

LAPORAN TEKNIS 2015

08.d/AIR 2/OT 02 02/01/2016

*SUPPORTING NUCLEAR AND ISOTOPIC TECHNIQUES TO  
ASSESS CLIMATE CHANGE IMPACT FOR SUSTAINABLE  
MARINE ECOSYSTEM MANAGEMENT (RAS/7/024)*

Ali Arman, Aditya Dwi Permana dan Untung Sugiharto



PUSAT APLIKASI ISOTOP DAN RADIASI  
BADAN TENAGA NUKLIR NASIONAL  
2016

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Ali Arman, Aditya Dwi Permana, Untung Sugiharto dan Zulhema

I. Laporan Kemajuan Januari 2015-Juni 2015

**REGIONAL COOPERATIVE AGREEMENT (RCA)**

**Project RAS/7/024**

**PROGRESS REPORT- January June 2015**

**1. Administrative information**

**1.1 Member State : INDONESIA (INS)**

**1.2 Project Title and Number :**

IAEA/RCA Project RAS-7/024 Supporting Nuclear and Isotopic Techniques to Assess Climate Change for Sustainable Marine Ecosystem Management

**1.3 National Project Coordinator : Ali ARMAN**

**Alternate NPC : Yulizon MENRY**

**2. Regional Activities**

**Participation in Regional Events**

<b>Title of the Event</b>	<b>Participant/s</b>	<b>Member of the Project Team</b>

- a) Are there any constraints faced in nominating members of the National Project Team for participation in regional events?
- b) Have the participants of the Regional Training Courses shared the knowledge gained with other member of the project team?
- c) Is the training received relevant to the project activities?

**3. Status of Implementing the National Work Plan**

Please attach a copy of the National Work Plan for implementing this project, and indicate the status of implementation of the Work plan. A simple format for the Work Plan is given below.

NATIONAL WORKPLAN INDONESIA RAS7024

No	Year	Activities	Remark
1.	2012	Appointment of the National Project Coordinator, Alternate Project Coordinator and National Project Team	Done
2.	2012	Meeting with end-users and stakeholders on coastal issues and candidate sites for study	Done
3.	2012	Preparation and adoption of the National Work Plan and identification of national support	Done
4.	2012	Submit semester and annual report to LCC and TO	Jan – Jun 2012, Jul – Dec 2012, done
5.	2012	Expert mission	
6.	2013	Participation in the RTC1, Colombo, Sri Lanka.	Done, 2 participants (1 from nuclear institute, 1 from stakeholder)
7.	2013	Implementation of the project in Nusa Penida Bali and Jakarta Bay in collaboration with NPT/stakeholder: <ol style="list-style-type: none"> <li>1. Sampling coral core</li> <li>2. Preparation for Analysis</li> <li>3. Collecting sample prawn for sending to Australia.</li> </ol>	- 2 Corals Porites Sp, have been analysed using Radiograph X-ray for determining date and extension rate related to climate change. - Analysis of Stable Isotopes of corals is still on on-going. - Samples (prawn and mussels) have been sent to Australia.
8.	2013	Participation in the Midterm review meeting	Done, 2-5 December 2013, in Goa, India
9.	2013	Participation in the RTC2, Kuala Lumpur, Malaysia	Done, 2 participants (1 from nuclear institute, 1 from stakeholder)
10.	2013	Submit semester and annual report to LCC and TO	Jan-Jun 2013, done
11.	2014	Implementation of the project in Nusa Penida Bali, Jakarta Bay and Bunaken in collaboration with NPT/stakeholder: <ol style="list-style-type: none"> <li>1. Analysis (continue)</li> <li>2. Report</li> </ol>	Continue the analysis of coral samples particularly on the trace elements ; such as Ca, Sr and Mg and stable isotopes (O-18 and C-13)
12.	2014	Submit semester and annual report to LCC and TO	Jan-Jun 2014, done
13.	2014	Participation in the Workshop on Climate Change in Monaco Laboratory and to disseminate to stakeholders	8-12 December 2014

14.	2014	Submit semester and annual report to LCC and TO	July-Dec 2014
15.	2015	Submit semester and annual report to LCC and TO	Jan-Jun 2015
	2015	1. Analysis of coral sample from Bunaken, North Sulawesi. 2. Finalize all analysis and data interpretation. 3. Final report	January – September 2015
	2015	Participation in Final Meeting	October 2015
	2015	Submit Final Report to LCC and TO	July-Dec 2015

#### 4. Main achievements

Please list the main achievements of the project during the period **January – June 2015**. If you are reporting on the past achievements for continuity, please indicate when they were achieved.

