

Public Version



REGIONAL COOPERATIVE AGREEMENT

ANNUAL REPORT 2021

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Annex 2: Planned Regional Events under RCA Projects in 2022

Annex 3: List of National RCA Representatives

Annex 4: RCARO Activities Related to Promotional and Other Non-technical Activities in 2021

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 2021

1. Summary of the RCA Programme in 2021

There were seventeen (17) active projects in 2021; five (5) projects in the field of human health, five (5) projects in food and agriculture, four (4) projects in the field of environment, one (1) project on wetland management, one (1) project 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 2021 is shown in Annex 1.

About 30 RCA events, including meetings/workshops and regional training courses, were initially planned for 2021 according to the work plan of each project. More than 90% of the regional events were implemented as planned, all of which were held virtually due to an ongoing global outbreak of COVID-19 pandemic.

In detail, thirteen (13) regional meetings, consisting of project kick-off and progress review meetings, final review meetings and workshops, were held virtually. A total of three-hundred-seventy (370) participants, including fifty-three (53) experts, participated in these events. In addition to the project-related and expert meetings, two (2) policy level meetings of the National RCA Representatives, namely the 43rd Meeting of National RCA Representatives and the 50th RCA General Conference Meeting, were held virtually, involving seventy-three (73) and seventy-eight (78) participants respectively. As for regional training courses, thirteen (13) regional training courses were held virtually, compared to the only one course organized physically in early 2020. A total of four-hundred-thirty-one (431) participants including sixteen (16) lecturers and experts attended the training courses.

Participation by GPs in RCA events in 2021 is presented in Annexes 2a-b.

As all regional events were held virtually, there were no expert missions implemented in 2021. Instead, a total of ninety-nine (99) home-based assignments were implemented for the purpose of conducting social and economic impact assessment, developing project-related documents and e-learning materials. The total duration was one-thousand-three-hundred-sixty-six (1,366) days and fourteen (14) RCA GPs were involved in these assignments.

RCA home-based assignments in 2021 are listed in Annexes 2d.

2. Management and Implementation of the RCA Programme in 2021

2.1 Summary of Financial and In-Kind Contributions

The budget allotment from the TC Fund for 2021 was €2,273,489.29. The encumbrances and actuals in 2021 were €2,122,990.76 at an Implementation Rate of about 93.56%.

Government Parties (GPs) continued supporting the RCA Programme through extrabudgetary contributions and in-kind contributions. In 2021, a total of €487,163 in extrabudgetary contributions were received from Republic of Korea, Malaysia, Philippines, and Norway.

Allocations of extrabudgetary contributions to RCA projects 2015-2021 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 €766,514 in 2021.

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

2.2 Planned Regional Events in 2022

In 2022, a total of 17 RCA projects are being implemented, including 6 projects that initiates in the same year. It was recommended by the Meetings of the National RCA Representatives that the Lead Country Coordinators (LCCs), in consultation with the RCA Focal Point (FP) and respective Technical Officers (TOs), identify the events that could be replaced by virtual activities in response to the prolonged COVID-19 pandemic. Based on the previous experiences of conducting and participating in virtual events, most of the project activities, including project coordination and review meetings, workshops, and training courses, will be carried out in the same manner, with the aim to achieve the set objectives and finish according to the project timelines. As for the project events that require physical activities as well as the special events planned in celebration of the 50th Anniversary of the RCA, such as the Ministerial Conference and the RCA Exhibition, the relevant stakeholders will constantly observe the situation of the pandemic and set out plans that could fulfil the objective of the events effectively and efficiently.

Indicative plan for RCA regional events in 2021 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.

The progress of the projects was reviewed at the 43rd Meeting of the National RCA Representatives and the 50th RCA General Conference Meeting, mainly by written reports due to the time limit of virtual meetings.

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. Compared to the year of 2020 when most of the regional events were postponed or cancelled due to the unpredictable situation, the project activities were well carried out as planned and in line with the objective of the projects in 2021. 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. 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 E-CAMPUS 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. Summary of the RCA Regional Office (RCARO) Activities Related to Promotional and other non-technical Activities in 2021

First, RCARO launched a plan to reform the RCA website to establish an integrated information system which will provide expanded information and more comprehensive online services to the RCA GPs, in response to the global trend of digitization. In accordance with the recommendation of the 41st NRM to upload the RCA project documents on the RCA website, RCARO operated a dedicated platform for providing information and documents of the RCA projects within the RCA website.

Also, with a view to enhancing the promotional effect using the IT tool, RCARO planned to publish the RCA Newsletter to offer timely news and information of the RCA to the GPs and relevant stakeholders. The RCA Newsletter Committee was established to manage the whole process of the publication and ensure the reliability and quality of the RCA Newsletter.

RCARO participated in the online exhibition during the 15th International Congress of the International Radiation Protection Association (IRPA15), held on 18 January - 5 February 2021 and ran an e-booth where the RCA videos and electronic versions of promotional materials such as brochures and success stories were displayed.

Under the RCA/UN Office for South-South Cooperation (UNOSSC) project on Electron Beam (EB) applications, seventeen (17) e-learning modules focusing on applications of the EB accelerator were developed in cooperation with the Korea Atomic Energy Research Institute (KAERI). An online training course using these modules was held for two weeks from 30 August to 10 September 2021, attended by 23 participants from 8 countries. The final review meeting was held virtually on 8-9 June 2021 in conjunction with a technical workshop on electron beam principles and applications, attended by 54 participants from 13 countries and an online exhibition showcasing the project achievements was also held to celebrate the successful completion.

As for the RCARO/ASEAN Network of Regulatory Bodies on Atomic Energy (ASEANTOM) partnership project on radiation safety, the project coordination meeting was held virtually on 2 March 2021 for preparatory discussion and on 4 March for the formal meeting, inviting the NPCs and relevant experts. According to the work plan, "Guideline for radioactivity measurements in the environment and individual dose assessment following a nuclear or radiological emergency" was developed with support from the experts from Australia, Japan and Korea, for which a webinar on its introduction was held, involving 58 participants including the NPCs and relevant experts. In addition, an online training course on enhancing Electronic Patient Record (EPR) capabilities in the ASEAN region was held on 22-26 November 2021. It provided real-time and e-learning lectures to 15 participants from 9 countries through the RCA E-CAMPUS upgraded recently.

