Project Concept Template

Project Proposals for the RCA Programme 2024/2025

Part 1: Information Sheet

Project proposals for the RCA Programme 2024/2025 are to be prepared using the attached template and submitted BEFORE 31ST OF DECEMBER 2021. Completed templates will be reviewed by the RCA PAC in January 2022.

Resource documents required for developing Project Concepts can be found in the RCA web-site – (RCA Regional Office (rcaro.org)), under Projects/Resource Documents. (see below for the list of resource documents.

The Project Concept should be prepared in consultation with the stakeholders of the other participating GPs. Information on RCA stakeholders can be found in the RCA web-site (RCA Regional Office (rcaro.org)), under Projects/Project Information.

Please request access to the RCA Members Only web-site from RCARO (email: rcaro@rcaro.org) through your National RCA Representative if you do not already have access.

A proposal will be evaluated against the following criteria:

- Alignment of the objectives with priorities set out the RCA Regional Programme Framework (RPF) for 2024/25.
- Whether the project addresses a regional need.
- Whether nuclear technology is an essential component of the project.
- Whether outcomes and achievements of previous projects in this area of technology are considered.
- Does the proposal overlap or duplicate current or previous RCA projects?
- Is a convincing case made to justify further projects in this area?
- Is there a strong TCDC component?
- If the proposal is essentially an extension of previous projects in this area that have been implemented for more than 2 TC Cycles, does the proposal include arrangements for the transfer of project leadership to another GP?

List of Resource Documents on RCA web-site (www.rcaro.org)

1. Timeframe for preparation, review and approval of Project Concepts
2. Brochure on Logical Framework Matrix (Quick Reference Guide on Designing IAEA TC Projects)
3. RCA Regional Programme Framework for 2024-29
4. Details of RCA TC Projects implemented in 2007-2019
5. List of TC Projects being implemented in 2020/21 and projects approved for 2022/24
6. Recommendations on Technical Cooperation among Developing Countries (TCDC)

Please note that your National Representative will be reviewing the concept document to ensure that it has been prepared in compliance with the RCA and IAEA Criteria for TC Projects

Please contact the Chair of the RCA Programme Advisory Committee, Dr. Prinath Dias at prinathd@yahoo.com if you need assistance.

Part 2: Concept Template[1]

Title:
Strengthening Marine Environmental Radiation Monitoring and Radiological Risk Assessment Capabilities in the Asia-Pacific region

Analysis of gaps / problems / needs as applied to the RCA region:
Outline the major gaps /problems/specific needs to be addressed by the project (~ max 300 words):
With the rapid development of nuclear power plants (hereafter NPPs), fuel cycling and nuclear technique application industries, in addition with planned radioactive waste water release and possible threats of nuclear power submarines or aircrafts, marine radiation monitoring are attached more and more importance in countries of Asia-Pacific region. ^{3}H, ^{14}C, radiocaesium and radiostrontium, and other artificial radionuclides are being and will be discharged from the operating and over 100 new NPPs to be commissioned in the next ten years across the region, all of these activities raise concerns about the potential for elevated radioactivity in the marine environment, including potential increases in radiation doses to seafood consumers. Unlike most artificial radionuclides, ^{3}H couldn't be removed by the advanced liquid processing system (hereafter ALPS), which made it the largest released radionuclide in both routine liquid effluents of NPPs and the ALPS treated water. On the other hand, ^{14}C was also largely released by Npps and turned to be the critical radionuclide of some pressurized water NPPs. Therefore, despite the existence of technical difficulties and ability gaps among regional countries, more attention should be paid to de monitoring and risk assessing of ^{3}H and ^{14}C.
To address the previous concerns, monitoring and analysis capability is required, as well as the expertise, to help ensure that the seafood consumers and the marine biota will not be at risk from a long-term radiation exposure by the radionuclides from those emerging threats in coming decades.

