

REGIONAL COOPERATIVE AGREEMENT (RCA)

ANNUAL LCC PROGRESS REPORT TO THE RCA NRM

FOR 2022 (*Final Year of Implementation*)

1. Administrative information

1.1 Project number and title:

IAEA/RCA TC Project RAS/7/028

1.2 Name and contact details of the LCC:

Wahyu Retno Prihatiningsih

Center for Research and Technology of Safety, Metrology and Nuclear Quality

Jl. Lebak Bulus Raya No. 49, Jakarta 12440

Kotak Pos 7043 JKSKL, Jakarta 12070

Email: wahyu.retno.prihatiningsih@brin.go.id ; prihatiningsihwr@gmail.com

Mobile Phone: +628119880606

1.3 Participating RCA GPs:

AUL, BGD, CAM, CPR, IND, INS, JPN, ROK, MAL, MYA, PAK, PHI, SIN, SRL, THA, VIE

2. Project 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

3. Outcome of the project:

Strategic and sustainable analyses of the extent and impacts of radioactive releases from Fukushima Dai-ichi, nuclear power plants (NPPs) and other nuclear activities to Asia-Pacific marine ecosystems

4. Regional activities:

List the regional events implemented during the year

Training Courses

1. Sampling and Basic Analytical Techniques (Indonesia): 14-25 August 2017
2. Analysis of ^{90}Sr and ^3H in Seawater (India): March 2018
3. Analysis of Pu, ^{241}Am in seawater and ^{210}Pb dating of sediments (Australia): 4 - 15 June 2018
4. Rapid Assessment of Radionuclides in the Marine Environment (Argonne National Laboratory USA): 10 - 21 September 2018
5. Gamma-ray Spectrometry (Australia): August 26 – September 6, 2019
6. Dose assessment and risk analysis modelling (China): October 28 – November 1, 2019
7. Tritium in the Marine Environment (virtual): 25-28 Oktober 2021

Regional Workshops

8. Implementation of Quality management System in Radioanalytical Laboratories Involved in Marine Radioactivity Studies (Malaysia): 29 April – 3 Mei 2019
9. Environmental Sampling and Monitoring Guidelines (Bali Indonesia): 4 - 8 Maret 2019
10. Radiological Dose Assessment (Philippine): 24 - 28 Februari 2020
11. Uncertainties and Characteristic Limits (virtual): 19-22 April 2022

Expert Missions

12. Marine sampling
13. Analysis/QMS/databases
14. Dose assessment and risk analysis modelling

Comment on the status of implementation of the Regional Work Plan (from PCMF)

Good and achieved.

5. Status of achievement of Project Outputs against the indicators of the LFM*

| Output | Indicator and Target | Status of Achievement |
|---|---|--|
| Output 1 Project Management Team Operational | An agreed project implementation programmed and monitoring structure. | The RAS7028 Project, which originally took place in the 2017-2019 period due to Covid-19 constraints, was extended until 2022. During the RAS Project period, the implementation of activities proceeded in accordance with the work plan prepared and mutually agreed upon. In the year-end period of the RAS7028 Project, a final review meeting was held on 7 - 11 November 2022 in Singapore. The purpose of the November 2022 meeting was to finalize the implementation of the RAS 7028 work plan which includes consolidating knowledge and understanding of the existing capabilities, and the achievements of the goals and milestones, proposed by |

| | | |
|---|---|---|
| | | <p>the participating countries in the area of marine radioactivity monitoring and assessment. The meeting focused on recording the outputs and outcomes of the project, which included advancements in GP capabilities, improvements in data outputs and data interpretations, and contributions to the socio-economic benefits of GPs and regional partnerships. The meeting provided a forum to share and exchange the acquired knowledge of RCA GPs in marine radioactivity studies, updates on methodologies, know-how and an overview of the research being undertaken in the Asia-Pacific region under RAS7028. Discussion also centered on various ways of maintaining partnerships, collaboration, and ongoing cooperation. The summary of main activities and achievements are described further in different outputs.</p> |
| <p>Output 2 Enhanced regional skills in marine environmental sampling of seawater and sediments.</p> | <p>Quality assured marine environmental samples and ancillary oceanographic data.</p> | <p>Various activities have been carried out to achieve the output to enhance regional skills in marine environmental sampling of seawater and sediment. Six Proficiency Tests have been conducted from 2017-2022, which helped the laboratories to monitor and enhance their analytical</p> |

| | | |
|---|---|---|
| | | <p>capability. Through the implementation of RAS7028, Quality Management System in all laboratories was maintained and improved significantly. Moreover, the project supported the fulfillment of requirements for maintaining the accreditation of eight laboratories in the region, and 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). These various RAS7028 Project achievements as representations or indicators of quality-assured marine environmental samples.</p> |
| <p>Output 3 Advanced regional skills in marine radiochemistry/radiometry for evaluation of radioactive discharges from nuclear power plants and other nuclear activities into the marine environment</p> | <p>Quality assured marine radioactive contamination monitoring data from each of the participating GPs.</p> | <p>A total of more than 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). Detailed information is presented in each country summary and report. A total of 3,923 data were submitted to the ASPAMARD database during the period of 2017-2022. The database provides the reference baseline radioactivity levels in the</p> |