The second phase of the RCARO Managed Project, the RCA Research Project, on air pollution, initiated in 2021. The research coordination meeting was held virtually on 18-19 March 2021, inviting CSIs from 12 participating GPs and project stakeholders. The CSIs submitted annual progress reports on the research activities in 2021 for review of the RRC.

Upon the approval of the 43rd NRM on RCARO's plan to initiate a new Research Project, RCARO conducted a survey invited the GPs to submit Research Project Theme proposals on radiation oncology, which was found to be the highest priority. Amongst 9 proposals received from 8 countries, "Closing the Gap in Access to Radiotherapy in RCA GPs" proposed by INS was approved by the 50th GCM as the final theme for the project, and a total of 8 countries, namely AUL, INS, MAL, MON, PHI, ROK, THA and VIE, were confirmed to participate in the project based on the review of the RRC.

The RCARO activities related to promotional and other non-technical activities in 2021 are given in Annex 8.

SECTION 2 - DETAILS OF THE TECHNICAL PROGRAMME IN 2021

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 2021

Event	Title	Summary of Purpose	Dates /Duration	Host Country
Meeting	43 rd Meeting of the National RCA Representatives and Its Preparatory Meetings	To review and decide on the RCA Programmes and other RCA related issues	28-29 Apr.	IAEA (Virtual)
Meeting	50 th RCA General Conference Meeting and Its Preparatory Meetings	To review and decide on the RCA Programme and other RCA related issues	16-17 Sep.	IAEA (Virtual)
Meeting	RCA Chair Meeting	To prepare for the 50 th RCA General Conference Meeting	15 Sep.	IAEA (Virtual)
Meeting	RCA SAC Meeting	To prepare for the 50 th RCA General Conference Meeting	15 Sep.	IAEA (Virtual)
Expert	Home-Based Assignment	On conducting social and economic impact assessment in the field of Non-Destructive Testing under the RCA projects	30 days	New Zealand
Expert	Home-Based Assignment	On conducting social and economic impact assessment in the field of Non-Destructive Testing under the RCA projects	30 days	Mexico
Expert	Home-Based Assignment	On conducting social and economic impact assessment in the field of Non-Destructive Testing under the RCA projects	30 days	New Zealand
Expert	Home-Based Assignment	On conducting social and economic impact assessment in the field of Non-Destructive Testing under the RCA projects	30 days	New Zealand

Expert	Home-Based Assignment	On conducting social and economic impact assessment in the field of Non-Destructive Testing under the RCA projects	30 days	Spain
Expert	Home-Based Assignment	On conducting social and economic impact assessment in the field of Non-Destructive Testing under the RCA projects	30 days	Mexico
Expert	Home-Based Assignment	On conducting social and economic impact assessment in the field of Non-Destructive Testing under the RCA projects	30 days	New Zealand
Expert	Home-Based Assignment	On conducting social and economic impact assessment in the field of Non-Destructive Testing under the RCA projects	30 days	New Zealand
Expert	Home-Based Assignment	On conducting social and economic impact assessment in the field of Non-Destructive Testing under the RCA projects	28 days	Mexico
Expert	Home-Based Assignment	On conducting social and economic impact assessment in the field of Non-Destructive Testing under the RCA projects	13 days	New Zealand
Expert	Home-Based Assignment	On conducting social and economic impact assessment in the field of Non-Destructive Testing under the RCA projects	23 days	New Zealand
Expert	Home-Based Assignment	On conducting social and economic impact assessment in the field of Non-Destructive Testing under the RCA projects	30 days	Spain
Expert	Home-Based Assignment	On conducting social and economic impact assessment in the field of Radiotherapy under the RCA projects	30 days	New Zealand
Expert	Home-Based Assignment	On conducting social and economic impact assessment in the field of Radiotherapy under the RCA projects	30 days	Mexico
Expert	Home-Based Assignment	On conducting social and economic impact assessment in the field of Radiotherapy under the RCA projects	30 days	New Zealand
Expert	Home-Based Assignment	On conducting social and economic impact assessment in the field of Radiotherapy under the RCA projects	30 days	New Zealand
Expert	Home-Based Assignment	On conducting social and economic impact assessment in the field of Radiotherapy under the RCA projects	30 days	Spain
Expert	Home-Based Assignment	On conducting social and economic impact assessment in the field of Radiotherapy under the RCA projects	30 days	Mexico

Expert	Home-Based Assignment	On conducting social and economic impact assessment in the field of Radiotherapy under the RCA projects	30 days	New Zealand
Expert	Home-Based Assignment	On conducting social and economic impact assessment in the field of Radiotherapy under the RCA projects	30 days	New Zealand
Expert	Home-Based Assignment	On conducting social and economic impact assessment in the field of Radiotherapy under the RCA projects	28 days	Mexico
Expert	Home-Based Assignment	On conducting social and economic impact assessment in the field of Radiotherapy under the RCA projects	13 days	New Zealand
Expert	Home-Based Assignment	On conducting social and economic impact assessment in the field of Radiotherapy under the RCA projects	23 days	New Zealand
Expert	Home-Based Assignment	On conducting social and economic impact assessment in the field of Radiotherapy under the RCA projects	30 days	Spain
Expert	Home-Based Assignment	On compiling the history and salient achievements of the RCA since 1972	20 days	Sri Lanka
Expert	Home-Based Assignment	On conducting social and economic impact assessment of crop mutation breeding projects under the RCA programme	17 days	Canada
Expert	Home-Based Assignment	On conducting social and economic impact assessment of Non-Destructive Testing projects under the RCA programme	17 days	Canada
Expert	Home-Based Assignment	On conducting social and economic impact assessment of Radiotherapy projects under the RCA programme	8 days	Canada
Expert	Home-Based Assignment	On conducting social and economic impact assessment of Radiotherapy projects under the RCA programme	5 days	Canada
Expert	Home-Based Assignment	On conducting social and economic impact assessment of Radiotherapy projects under the RCA programme	4 days	Canada