Review the resource documentation and list any past RCA projects that have addressed similar problems/needs in this area of technology. Consider outcomes and achievements of previous projects, and avoid any overlap or duplication.
Projects RAS7021, and RAS7028, titled "Marine benchmark study on the possible impact of the Fukushima radioactive releseas in the Asia-pacific region" and "Enhance regional capabilities for marine radioactivity monitoring and assessment of the potential impact of radioactive releases from nuclear facilities in Asia-Pacific marine ecosystems" respectively, have addressed similar problems as this project, during which substantial efforts have gone towards enhancing the GPs' capability in measuring Cs-134, Cs-137, and Sr-90

[1] If you have not been involved in drafting a concept befor e and if you are not fully acquainted with the RCA and its Programme you are encouraged to support advice and assistance from your RCA National Representative.

in the marine environment, while the generated data have been uploaded in the ASPAMARD, either. However, monitoring data of certain vital radionuclides, especially for the main released radionuclides ^{3}H and ^{14}C during routine and emergency status of NPPs, are still needed to be used as reference values in case of a future nuclear or radiological emergency causing radioactive contamination in the ocean. However, ^{3}H measurement, and bioaccumulation & trophic transfer of radionuclides were not sufficiently performed during the implementation of those regional projects due to its complexity and the recent COVID-19 pandemic. These site-specific data are required for customization of modern mathematic & hydrological models or other decision support systems for accurate radiation dose and risk assessment in local seafood consumers & marine species in case of routine and accidental discharges. Technical capabilities in specific areas above need to be further enhanced.

This project will focus on the analytical techniques, bioaccumulation & trophic transfer of H-3 and C-14 to avoid any overlap or duplication with the relevant previous projects.

What are the major additional capabilities/skills in this area of technology that will be provided through this project (~ max 200 words).

A series of monitoring techniques would be provided, such as H-3 pre-treatment via biota combustion and water electrolysis enrichment, C-14 pre-treatment via biota combustion and wet oxidation of water, LSC measurement technology of H-3 and C-14. Nevertheless, H-3 and C-14 standard matrices must be distributed ahead of time. Online monitoring techniques for tritium, accelerator mass spectrometry (AMS) analysis technology of C-14 might be preliminarily introduced to prepare for future RCA projects.

The bioaccumulation & trophic transfer of radionuclides would be studied, mathematic & hydrological models or other decision support systems would be applied. As a result, the accuracy of radiation dose and hydrological modelings might be improved.

Furthermore, by applying those newly provided monitoring techniques, in addition to the newly developed data assessing models, more accurate pollution origin distinguish mechanism for the routine, accidental, or planned wastewater discharge to the Asia-pacific marine environment would be established.

Overall Objective: (Required for the preparation of the IAEA Regional Programme Note)

State the overall long-term objective to which the project will contribute. This should reflect an impact related to the RCA Regional Programme Framework for 2024/29.

The overall objective of this project is to further enhance the technical capabilities of GPs in the region in protecting economic seafood consumers and marine species from potential radiation impacts caused by emerging threats both in regular operation and emergency. The overall objective is in accordance with the priority area of Marine and Coastal Pollution Monitoring -EN3 in the RCA RPF for 2024/29.

Problem and objective analysis using objective and problem trees is recommended. (See pages 9 and 10 of the Quick Reference Guide on Designing IAEA TC Projects in resource documents)

The proposed project objective is supported by the following three sub-objectives.

1. Developed regional skills in analyzing H-3 and C-14 in marine samples, including seawater and marine biota.
2. Improved regional skills in evaluating radioactive discharges from nuclear power plants and other nuclear facilities into the marine environment.
3. Enhanced regional capabilities in dose assessment and risk analysis modelling to conduct a joint analysis of the data collected in the RAS7028 project to develop a shared understanding of the impact of radioactive releases on the marine environment in the Asia-Pacific Region.