| | | |
|---|---|--|
| | | <p>region. Marine radioactivity databases have been established or updated within each country. To support the quality of monitoring data acquisition by members, RAS7028 has also successfully held Determination of Uncertainties and Characteristic Limits On 19-22 April 2022. The purpose of the workshop is to support the development of Asia-Pacific organizations and individuals in the determination of uncertainties and characteristic limits to support regionally harmonized reporting of marine radioactivity data according to international standards.</p> |
| <p>Output 4 Developed regional skills in radioecology and radiobiology studies of radionuclides in marine biota endemic to the Asia-Pacific region</p> | <p>Radionuclide bio-concentration factors for Asia-Pacific endemic representative marine biota.</p> | <p>Even though in the implementation of the project there were modifications adapted to global dynamics such as radioecology training which could not be held due to the impact of covid. However, this does not eliminate the opportunity to obtain output on developing regional skills in radioecology and radiobiology studies of radionuclides in marine biota endemic to the Asia-Pacific region. The detailed Guidelines for 'Sampling, Preparation and Radio-analysis of Marine Matrices' was developed in collaboration and made available for use by the GPs.</p> |

| | | |
|--|---|---|
| | | <p>The guidelines document enables conducting marine radioactivity monitoring in a harmonized manner and supports regional data comparability. The guidelines also convey radioecology and radiobiology research techniques as a result of GP sharing which can be utilized by other laboratories in the regional area. On the other hand, it is also recorded that RCA GP has succeeded in publishing radioecology experiments that are known to have been established in their country, this can be used as a scientific reference source in terms of radioecology research. Moreover, total of 74 reports and scientific papers related to marine radioactivity were published during the course of the project.</p> |
| <p>Output 5 Enhanced regional capabilities in dose assessment and risk modelling to understand the impact of the Fukushima radioactive releases on the marine environment in the Asia-Pacific and aid development of environmental response plans</p> | <p>At least two persons in each participating GP trained at the regional level and practiced in the assessment of environmental health risks associated with the radioactive contamination in the marine environment.</p> | <p>Project RAS7028 has successfully held 7 RTCs and 4 RWSSs. The capabilities for assessing radiological dose and risk to humans and the environment were improved via training courses and a collaborative workshop where the RAS7028 data were used to evaluate dose for the background baseline and a range of potential nuclear release scenarios. Total of 147 persons from 16 participating GP were trained through all</p> |

| | | |
|--|--|--|
| | | <p>RTC and RWS hosted by the RAS7028 Project, which led to significantly enhancing the regional capacity in marine radioactivity monitoring and in dose assessment and risk modeling to understand the impact of the Fukushima radioactive release on the marine environment in the Asia-Pacific and aid development of environmental response plans. Transfer knowledge from the person trained on the RAS7028 RTC and RWS has been very contributed to the improvement of the national capability and new knowledge provided used by the National Authority in preparation for the policy for marine environmental management.</p> |
|--|--|--|

*The full achievement of the Outputs could be expected only at the end of the project. The purpose of the information requested on the achievement of the Outputs in annual reports is to assess the progress made towards achieving the Outputs and to take corrective action if necessary.

6. National Activities (Target GPs)

| Participating GP | Submission of six- monthly progress reports | National Work Plans developed | Progress of implementation of national work plans | Comments |
|------------------|---|-------------------------------|--|----------|
| AUL | Yes/ No | Yes/ No | Good/ satisfactory / not satisfactory. | - |

| | | | | |
|------------|--------------------|--------------------|--|---|
| | | | On target / behind target. | |
| BGD | Yes/ No | Yes/ No | Good/ satisfactory / not satisfactory. On target / behind target. | - |
| CAM | Yes/ No | Yes/ No | Good/ satisfactory / not satisfactory. On target / behind target. | - |
| CPR | Yes/ No | Yes/ No | Good/ satisfactory / not satisfactory. On target / behind target. | - |
| IND | Yes/ No | Yes/ No | Good/ satisfactory / not satisfactory. On target / behind target. | - |
| INS | Yes/ No | Yes/ No | Good/ satisfactory / not satisfactory. On target / behind target. | - |
| JPN | Yes/ No | Yes/ No | Good/ satisfactory / not satisfactory. On target / behind target. | - |
| ROK | Yes/ No | Yes/ No | Good/ satisfactory / not satisfactory. On target / behind target. | - |