Project highlights for 2021

The project supported the arrangement of meetings related to the RCA Programme and its policies, contributing to the effective management of the Programme. All meetings were held virtually due to the ongoing COVID-19 pandemic. Two (2) RCA policy meetings, namely the 43rd Meeting of National RCA Representatives and the 50th RCA General Conference Meeting, were held to deal with various issues with regard to the RCA and its Programme. Preparations for the RCA Programme 2024-2025 TC cycle and the 50th Anniversary of the RCA as well as strategic matters of the RCA were discussed during the Meetings. Under this project on management of the RCA, a number of

home-based assignments were carried out to conduct social and economic impact assessments of the RCA Programme and develop publications in celebration of the 50th Anniversary of the RCA in 2022.

	
<p>43rd Meeting of National RCA Representatives, April, Virtual</p>	<p>50th RCA General Conference Meeting, September, Virtual</p>

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

Project Activities in 2021

Event	Title	Summary of Purpose	Dates /Duration	Host Country
Meeting	Regional Workshop on NDT	To enhance regional capabilities on NDT in Civil Engineering Structures during maintenance and post disaster	26-29 Jul.	IAEA (Virtual)
Training Course	Regional Training Course	To train experts on computed tomography in associated with 3D Image Analysis for Industrial Components	6-10 Sep.	IAEA (Virtual)
Expert	Home-Based Assignment	To assist for regional training course on computed tomography associated with 3D image analysis for industrial components	5 days	Malaysia
Expert	Home-Based Assignment	To recruit expert lecturers for virtual regional workshop on NDT in civil engineering structures during maintenance and post disaster	3 days	Spain
Expert	Home-Based Assignment	To recruit expert lecturers for virtual regional workshop on NDT in civil engineering structures during maintenance and post disaster	3 days	Italy

Expert	Home-Based Assignment	To recruit expert lecturers for virtual regional workshop on NDT in civil engineering structures during maintenance and post disaster	3 days	Malaysia
Expert	Home-Based Assignment	To recruit expert lecturers for virtual regional workshop on NDT in civil engineering structures during maintenance and post disaster	3 days	Germany
Expert	Home-Based Assignment	To recruit expert lecturers for regional training course on computed tomography in association with 3D image analysis for industrial components	20 days	Germany

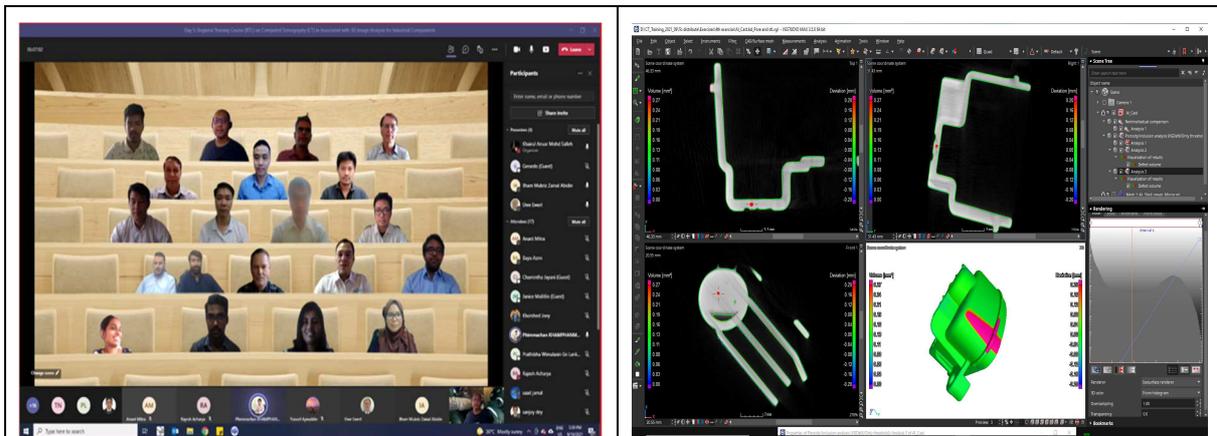
Project highlights for 2021

With the COVID-19 pandemic, there were still restrictions for international travelling and events to be conducted physically.

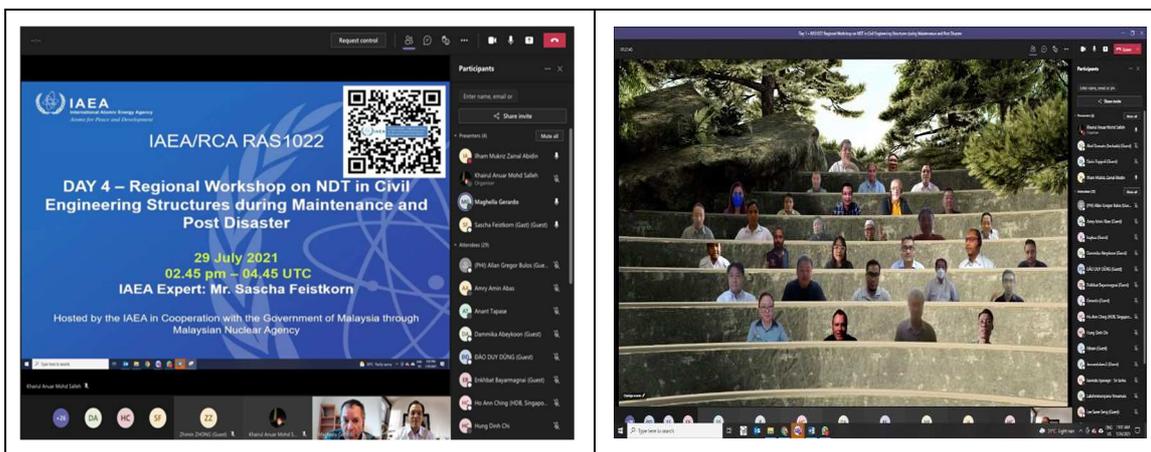
The Regional Workshop on Non-destructive Testing in civil engineering structures during maintenance and post disaster was held virtually on 26-29 July 2021, attended by thirty-one (31) participants from fifteen (15) GPs. It provided presentations and discussions with contribution of four (4) experts in the field of NDT for civil structures. Even though hands-on training and demonstration were not possible, the sharing of knowledge and information by the experts provided important exposures to the participants to develop their capacity in various techniques applied for civil structures inspection and assessment.