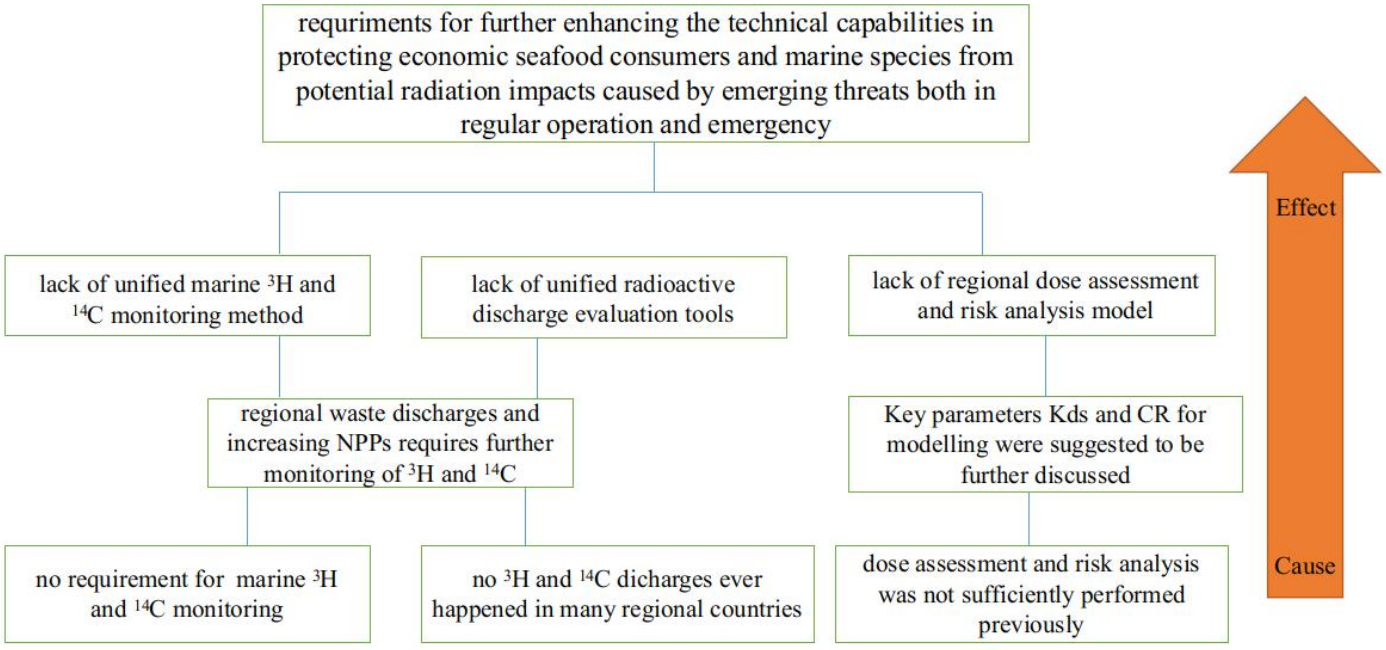

Fig.1 Problem tree of this project

These sub-objectives are interlinked and contribute to the achievement of the overall objective. Through further support to the radioecology labs recently established and under development in several RCA countries, this project could achieve a coordinated regional applied research outcome of Recommended Transfer Factors for Asia Pacific marine biota. These would enhance consistency in marine radiological dose & risk assessments undertaken by RCA countries and increase the value and application of the ASPAMARD database. End-users and stakeholders will directly benefit from the project outputs (quality-assured environmental monitoring data, regionally specific biological transfer factors, and more accurate radiological risk analyses) for radiation monitoring technology, environmental protection policy development, discharge guidelines/regulation, seafood safety, human health, and tourism.

