotherapy suited for situations in RCA GPs.

RAS6100	**Strengthening Clinical Application of Hypofractionated Radiotherapy**
Objective	**To strengthen the application of hypofractionated radiotherapy in the RCA region through a comprehensive approach, including the clinical aspect and the medical physics aspect of the whole treatment process**

Project Activities in 2022

Event	Title	Summary of Purpose	Dates /Duration	Host Country
Meeting	Virtual First Project Coordination Meeting of RAS6100	To review the national capacity and plan of RCA GPs in strengthening the clinical application of hypofractionated radiotherapy, set up the project baseline from which the project success can be measured, discuss and agree on work plan for 2022-2023	14 - 17 Mar.	Virtual
RTC	Virtual Regional Training Course on Basic Science and Clinical Applications of Hypofractionated Radiotherapy	To provide the participants with the knowledge, experience, and skills in the application of hypofractionated radiotherapy for cancer management	31 Oct.- 03 Nov.	Virtual
Expert	Home Based Assignment	To assist in the preparation, organization, implementation and reporting on the first project coordination meeting of RAS6100	10 days	Korea

Project highlights for 2022

Initiated in 2022, the Project Coordination Meeting was held in March virtually, attended by twenty-eight (28) NPCs and the NPT members from eighteen (18) RCA GPs. During the meeting, a clear

definition of the term “Hypofractionation” was determined as pertaining to the scope of the project. The participants decided on what kinds of HFRT treatments would be included and a roadmap for training radiation oncologists, medical physicists and radiation therapist in the proper and safe application of HFRT for enabling efficient use of existing treatment recourse. Expected outputs of the project were also shared at the meeting.

A Regional Training Course was held for four days from 31 October 2022 virtually, attended by thirty-three (33) trainees from fifteen (15) GPs. The training course provided lectures on basic science and clinical applications of hypofractionated radiotherapy. There was also a special session on MR-based radiotherapy techniques to introduce new treatments using MRI for inducing radiotherapy in areas where organs are prone to movement in addition to statistical analysis of the benefits of small-division radiotherapy related to infection risk curing the COVID-19 pandemic.

	
Project Coordination Meeting, May, Virtual	RTC on Basic Science and Clinical Applications of Hypofractionated Radiotherapy, Oct.-Nov., Virtual

RAS6101	**Improving the Quality and Safety of Radiation Medicine through Medical Physicist Education and Training**
Objective	**To improve the quality and safety of radiation medicine in the Asia-Pacific region through medical physicist education, training and certification**

Project Activities in 2022

Event	Title	Summary of Purpose	Dates /Duration	Host Country
RTC	Virtual Regional Training Course on Quality Management and QA in Radiotherapy Medical Physics	To provide participants with knowledge, experience and skills in quality management and QA in radiotherapy medical physics.	12 Sep.-14 Oct.	Virtual

Meeting	First Project Coordination Meeting	To review the national capacity and plan of RCA GPs in education and training of medical physicist, set up the project baseline from which the project success can be measured, discuss and agree on workplan for 2022-2023.	04-08 Apr.	Virtual
Expert	Home Based Assignment	To assist in the preparation, organization, implementation and reporting on the first project coordination meeting	10 days	China

Project highlights for 2022

Initiated in 2022, the First Coordination Meeting of this project was held in April virtually, attended by the National RCA Representative of China, the Lead Country, the LCC and NPCs from eighteen (18) participating RCA GPs as well as other project stakeholders. During the meeting, the mechanism of the implementation of the IAEA Technical Cooperation programme and resource related to the project were introduced. In addition, country reports and national work plans as well as the current status and particular challenges faced by each country regarding the education, training and certification of medical physicists were shared. In order to draw out specific plan for implementation of the project, the participants also discussed the intended project outputs and details of the future activities, including the dates, venues and expected outcomes.

The first RTC on quality management and QA in radiotherapy medical physics was conducted for one month from 12 September to 13 October virtually. More than fifty (50) participants, including the NPCs, attended the event and was provided with lectures on quality management and QA in radiotherapy medical physics and audits in radiotherapy.