A Regional Training Course was conducted virtually on 6-10 September 2021, attended by twenty-three (23) participants from thirteen (13) GPs. The participants were provided with training on computed tomography (CT) image reconstruction and analysis using commercial CT software, with images from real industrial components. The usage of commercially used software for training provided hands-on expertise for the participants on the application of CT.

Another Regional Workshop planned in conjunction with the Asia Pacific Conference for Non-Destructive Testing (APCNDT) in Australia was put off due to the postponement of the conference to 2023 in response to the COVID-19 pandemic.



Regional Training Course on Computed Tomography (CT) in associated with 3D image analysis for industrial components



Regional Workshop on NDT in Civil Engineering Structures during Maintenance and Post Disaster

RAS5077	Promoting the Application of Mutation Techniques and Related Biotechnologies for the Development of Green Crop Varieties
Objective	To increase environmentally friendly crop productivity through the application of mutation techniques and related biotechnology

Project Activities in 2021

Event	Title	Summary of Purpose	Dates /Duration	Host Country
Meeting	Final Project Review Meeting	To review and assess the final progress of project implementation and discuss lessons learned	7-9 Dec.	IAEA (Virtual)
Expert	Home-Based Assignment	To assist in the preparation, organization, implementation and reporting on the final project review meeting	20 days	China

Project highlights for 2021

The final project review meeting was held virtually on 7-9 December 2021, attended by experts and delegates from the participating GPs and the IAEA. The Meeting evaluated the final progress of the project and successful achievement obtained in the GPs. Most of the GPs were given proper training and made positive results in increasing environmentally friendly crop productivity with the application of mutation techniques and related biotechnology through the project implementation for the past four years.

RAS5081	Enhancing Food Safety and Supporting Regional Authentication of Foodstuffs through Implementation of Nuclear Techniques
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Objective	To improve food safety, enhance consumer confidence and increase trade by establishing a robust and independent means of verification of origin of foodstuffs
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Project Activities in 2021

Event	Title	Summary of Purpose	Dates /Duration	Host Country
Meeting	Final Project Review Meeting	To review and assess the final progress of project implementation and discuss lessons learned	30 Nov. - 2 Dec.	IAEA (Virtual)
Training Course	Regional Training Course	To train experts on stable isotope systematics in the environment	19-30 Jul.	IAEA (Virtual)
Expert	Home-Based Assignment	To assist in the preparation, organization, implementation and reporting on the final project review meeting	20 days	New Zealand

Project highlights for 2021

The Regional Training Course was held virtually on 19-30 July, attended by twenty-six (26) participants from twelve (12) GPs. The Training Course provided the participants with training on stable isotope systematics in the environment. In addition, the Final Project Review Meeting was held virtually on 30 November - 2 December 2021, attended by twenty (20) GPs and three (3) experts from the IAEA. It reviewed the national/regional status improved through the project and assessed the overall achievements.

RAS5084	Assessing and Improving Soil and Water Quality to Minimize Land Degradation and Enhance Crop Productivity Using Nuclear Techniques
Objective	To enhance the capacity of countries in the Asia-Pacific region to use nuclear techniques to assess and improve soil and water quality, and to implement best agricultural practices to minimize land degradation and enhance crop productivity

Project Activities in 2021

Event	Title	Summary of Purpose	Dates /Duration	Host Country
Meeting	Regional Workshop on Development of a Regional Database	To enhance regional capabilities on development of a regional database of soil erosion, soil and water quality based on nuclear and isotopic signatures	24-26 Aug.	IAEA (Virtual)

Meeting	Final Project Review Meeting	To review and assess the final progress of project implementation and discuss lessons learned	23-25 Nov.	IAEA (Virtual)
Expert	Home-Based Assignment	To assist in the preparation, organization, implementation and reporting on the final project review meeting	20 days	Australia
Expert	Home-Based Assignment	To assist in the preparation, implementation and reporting for the workshop on development of a regional database of soil erosion, soil and water quality based on nuclear and isotopic signatures	7 days	Australia
Expert	Home-Based Assignment	To share experience and related issues in the development of environmental radioactivity research network center	7 days	Japan
Expert	Home-Based Assignment	To share experience and related issues in the development of environmental radioactivity research network center	3 days	Japan

Project highlights for 2021

The Regional Workshop on the development of a regional database was held virtually on 24-26 August 2021, attended by experts and delegates from the participating GPs. The Meeting discussed the progress to enhance regional capabilities on development of a regional database of soil erosion, soil and water quality based on nuclear and isotopic signatures.

The final project review meeting was held virtually on 23-25 November, attended by twenty-three (23) participants from seventeen (17) GPs and three (3) experts from the IAEA. As a final stage, the Meeting reviewed and assessed the final progress of project implementation and discussed the lessons learned from the past activities.

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 regional through developing and promoting electron beam and X ray technologies for food irradiation

Project Activities in 2021

Event	Title	Summary of Purpose	Dates /Duration	Host Country
Training Course	Regional Training Course	To train experts on electron beam/X-ray technology and the future of food irradiation in the RCA region	30 Aug. - 1 Sep.	IAEA (Virtual)

Expert	Home-Based Assignment	To recruit expert lecturers for electron beam/X-ray technology and the future of food irradiation in the RCA region	5 days	France
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Project highlights for 2021

The Regional Training Course was held virtually on 30 August - 1 September 2021, attended by forty-three (43) participants. The training course provided lectures on the EB technology for food irradiation, innovations in the EB and X-ray facilities including low energy and soft electron machines, dosimetry systems for food irradiation using EB/X-ray. The event showed an overview on the current and future of food irradiation in our RCA region. Experts were recruited to finalize the recommendation on the 7.5 MeV X-ray for food irradiation and give the lectures on the EB facility and dosimetry.