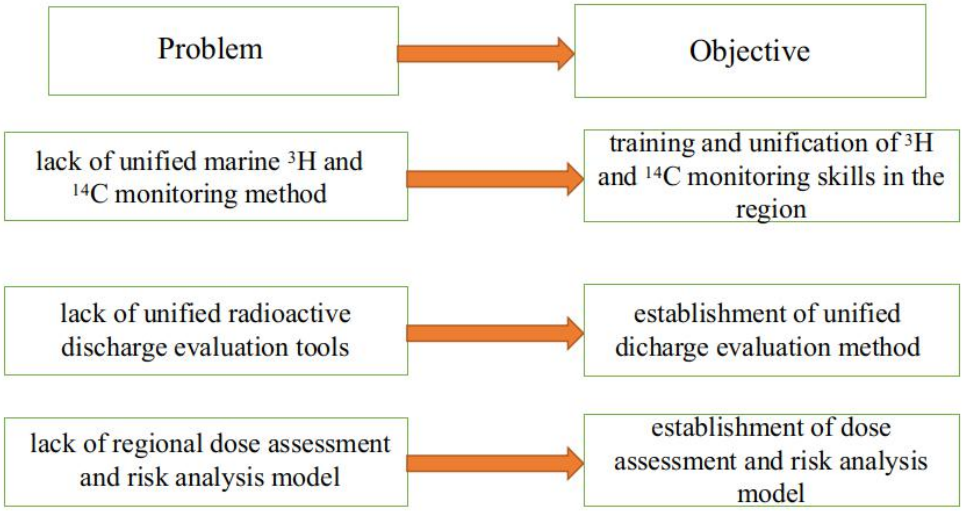

Fig.2 Objective tree of this project

Project Outcome: (Required for the preparation of the IAEA Regional Programme Note)

The outcome is the planned result of a project, achieved through the collective effort of stakeholders and partners. It represents the change or improvement that occurs as a result of the project. Should be worded in past tense. (eg. The capability for ……developed)

The outcomes of the project are listed below.

1. Unified sampling and analysis method for H-3 and C-14 in seawater and biota.
2. Enhanced understanding of bioaccumulation & trophic transfer of radionuclides, especially those important dose contributing radionuclides with very little available concentration ratio (CR) data.
3. Site-specific sediment distribution coefficients (Kds), CRs on seaweed products that have emerged as a significant food source and are vulnerable as they depend on the coastal waters most likely impacted from potential future releases.
4. Continuous data collection, especially for H-3 and C-14 in seawater, which could be used as reference values in case of a future nuclear or radiological emergency causing radioactive contamination in the ocean.
5. Improved radiation dose and risk assessment in local marine species & seafood consumers with the updated data.
6. Comprehensive suggestions on optimizing the marine radiation environment monitoring network in the Asia-Pacific region by increasing the site coverage in various ambient medias.

RCA Projects are to be designed to have a Socioeconomic Benefit:

What is the potential socioeconomic benefit that would be realised from the project concept over a 5 to 7-year horizon?

The potential socioeconomic benefit is the corresponding targets in the UN Sustainable Development Goals (SDGs) for Asia and the Pacific region -SDG 14: Protect and utilize the ocean and marine resourses for sustainable development. Even though nuclear facilities provide stable and low-carbon energy for the Asia-Pacific region, they raise concerns about the radiological safety of the marine ecosystem and seafood consumption at the meantime. Strengthening regional capabilities for marine radiation monitoring and radiological dose assessment will help evaluate the impact of nuclear facilities and other radioactive sources on the marine environment more reasonably, in addition to providing reference data and technical basis for relevant decision-making. This project will contribute to the marine environmental protection, fisheries production industry, and the achievement of carbon peak and neutral goals in the Asia-Pacific region.

The obtained information and improved capabilities will be of immense importance to the region for protecting economic marine species and humans from possible radiation hazards and for ensuring seafood safety to avoid socio-economy problems in seafood exporting countries.

Proposed Participating Government Parties:

List the Government Parties expected to participate in the project. Indicate target and resource GPs:

Resource GPs: China, Australia, Japan, Republic of Korea, New Zealand

Target GPs: Bangladesh, Cambodia, Fiji, India, Indonesia, Malaysia, Myanmar, Pakistan, Palau, Philippines, Singapore, Sri Lanka, Thailand, Viet Nam

Technical Cooperation among Developing Countries (TCDC) Project Component:

Please refer to the resource documents (RPF and Recommendations on TCDC)

Will the project design feature partnering arrangements between those advanced and those less advanced in the technology to be transferred through this project?