Project Coordination Meeting, Apr., Virtual

TC on Quality Management and QA in Radiotherapy Medical Physics, Sep.-Oct., Virtual

RAS7028	**Enhancing Regional Capabilities for Marine Radioactivity Monitoring and Assessment of the Potential Impact of Radioactive Releases from Nuclear Facilities in Asia-Pacific Marine Ecosystems**

Objective	**To improve the integrated regional quality-assured capabilities for marine radioactivity monitoring and for impact assessment of routine and accidental releases of radioactivity into the marine environment**

Project Activities in 2022

Event	Title	Summary of Purpose	Dates /Duration	Host Country
Meeting	Virtual Regional Workshop on Determination of Uncertainties and Characteristic Limits	To provide training on determination of uncertainty and characteristic limits to support regionally harmonised reporting of marine radioactivity according to international standards. To demonstrate application through working examples from the day-to-day practice of participating laboratories	19-22 Apr.	Virtual
Meeting	Final Project Review Meeting	To review the implementation of the project RAS7028 and assess the achieved results of the project, identify future needs of the region, discuss and agree on follow-up cooperative plan to ensure the sustainability of the results gained from the project.	07-11 Nov.	Singapore

Project highlights for 2022

In 2022, a virtual regional workshop on determination of uncertainties and characteristic limits was held on 19-22 April to provide training on the application through working examples that could be used in the laboratories. Final project review meeting was also held on 7-11 November to review and assess the project achievements and results of the project, identify future needs and agree on the plan to ensure the sustainability of the project.

Under the project, a total of 7 training courses, 4 workshops and 2 expert missions were conducted. A total of 147 relevant personnel were trained and six proficiency tests have been conducted between 2017-2022, enhancing the regional capacity in marine radioactivity monitoring.

A total of 76,680 samples of seawater, sediment, and biota were collected by all the participating GPs and analyzed for radionuclides like Cs-137, Sr-90, Po-210, Ra-226, and H-3, etc (this total includes 2017-2022 post-Fukushima monitoring in Japan and other countries) and a total of 3,923 data were submitted to the ASPAMARD database during 2017-2022. The database provides the reference baseline radioactivity levels in the region. Further, new analytical procedures for the estimation of radionuclides in the marine environment have been established by seven countries (AUS, IND, INS, PAK, SRI, TH, SIN) and guidelines for 'Sampling, Preparation and Radio-analysis of Marine Matrices' was developed and made available for use by the GPs. The guidelines document enables conducting marine radioactivity monitoring in a harmonized manner and supports regional data comparability.

There have been improvements in the laboratories in the region too. Three new laboratories have been established adding value to the existing laboratories of which also upgraded equipment including the radiometric counting systems. Quality Management System in all laboratories was also maintained

and improved significantly. The project supported the fulfillment of requirements for maintaining the accreditation of eight laboratories in the region.

A total of seventy-four (74) reports and scientific papers related to the marine radioactivity were published during the course of the project.

RAS7031	**Assessing the Vulnerability of Coastal Landscapes and Ecosystems to Sea-Level Rise and Climate Change**
Objective	**To improve capacity of coastal countries in the Asia-Pacific region to use radiometric and isotopic techniques to ascertain coastal vulnerability and resilience to climate change in the 21st century**

Project Activities in 2022

Event	Title	Summary of Purpose	Dates /Duration	Host Country
RTC	Virtual IAEA/RCA Training Workshop on Isotopic and Radiometric Data Analysis and Interpretation of Results	To provide 'hands-on' experience in data analysis and interpretation of radiometric and stable isotopes results to enhance the understanding and capacity of participants to assess vulnerability of coastal landscapes and ecosystems to sea-level rise.	21-23 Mar.	Virtual
Meeting	Final Project Review Meeting	To review the implementation of the project RAS7031 and assess the achieved results of the project, identify future needs of the region, discuss and agree on follow-up cooperative plan to ensure the sustainability of the results gained from the project	28 Nov.- 2 Dec.	Philippines
Expert	Home based assignment	To recruit expert lecturer for virtual training workshop on isotopic and radiometric data analysis and interpretation of results	6 days	Australia
Expert	Home based assignment	To recruit expert lecturer for virtual training workshop on isotopic and radiometric data analysis and interpretation of results	6 days	Switzerland
Expert	Home based assignment	To collect and compile country progress reports for the development of a final project report highlighting the application of isotopic and radiometric analyses to ascertain coastal vulnerability and resilience to climate change	5 days	Australia

Project highlights for 2022

Training opportunities and capacity building RAS7031 training courses were attended by multiple participants from many Government Parties. Significant outcomes from these training courses included: (1) the building of capacity on sampling techniques; (2) gaining experience in the use of equipment; (3) new knowledge of model selection and data analyses; and (4) reiteration of sampling and analytical approaches. Items (1) and (2) are outcomes of the 2019 ANSTO training course, while (3) and (4) are outcomes of virtual workshops in November 2021 and March 2022. Techniques for sample collection, transport and/or processing have been since developed and implemented in multiple countries.