Despite the restrictions imposed by the COVID-19 pandemic, the outputs of the project were well achieved as planned. Some project teams showed their active commitment in implementing their national work plan to achieve the project goals. A comparative analysis of different radiation modalities was documented and circulated to all GP through virtual workshops and dosimetry systems for food irradiation using EB/X-ray were introduced during the RTC events. In 2021, two new EB/X-ray facilities were installed and operated for multi-purposes including food irradiation in Vietnam, and one EB/X-ray in Thailand.

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 2021

Event	Title	Summary of Purpose	Dates /Duration	Host Country
Meeting	Project Kick-off Meeting	To plan deliverables, structure, criteria, and key features of the project and develop the protocols of the project	21-25 Jun.	IAEA (Virtual)
Training Course	Regional Training Course	To train experts on digital breeding management systems and field experimental data analysis	22 Nov.-3 Dec.	IAEA (Virtual)
Expert	Home-Based Assignment	To recruit expert lecturers for virtual regional training course on digital breeding management systems and field experimental data analysis	10 days	India
Expert	Home-Based Assignment	To recruit expert lecturers for virtual regional training course on digital breeding management systems and field experimental data analysis	10 days	China

Expert	Home-Based Assignment	To recruit expert lecturers for virtual regional training course on digital breeding management systems and field experimental data analysis	15 days	India
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Project highlights for 2021

This project commenced in 2021 to improve food security in the Asia Pacific region through faster release of mutant varieties with improved crop productivity and quality. The Project Kick-off Meeting was held virtually on 21-24 June 2021, attended by twenty-eight (28) participants from seventeen (17) GPs and delegates from the IAEA. The Meeting review the national capacity and plan of GPs in mutation induction with speed breeding methods and set up the project baseline and agree on the work plan for 2021-2022. National status and work plans were presented, and the major problems in speed breeding and mutation induction were discussed and amended to align with overall objective of the project.

A Regional Training Course on Advanced Regional Training Course on Digital Breeding Management Systems and Field Experimental Design/Analysis was held virtually on 22 November - 3 December 2021, attended by twenty-eight (28) trainees from ten (10) GPs and the Technical Officer of the IAEA. The Course provided lectures on tools of Breeding Management Systems (BMS) and R Language, which could be used in mutation breeding process as well as data analysis for marker assisted selection in terms of improving breeding efficiency, based on a practical approach.

RAS6086	Strengthening Cancer Management Programmes in GPs through Collaboration with National and Regional Radiation Oncology Societies
Objective	To improve the cancer management of RCA States Parties by training radiation oncology professionals in collaboration with RCA and Asia Pacific national/regional radiation oncology societies

Project Activities in 2021

Event	Title	Summary of Purpose	Dates /Duration	Host Country
Meeting	Final Review Meeting	To review and assess the final progress of project implementation and discuss lessons learned	13-15 Dec.	IAEA (Virtual)
Training Course	Regional Training Course	To train experts on multidisciplinary approach to palliative radiotherapy in cancer management	22-25 Mar.	IAEA (Virtual)
Training Course	Regional Training Course	To train risk management, radiation safety and quality assurance in radiotherapy	16-18 Aug.	IAEA (Virtual)
Expert	Home-Based Assignment	To assist in the preparation, organization, implementation and reporting on the final project review meeting	20 days	Japan

Expert	Home-Based Assignment	To recruit expert lecturers for regional training course on risk management, radiation safety and quality assurance in radiotherapy	5 days	Australia
Expert	Home-Based Assignment	To recruit expert lecturers for virtual regional training course on multidisciplinary approach to palliative in cancer management	15 days	India
Expert	Home-Based Assignment	To recruit expert lecturers for virtual regional training course on multidisciplinary approach to palliative in cancer management	15 days	India
Expert	Home-Based Assignment	To recruit expert lecturers for virtual regional training course on multidisciplinary approach to palliative in cancer management	15 days	India

Project highlights for 2021

Two (2) Regional Training Courses and a Final Review Meeting were held virtually in 2021 due to the COVID-19 pandemic. Over the project period, 152 professionals were trained as trainers in four (4) Regional Training Courses and 10,092 professionals were trained in National Training Courses in fifteen (15) GPs. Compared to the data from the Project Kick-Off Meeting, it was found during the Final Review Meeting that more than 90% (17/18) GPs have increased the number of radiation oncologists with a median increase of 26.7%. For medical physicists, seventeen (17) out of eighteen (18) GPs have increased numbers with a median of 23.6%. For radiation therapy technologists, thirteen (13) of seventeen (17) GPs have increased numbers with a median of 23.0%. More than 70% (11/14) of the GPs have increased the number of patients who received radiotherapy with a median increase of 12.1%, unlike the decrease in several GPs due to the pandemic of COVID-19.