| | | | | |
|------------|--------------------|--------------------|--|---|
| MAL | Yes/ No | Yes/ No | Good/ satisfactory / not satisfactory. On target / behind target. | - |
| MYA | Yes/ No | Yes/ No | Good/ satisfactory / not satisfactory. On target / behind target. | - |
| PAK | Yes/ No | Yes/ No | Good/ satisfactory / not satisfactory. On target / behind target. | - |
| PHI | Yes/ No | Yes/ No | Good/ satisfactory / not satisfactory. On target / behind target. | - |
| SIN | Yes/ No | Yes/ No | Good/ satisfactory / not satisfactory. On target / behind target. | - |
| SRL | Yes/ No | Yes/ No | Good/ satisfactory / not satisfactory. On target / behind target. | - |
| THA | Yes/ No | Yes/ No | Good/ satisfactory / not satisfactory. On target / behind target. | - |
| VIE | Yes/ No | Yes/ No | Good/ satisfactory / not satisfactory. | - |

| | | | | |
|--|--|--|--|--|
| | | | On target / behind target. | |
|--|--|--|--|--|

7. Resources Provided (Resource GPs)

| Participating GP | Expert services | Laboratory services | Hosting of RTCs | Comments |
|------------------|---|---|---|----------|
| AUL | <ol style="list-style-type: none"> 1. Marine radioecology and application, Jakarta, IND 2. Marine Environmental Radiological Risk Assessment, Xiamen, CHN | <ol style="list-style-type: none"> 1. Marine Environment Monitoring Guidelines, Denpasar, IND 2. Quality management systems, Penang, MYS 3. Radiological Dose Assessment, PNRI, Manila, PHI. | <ol style="list-style-type: none"> 1. Radiochemical Analysis of Marine Environmental Samples, Melbourne, AUL. 2. Gamma-Ray Spectrometry, Sydney, AUL. | - |

8. Regional activities planned for the next 12 months

-

9. Main constraints faced in project implementation that should be brought to the attention of the RCA NRs

Due to covid travel restrictions, one RTC was not able to be held due to Covid travel restrictions (radioecology laboratory methods—which requires in-person attendance and therefore could not be held virtually). RTC Radioecology was continued with Virtual RTC on Tritium Analysis in Marine Environment and Virtual RTC on Uncertainties and Characteristic Limits.

10. Describe notable achievements of the project.

The Major outcomes of the Project were clarified with input from all RCA GP and based on the summary of activities and achievements presented by the country:

1. A total of 7 training courses, 4 workshops, and 2 expert missions were conducted under the project. Total of 147 persons were trained, which led to significantly enhancing the regional capacity in marine radioactivity monitoring.

2. Six Proficiency Tests have been conducted from 2017-2022, which helped the laboratories to monitor and enhance their analytical capability.
3. Three new laboratories have been established and the rest of the laboratories upgraded their infrastructure in terms of radiometric counting systems and other equipment
4. Through the implementation of RAS/7/028, Quality Management System in all laboratories was maintained and improved significantly. The project supported the fulfillment of requirements for maintaining the accreditation of eight laboratories in the region.
5. A total of more than 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). Detailed information is presented in each country summary and report.
6. 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).
7. The detailed Guidelines for 'Sampling, Preparation and Radio-analysis of Marine Matrices' was developed in collaboration 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.
8. A total of 3,923 data were submitted to the ASPAMARD database during the period of 2017-2022. The database provides the reference baseline radioactivity levels in the region.
9. Marine radioactivity databases have been established or updated within each country.
10. The capabilities for assessing radiological dose and risk to humans and the environment were improved via three training courses and a collaborative workshop where the RAS/7/028 data were used to evaluate dose for the background baseline and a range of potential nuclear release scenarios.
11. A total of 74 reports and scientific papers related to marine radioactivity were published during the course of the project.
12. The achievement of RAS 7028 has been appreciated and used by the National Authority in preparation of the policy for marine environmental management.
12. Project has completed the procurement of Niskin bottles and sediment grab samples for SIN and BGD, and a Niskin bottle for MAL. in 2022 status the procurement of Tritium Enrichment Units is also underway for INS.

11. Any additional information that could be relevant

Based on the Regional and National achievement it was concluded that the project has successfully implemented and achieved the objectives set out. There have been demonstrated improvements in the capabilities of GPs in marine radiological monitoring. Numerous new data have been developed and shared. A new "best practices" guidelines document has been produced for use throughout the region and internationally, and numerous reports and scientific papers have been published. The project facilitated improved coordination, communication, and collaboration among participating members.

On the other side, regarding the global concern on the radioactive contamination in marine environment and currently, according to the country report submitted this is also becomes the main concern of RCA GP as their national concern. Therefore, in order to increase regional/interregional capability in estimating the distribution and role of radioactive contamination in the marine environment, a new international group for RCA GP is urgently needed which is should fully supported and facilitated by the IAEA to monitor this current issue.