Training materials provided included online resources for ongoing self-paced training including guides, analytical techniques, presentations, calculation/model templates. Lessons from these training courses, and these materials were also shared more broadly within the Government Party networks. In some cases findings were shared with stakeholders via domestic workshops, field and laboratory activities. Importantly, the outcomes of these training initiatives and infrastructure provision will enable further capacity building and expansion of the scope of activities and applications into the future.

During the project, the regional cooperation amongst participating countries has been active in sharing knowledge and experiences in the investigation of coastal ecosystem. Some countries volunteered to provide sample analysis and data interpretation for other countries. As a result, a study network of coastal ecosystem in the region has been formed and developed, which would promote further cooperation among RCA GPs in this area in the future.

Final project review meeting was held from 8 November to 2 December 2022 to review and assess the implementation and achieved results of the project inviting thirteen (13) participating RCA GPs. The meeting concluded that the first salient result of the project was the capacity built for coastal RCA GPs to use radiometric and isotopic techniques to ascertain coastal vulnerability and resilience to climate change.

RAS7035	**Enhancing Regional Capability for the Effective Management of Ground Water Resources Using Isotopic Techniques**
Objective	**To enhance management of ground water pollution using isotopic techniques**

Project Activities in 2022

Event	Title	Summary of Purpose	Dates /Duration	Host Country
Meeting	Project Progress Review Meeting	To review project progress, discuss and agree on the workplan for 2022-2023, taking into consideration the Covid-19 situation in the region	12-14 Apr.	Virtual
Expert	Home Based Assignment	To Recruit Expert for Virtual Project Progress Review Meeting of RAS7035	6 days	China

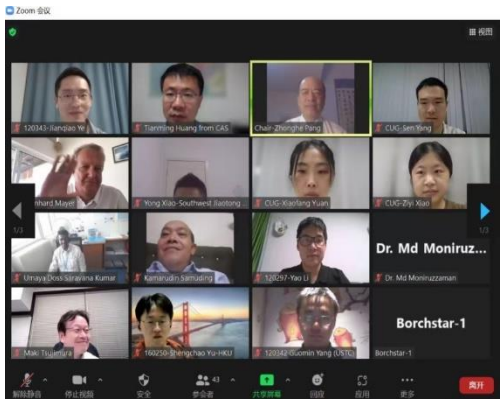
Project highlights for 2022

The Project Progress Review Meeting was held on 12-14 April virtually, attended by seventeen (17) participants from thirteen (13) GPs and a Technical Officer from the IAEA. During the meeting, a representative from CPR presented on a study on the potential pollution on groundwater by shale gas development in China and shared about water-rock interaction processes using multiple isotope approach.

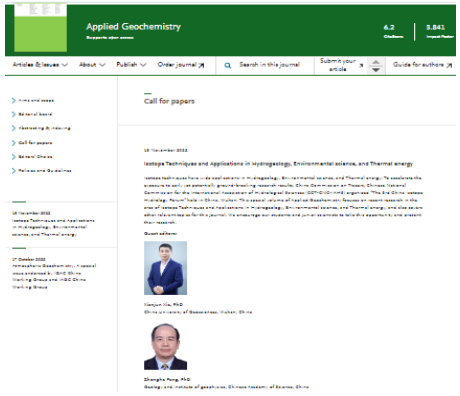
Two special events were held in connection with the project RAS7035 in 2022. At the 29th Congress of International Association of Hydrogeologists held in September in Wuhan, China, a session on "Isotope Hydrology and Groundwater" was co-organized by the IAEA and the International Commission on Tracers of International Association of Hydrological Sciences (IAHS). The LCC of the project delivered a plenary keynote lecture on "Isotope Geochemistry of Geothermal Fluids in South-eastern Tibetan Plateau" and two other experts were supported by the project to make presentations on isotope hydrology at the Congress.

In addition, at the 11th Scientific Assembly of the IAHS held in May in France, a session on "Tracer Methods in Catchment and Critical Zone Hydrology" was organized with support of the project, where the LCC acted as a co-convener. A conference paper titled "Quantification of Precipitation Moisture Sources in the Eastern Asian Monsoon Zone: A Modified Deuterium-Excess-Based Model" produced by the Chinese team under the project was published.

Under the support of the project, two journal special issues were published – one on "Hydrochemistry and Isotopes in Groundwater Investigations" in the journal *Water* and another on "Isotope Techniques and Applications in Hydrogeology, Environmental Science and Thermal Energy" in *Applied Geochemistry*.