RAS6087	Enhancing Medical Physics to Develop GPs through Regional Leadership in Standards and Education and Training Support
Objective	To improve health care to patients in the regional through the application of appropriate, effective and safe radiation medicine, utilizing competent medical physicist, consistent with IAEA requirements and guidelines

Project Activities in 2021

Event	Title	Summary of Purpose	Dates /Duration	Host Country
Meeting	Final Review Meeting	To review and assess the final progress of project implementation and discuss lessons learned	6-8 Dec.	IAEA (Virtual)
Training Course	Regional Training Course	To train supervisors of clinical training programmes in medical physics	25 Oct.-19 Nov.	IAEA (Virtual)
Expert	Home-Based Assignment	To review, enhance and provide a final draft of the document on assessment in clinical medical physics	3 days	Australia
Expert	Home-Based Assignment	To review, enhance and provide a final draft of the document on assessment in clinical medical physics	3 days	Indonesia
Expert	Home-Based Assignment	To review clinical training programmes in medical physics for diagnostic radiology and nuclear medicine	4 days	Australia
Expert	Home-Based Assignment	To review clinical training programmes in medical physics for diagnostic radiology and nuclear medicine	4 days	India
Expert	Home-Based Assignment	To review clinical training programmes in medical physics for radiation oncology	4 days	Australia
Expert	Home-Based Assignment	To review clinical training programmes in medical physics for radiation oncology	4 days	Thailand
Expert	Home-Based Assignment	To lead the preparation of a training manual for RAS6087	5 days	Australia
Expert	Home-Based Assignment	To assist in the preparation, organization, implementation and reporting on the final project review meeting of RAS6087	20 days	Australia
Expert	Home-Based Assignment	To assist in the preparation and implementation of the regional training course for supervisors of clinical training programmes in medical physics	13 days	Australia
Expert	Home-Based Assignment	To assist in the preparation and implementation of the regional training course for supervisors of clinical training programmes in medical physics	13 days	India
Expert	Home-Based Assignment	To assist in the preparation and implementation of the regional training course for supervisors of	13 days	Thailand

		clinical training programmes in medical physics		
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Project highlights for 2021

Despite COVID-19, several activities were conducted virtually, including assistance in some aspects of resident assessments and a program review audit. A Regional Training Course was held on 25 October - 19 November 2021, aiming to strengthen clinical training supervision skills. Revised coding for the learning management system, AMPLE, was featured in the training program. A document was developed to address assessment in clinical training identified at the initial regional meeting as a key skill for sustainability in clinical training through home-based assignments.

The final Project Review Meeting was conducted on 6-8 December 2021, attended by participants from sixteen (16) participating GPs. The Meeting discussed the professional status of medical physicists in many of the GPs, with various forms of certification or registration noted by Korea, Japan, India, Indonesia, the Philippines, Thailand, Australia, and New Zealand. The work of Thailand in TCDC outreach in providing clinical training to neighbouring countries, including Laos and Myanmar was highly commended. This work achieved on a modest budget through various external funding mechanisms, allowed Laos to have its first clinically qualified medical physicist in radiotherapy and added to the number of nuclear medicine medical physicists in Myanmar.

As a follow-up, the project RAS6101 on Improving the Quality and Safety of Radiation Medicine through Medical Physicist Education and Training will commence in 2022 to provide new pilot medical physics clinical training programs for Pakistan and Vietnam.

RAS6093	Strengthening Capacity to Manage NCDs Using Imaging Modalities in Radiology and Nuclear Medicine
Objective	To implement better management and control of non-communicable diseases (NCDs) in the RCA region in line with UN SDGs and WHO Global Action Plan for the Prevention and Control of NCDs 2013-2020

Project Activities in 2021

Event	Title	Summary of Purpose	Dates /Duration	Host Country
Expert	Home-Based Assignment	To develop e-learning modules on gastric cancer	10 days	Korea
Expert	Home-Based Assignment	To review and provide expert comment and recommendation on eight e-learning modules	28 days	Korea
Expert	Home-Based Assignment	To develop e-learning modules on head and neck cancer	21 days	India
Expert	Home-Based Assignment	To develop e-learning modules on breast cancer	7 days	Indonesia

Expert	Home-Based Assignment	To develop e-learning modules on breast cancer with non FDG markers and review	7 days	Malaysia
Expert	Home-Based Assignment	To develop e-learning modules on cervical cancer	7 days	Myanmar
Expert	Home-Based Assignment	To develop e-learning modules on small cell lung cancer	7 days	Pakistan
Expert	Home-Based Assignment	To develop e-learning modules on non-small cell lung cancer	7 days	Philippines
Expert	Home-Based Assignment	To develop e-learning modules on hepatocellular carcinoma	7 days	Viet Nam
Expert	Home-Based Assignment	To lecture at the virtual national training course on neurology in radiology and nuclear medicine	4 days	Austria
Expert	Home-Based Assignment	To lecture at the virtual national training course on neurology in radiology and nuclear medicine	2 days	Greece
Expert	Home-Based Assignment	To lecture at the virtual national training course on neurology in radiology and nuclear medicine	4 days	Japan

Project highlights for 2021

In response to the COVID-19 Pandemic, a number of Home-Based Assignments were conducted to develop E-learning modules and provide online lectures. In result, nine (9) E-learning modules on nasopharynx, oropharynx, larynx, breast cancer, cervix cancer, small cell lung cancer, non-small cell lung cancer, gastric cancer, and hepatocellular carcinoma were developed successfully based on contribution of seven (7) National Project Coordinators and the Lead Country Coordinator.

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

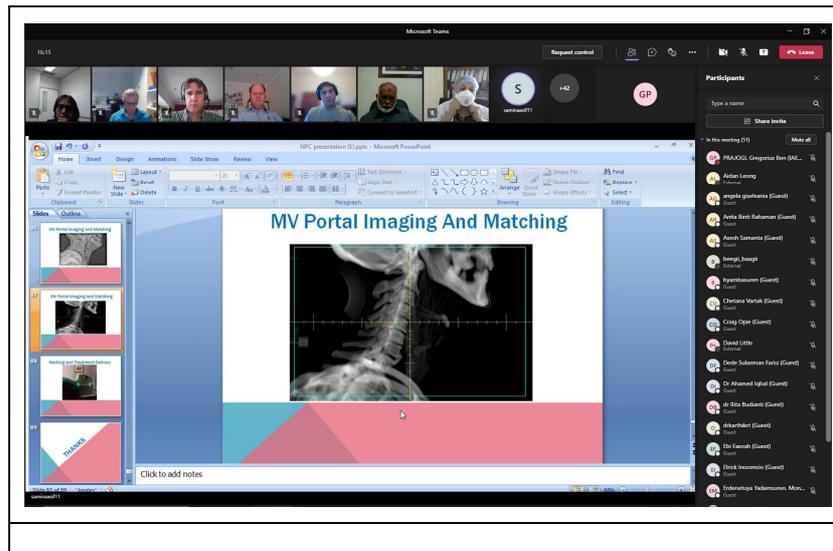
Project Activities in 2021

Event	Title	Summary of Purpose	Dates /Duration	Host Country
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Meeting	Second Annual Project Coordination Meeting	To review the progress of the project and discuss the work plan for further development	15-16 Sep.	IAEA (Virtual)
Expert	Home-Based Assignment	To assist in the preparation, organisation, implementation and reporting on the second project coordination meeting	4 days	New Zealand