If so, list those expected partnerships.

Yes, for achieving average regional skills and coordinated monitoring & dose assessment activities, several partnership would be expected among developed countries, for example, marine sampling experience sharing and technique unification, radiochemistry/radiometry method discussion and followed inter comparion practice, establishment of regional radioecologsy models. online or offline marine radiological dose assessment training courses, etc,.

Requirements for participation:

Indicate the minimum requirements that the counterpart institutions in Government Parties would need to meet in order to participate in this project.

For resource GPs, radiation monitoring agencies intalled with basic experimental apparatus, such as liquid scintillation counter, tritium electrolysis apparatus, combustion furnace for extracting ^{3}H and ^{14}C are required, while skilled marine radiation monitoring and dose assessment researchers are of vital importance, either. For target GPs, radiation protection monitoring or research agencies with local staff are required.

Stakeholder analysis and partnerships:

Briefly describe who are expected to be the end-users and principal beneficiaries of this project. Indicate whether the end-users contributed to development of the Concept.

Principal stakeholders of this project will include nuclear regulators, environmental agencies, nuclear power plant operators (existing and future), fisheries departments, seafood industry, official food protection agencies, marine aquaculture industry, and tourism industries. Their role in this project is to attend partially or fully in the research projects and training courses. Vise vera, yes, the end-users would contribute a lot to the development of the Concept, either.

Have any extrabudgetary funding possibilities been identified?

Not yet.

Role of nuclear technology:

Indicate the essential nuclear technique that would be used and outline why it is suitable for addressing the problems/needs in question.

Nuclear technology is an essential component of this project. Advanced radiochemical procedures for sample processing are followed by the application of liquid scintillation counting (LSC) and mass-spectrometry (MS), etc, during which ^{3}H and ^{14}C isotopes are applied to verify radiochemical yields and calibrate the instrument counting efficiency, which turns to be the vital steps for establishing monitoring methods required in this project. Integral to this proposal is the enhancement of existing programs through training and inter-laboratory quality assurance activities.

Radiotracers will be used in radioecology and oceanography investigation, ocean circulation, and water mass mixing investigation. This technique has become a powerful tool to reveal bioaccumulation, distribution, and trophic transfer of radionuclides in marine species of interest, and to understand natural coastal and marine processes. The results obtained, including concentration/transfer factors and ocean circulation & water mass mixing, could also be used in conjunction with site-specific data from the radioactivity measurement to customize and improve the accuracy of radiation dose and hydrological

modelling. The former could be used for radiological risk & dose assessment in economic marine species and consumers, while the latter could be used as the decision support system for preparedness and response in a nuclear or radiological emergency in seas. Assistance would be requested from IAEA for the conduct of proficiency tests for this project and in the sourcing and provision of appropriate standards and reference materials.

Is this the only available technique that could be applied to address the problem/ need?

Yes.

Does it have a comparative advantage over non-nuclear techniques?

Yes.

Duration of the project:

Indicate the number of years required to complete the project.

Four years are required to complete the project.

Part 3: National Representative Endorsement for Project Concept

As the RCA NR of China, I have reviewed the Project Concept thoroughly and confirm that it meets the following requirements:

1. The objective of the Project Concept is aligned with priorities set out the RCA Regional Programme Framework (RPF) for 2024/25.
2. The project addresses a regional need.
3. Nuclear technology is an essential component of the project.
4. Outcomes and achievements of previous projects in this area of technology have been taken into consideration
5. There is no overlap or duplication with current or previous RCA projects
6. Further projects in this area can be justified (if relevant)
7. The Project Concept has a strong TCDC component

Signature: 

Name: Mr. HUANG Ping

Date: 31/12/2021