"Isotope Hydrology and Groundwater" Session at the 29th Congress of Int'l Association of Hydrogeologists, Sep., Virtual



Special Issue on "Isotope Hydrology" in *Applied Geochemistry*

RAS7037	**Enhancing Wetland Management and Sustainable Conservation Planning**
Objective	**To enhance the sustainable development of wetlands and their ecosystem services in the Asia Pacific Region**

Project Activities in 2022

Event	Title	Summary of Purpose	Dates /Duration	Host Country
Expert	**HBA**	To prepare an Agency publication for RAS7037	15 days	France

Project highlights for 2022

The first RTC on Design and Implementation of Wetland Isotope Programmes was performed 28-29 July 2021. The second RTC on sample preparation and analyses of stable isotopes in wetland samples was performed on 1-2 December 2021. There were no RTC's undertaken during the 2022 reporting period. A third RTC on interpretation of isotopic data will be performed on 22-23 June 2023. In the interim, a training manual for the application of stable isotopes in wetland management has been developed by a group of experienced experts under RA7037. The training manual is formatted and written in the form of an IAEA publication.

RAS7040	**Improving Water Resources Management Practices by Enhancing the Regional Collaboration in Environmental Isotope Analysis and Applications**
Objective	**To enhance the regional capability in water quality and water resource monitoring for effective development and management of surface water and groundwater**

Project Activities in 2022

Event	Title	Summary of Purpose	Dates /Duration	Host Country
Meeting	Virtual First Project Coordination Meeting of RAS7040	To review the national capacity and plan of RCA GPs in the application and development of isotope analysis, set up the project baseline from which the project success can be measured, discuss and agree on workplan for 2022-2023.	8-11 March	Virtual
Expert	Home Based Assignment	To assist in the preparation, organization, implementation and reporting on the first project coordination meeting of RAS7040	10days	Viet Nam

Project highlights for 2022

Initiated in 2022, the First Project Coordination Meeting was held in March virtually where the objectives and the national programme of Viet Nam were discussed and integrated in the general programme of the project.

A number of additional activities were carried out during the first year of the project: twenty-four (24) precipitation samples were collected on bi-monthly basis, twenty-four (24) water samples from the Red River and forty-eight (48) groundwater samples from Holocene and Pleistocene aquifers were collected on the same days of precipitation sampling for chemistry and water isotopic compositions determination. The ion chromatography was used for chemistry analysis whereas the laser spectrometry methods were used for water isotopic compositions (^{2}H and ^{18}O) quantification. Sampling and analysis for the chemistry and isotopic compositions in the surface and groundwater samples will continue in 2023 in order to obtain assured data in the interpretation for the interaction between the surface and the groundwater in the region.

Project Coordination Meeting, Mar., Virtual

RAS9092	**Strengthening the Capacity to Respond to Radiological Emergencies of Category II and III Facilities**
Objective	**To ensure radiation safety for workers and the public during nuclear or radiological emergencies in the RCA region**

Project Activities in 2022

Event	Title	Summary of Purpose	Dates /Duration	Host Country
RTC	IAEA/RCA RTC on Development and Use of Operational Intervention Levels (OILs) for Reactor Emergencies	To introduce practical considerations for the use of Operational Intervention Levels (OILs) during a response to safety- or security-related emergencies taking place at nuclear power plants, the methodology for deriving default OIL values, general considerations concerning the revision of default OIL values to account for different underlying assumptions or methodological approaches, and a review of the data used to calculate IAEA's default OIL values.	3-7 Oct.	Thailand
RTC	IAEA/RCA RTC on Developing a Protection Strategy for a Nuclear or	To provide training for personnel from response organizations on how to develop, justify and optimize a protection strategy for a nuclear or	31 Oct- 3 Nov.	Viet Nam

	Radiological Emergency	radiological safety or security related emergency, as required in Requirement 5 of IAEA Safety Standards Series No. GSR Part 7, Preparedness and Response for a Nuclear or Radiological Emergency. The workshop addresses the main aspects that need to be taken into account for the development of protection strategies for nuclear emergencies: approaches for development of a protection strategy; planning basis, including hazard assessment; processes of justification and optimization of the strategy; considerations for a justified and optimized strategy; consultation with interested parties and dosimetric concepts relevant to the development of protection strategies		

Project highlights for 2022

In 2022, two Regional Training Courses were implemented. Regional Training Course on Development and Use of Operational Intervention Levels (OILs) was held on 3-7 Oct., Thailand, inviting 30 participants. Regional Training Course on Developing Protection Strategy for Nuclear or Radiological Emergency was held on 31 Oct.- 3 Nov., Vietnam, inviting 23 participants. These RTCs provided basic knowledge on the OILs and Protection Strategy in line with the IAEA safety guidelines and are expected to contribute to strengthening the EPR capacity of RCA countries.