Project highlights for 2021

The implementation of this project and its activities is based on the Asia-Pacific Radiation Oncology Network (ASPRONET). Virtual Tumour Boards have been well established and held monthly, involving oncologists from twenty (20) GPs. They provided an opportunity for radiation and clinical oncologists to share and discuss challenging cases. During the meetings, thirty-four (34) cases were presented and the clinical management of more than half was changed because of the discussions. Appropriate software was equipped to allow interactive comparison of radiation treatment plans to enhance the educational benefit. Regular virtual meetings for Radiation Therapy Technologists were commenced in December 2021, followed by the commencement of virtual meetings for Radiation Oncology Medical Physicists in January 2022. The project will see additional virtual educational meetings that focus on management of specific tumour types in the following year.



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 2021

Event	Title	Summary of Purpose	Dates /Duration	Host Country
Training Course	Regional Training Course	To train experts on set-up cyclotron facility for radiopharmaceutical production	28 Jun.-2 Jul.	IAEA (Virtual)
Expert	Home-Based Assignment	To recruit expert lecturers for virtual regional training course on set-up of cyclotron facility for radiopharmaceutical production	5 days	India
Expert	Home-Based Assignment	To recruit expert lecturers for virtual regional training course on set-up of cyclotron facility for radiopharmaceutical production	5 days	Portugal
Expert	Home-Based Assignment	To recruit expert lecturers for virtual regional training course on set-up of cyclotron facility for radiopharmaceutical production	4 days	Korea
Expert	Home-Based Assignment	To recruit expert lecturers for virtual regional training course on set-up of cyclotron facility for radiopharmaceutical production	4 days	Korea

Project highlights for 2021

The Regional Training Course on Research, Development and Training Related to Nuclear Science and Technology for Asia and the Pacific was held virtually on June 28 - July 2, 2021. This It was attended by fifty (50) trainees including radiochemists, radio pharmacists, and nuclear medicine specialists from nineteen (19) GPs. Training Course provided online lectures on the quality improvement of radiopharmaceuticals and their clinical applications with support of experts and lecturers from the Korea Institute of Radiological & Medical Sciences (KIRAMS), radiopharmaceutical companies and the IAEA.

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 2021

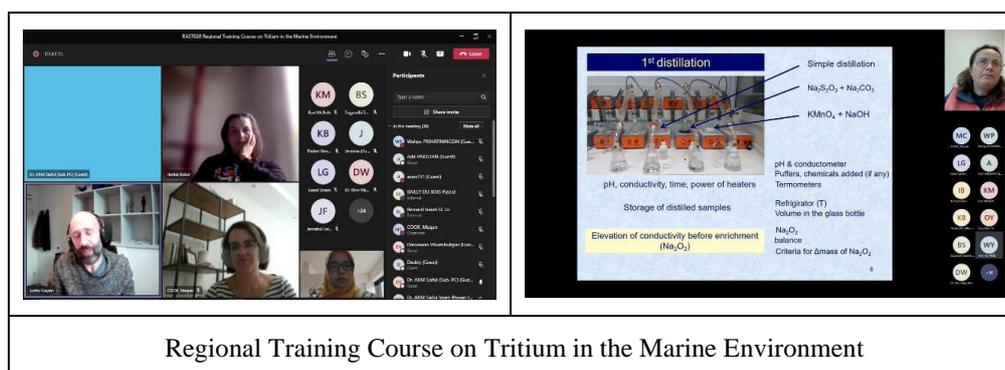
Event	Title	Summary of Purpose	Dates /Duration	Host Country
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Training Course	Regional Training Course	To train experts on tritium in the marine environment	25-28 Oct.	IAEA (Virtual)
Expert	Home-Based Assignment	To prepare material and provide lecturers for regional training course on tritium in the marine environment	4 days	Canada
Expert	Home-Based Assignment	To prepare material and provide lecturers for regional training course on tritium in the marine environment	6 days	France
Expert	Home-Based Assignment	To prepare material and provide lecturers for regional training course on tritium in the marine environment	6 days	Indonesia
Expert	Home-Based Assignment	To prepare material and provide lecturers for regional training course on tritium in the marine environment	4 days	Norway
Expert	Home-Based Assignment	To prepare material and provide lecturers for regional training course on tritium in the marine environment	4 days	Slovenia

Project highlights for 2021

The Regional Training Course on Tritium in the Marine Environment was held virtually on 25-28 October 2021, attended by twenty-eight (28) participants from fifteen (15) GPs. The Course provided training on the behaviour of tritium in the principal compartments of marine ecosystems, its origins, transfer processes, and radiological effects. Alongside this, fit-for-purpose analysis techniques, available datasets, and its applications to oceanographic studies were presented. A total of seven (7) global reputable experts in the field of Tritium conveyed the above materials both in theory and application. The Course assisted the participants in understanding the physical and chemical characteristics of tritium, its natural and anthropogenic sources, transfer processes, and pathways in the marine environment. Moreover, participants acquired the specific relevant marine sampling techniques, discern fit-for-purpose tritium analysis techniques and data analysis including statistical techniques.

In addition, an informal project meeting was held virtually on 2 August 2021 to catch up on the implementation status of regional and national work plans related to the project in 2021. It was conducted as a commitment from GPs to successfully realize the project objectives. The achievement on national monitoring program, paper publication, amount of data submitted to the Marine Radioactivity Information System (MARIS) and Asia-Pacific Marine Radioactivity Database (ASPAMARD) progress on procurement, guidelines documents and future project work plans were discussed in the meeting.



Regional Training Course on Tritium in the Marine Environment



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 2021

Event	Title	Summary of Purpose	Dates /Duration	Host Country
Meeting	Progress Review Meeting	To review and assess the progress of project implementation, discuss and update work plans, agree on measures to ensure achievement of project objectives	5-24 Nov.	IAEA (Virtual)
Expert	Home-Based Assignment	To recruit expert lecturers for virtual training workshop and project progress review meeting	3 days	Australia
Expert	Home-Based Assignment	To recruit expert lecturers for virtual training workshop and project progress review meeting	3 days	Australia
Expert	Home-Based Assignment	To recruit expert lecturers for virtual training workshop and project progress review meeting	5 days	Australia
Expert	Home-Based Assignment	To recruit expert lecturers for virtual training workshop and project progress review meeting	8 days	Australia

Project highlights for 2021

The project focused to improve the capacity of coastal countries in the Asia-Pacific region in the use of radiometric and isotopic techniques to ascertain coastal vulnerability and use of nuclear analysis

techniques for planning and management of climate change impacts on coastal ecosystems. The COVID-19 pandemic situation affected the normal implementation of the project activities. Sample collection and analyses were affected, and the face-to-face training program was postponed.

The Project Review Meeting and Training Workshop were held virtually on 22-24 November 2021, attended by participants from thirteen (13) GPs, to determine the progress and supports needed by the countries. It was found that the participating countries had established national programs and achieved progress for study site selection. In addition, training programs improved the scientific skill of participating countries for experimental design, sample collection, data analysis and interpretation to assess coastal vulnerability and resilience to climate change. Most of the countries analysed their collected samples to some extent for stable isotopes and or radiometric analyses to achieve project milestones.



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 2021

Event	Title	Summary of Purpose	Dates /Duration	Host Country
Training Course	Regional Training Course	To train experts on isotope techniques in the investigation of groundwater resources	23-27 Aug.	IAEA (Virtual)
Training Course	Regional Training Course	To train experts on the use of isotope techniques for the investigation of groundwater pollution	8-12 Nov.	IAEA (Virtual)
Expert	Home-Based Assignment	To assist in the preparation, organization, evaluation, and model groundwater flow in the Metro Manila, Philippines	14 days	India

Expert	Home-Based Assignment	To prepare a guiding document on development of a miniaturised and durable benzene synthesis line for C-14 analysis using liquid scintillation counter	20 days	India
Expert	Home-Based Assignment	To develop technical guidelines on groundwater pollution investigation (including deep groundwater) using isotope techniques.	21 days	India
Expert	Home-Based Assignment	To prepare material and conduct lectures for the 'Advanced Regional Training Course on Applications of Isotope Techniques in Investigation of Groundwater Pollution'	15 days	China
Expert	Home-Based Assignment	To prepare material and conduct lectures for the 'Advanced Regional Training Course on Applications of Isotope Techniques in Investigation of Groundwater Pollution'	15 days	Pakistan
Expert	Home-Based Assignment	To prepare material and conduct lectures for the 'Advanced Regional Training Course on Applications of Isotope Techniques in Investigation of Groundwater Pollution'	15 days	China

Project highlights for 2021

A Regional Training Course was held virtually on 23-27 August 2021, attended by twenty-seven (27) participants from twelve (12) GPs. The Training Course focused on training experts on isotope techniques in the investigation of groundwater resources.

Another Regional Training Course on the use of isotope techniques for the investigation of groundwater pollution was held virtually on 8-12 November 2021, attended by twenty-four (24) participants from twelve (12) GPs. The Training Course provided training on the use of advanced isotope techniques for the investigation of groundwater pollution.

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 2021

Event	Title	Summary of Purpose	Dates /Duration	Host Country
Training Course	Regional Training Course	To train experts on designing and implementation of wetland isotope programs	28-29 Jul.	IAEA (Virtual)

Training Course	Regional Training Course	To train experts on sample preparation and analyses of stable isotopes in wetland samples prospectus	1-2 Dec.	IAEA (Virtual)
Expert	Home-Based Assignment	To develop a training manual on isotopes in wetlands for RAS7037	10 days	China
Expert	Home-Based Assignment	To develop a training manual on isotopes in wetlands for RAS7037	10 days	New Zealand
Expert	Home-Based Assignment	To assist in the preparation and the implementation of procurement for RAS7037	7 days	Austria
Expert	Home-Based Assignment	To recruit expert lecturers for virtual regional training course on design and implementation of wetland isotope programmes	7 days	Australia
Expert	Home-Based Assignment	To recruit expert lecturers for virtual regional training course on design and implementation of wetland isotope programmes	7 days	Australia

Project highlights for 2021

A Regional Training Course was on the application of isotopic techniques to wetland science and management was held virtually on 28-29 July 2021, attended by thirty-one (31) participants. The Training Course covered project design and sampling protocols.

Another Regional Training Course was conducted virtually on 1-2 December 2021, attended by thirty-four participants. Led by an expert from the Australian Nuclear Science and Technology Organisation (ANSTO), the Training Course provided training on the preparation and analysis of samples for stable isotopes using Isotope Ratio Mass Spectrometers (IRMS).

To support and in preparation of the Training Course, a 92-page training manual titled, “Manual for the Use of Stable Isotope in Wetland Science” was developed under the project.



Delegates at the on-line RTC program 28 July 2021

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 2021

Event	Title	Summary of Purpose	Dates /Duration	Host Country
Meeting	Webinar	To provide introductory learning on the IAEA Safety Standards, Protection Strategies, and information on the development of the national standards	7 Sep.	IAEA (Virtual)

Project highlights for 2021

A one-day Webinar for introductory learning on the IAEA Safety Standards and Protection Strategies was held virtually on 7 September 2021, attended by thirty-six (36) participants from eleven (11) GPs. The participants were provided with lectures on the basic concepts and the practical experiences for ensuring the arrangements in terms of preparedness and response for a nuclear or a radiological emergency.