Collecting coral core sample from massive coral *Porites spp* using drilling techniques (2013).

Sample preparation of massive coral for X-ray and trace element analysis (2013).

Analysis of annual banding of massive coral using X-ray radiograph and Ultra violet light related to past climate change (2014).

Analysis of pollutants (heavy metals) in coral sample using Neutron Activation Analysis (NAA) related to geochronology of pollutions (2015).

Sample corals from 4 different locations; Seribu Islands (Northern Jakarta), Nusa Penida-Bali, Bunaken-North Sulawesi and Lombok-West Nusa Tenggara. The last three are located in Coral Triangle Initiative (CTI) area (2013-2015).

#### 5. Constraints for successful implementation of the project

#### 6. Any additional information that could be relevant

II. Laporan Kemajuan Juli 2015-Desember 2015

**REGIONAL COOPERATIVE AGREEMENT**  
**INTERNATIONAL ATOMIC ENERGY AGENCY**



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**Final Assessment Meeting Report**

**IAEA/RCA TC Project RAS/7/024**

**Supporting Nuclear and Isotopic Techniques to Assess Climate Change Impact for Sustainable Marine  
Ecosystem Management**

**Denpasar, Indonesia**

**October 26-30, 2015**

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## 1. PROJECT BACKGROUND

The Asia-Pacific is a unique region rich in biodiversity accounting for 2/3 of the world's biological resources and more coastline than any other region of the world. The protection and sustainable management of the region's marine resources is a compelling issue. The region supports 50% of the world's population, with rapid population growth especially in the coastal zone and rapidly increasing industrial expansion. Growth in trade and fisheries resources, expansion of aquaculture production, intensified land-based activities, including deforestation; mining and agriculture all impact the health and sustainability of coastal resource. *Climate change, biodiversity losses and marine resources degradation* have impacted on the coastal environment in the regional context, not to mention the global impact of these issues.

The impacts of climate change on the marine ecosystem can no longer be underestimated. This phenomenon is known to cause global warming, sea level rise, ocean acidification, oxygen depletion, and increases the frequency and intensity of extreme weather events. Consequently, climate change has direct adverse effects on fisheries resources (e.g. changes in the structure of food webs), coastal aquaculture (e.g. storm damage & hypoxia), coral reefs (e.g. coral bleaching) and other coastal resources as well as human habitation patterns in large low-lying coastal cities. Alteration in the water cycle will also cause changes in erosion and the distribution, transport and bioavailability of nutrients and pollutants resulting in eutrophication and contamination of seafood and aquaculture products. The Asia-Pacific region is particularly vulnerable to the impacts of climate change, as the region has the greatest coastline (e.g. island nations), incredibly diverse and often unique marine environments (e.g. coral triangle), and many large coastal population centres (mega-cities) that are already suffering from more storms and floods when compared to other regions in the world. This situation is well acknowledged by UNISDR, UNESCAP and IPCC reports and strategic plans.

In recognition of the alarming threats of climate change to the marine environment, the IAEA/RCA implemented the RAS 7024 regional project entitled; supporting Nuclear and Isotopic Techniques to Assess Climate Change Impact for Sustainable Marine Ecosystem Management which specifically aims to enhance regional capabilities for utilization and application of nuclear and isotopic techniques to assess climate change impacts on marine and coastal resources. The regional project is implemented 2012- 2014 and extended for one year.

The purpose of the meeting is to identify the achievements, hindrances and perspective of the regional project. It also aims to how to properly disseminate information materials and to decide how to proceed with the long term storage and maintenance of regional climate change project data.

## 2. OPENING and INTRODUCTORY SESSION

The final assessment meeting was held in Denpasar, Bali, Indonesia from October 26 to 30 October 2015. It was attended by fourteen participants (14) participants from twelve(12) RCA Government Parties (GPs) including National Project Counterparts (NPCs) from Australia, Bangladesh, People's Republic of China, Indonesia, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam and three (3) stakeholders/observers from the host country (Indonesia). The list of participants is shown in Annex II.

Mr.Massoud Malek, Project Management Officer (PMO) was also in attendance to participate in the final assessment meeting and represent the IAEA.

The meeting started with the opening and welcome remarks rendered by Dr.Ferhat Azis, the Deputy Chairman for Nuclear Science and Technology Application, BATAN, Indonesia. He extended his greetings, warmly welcomed all participants to the meeting and acknowledged IAEA in selecting Indonesia to be the host of this important meeting. In his remarks, he also highlighted the activities being conducted in BATAN starting from the successful establishment of their research reactor. He also recognized that apart from the utilization of reactors for nuclear energy generation, also comes the application of nuclear science and technology in addressing marine issues notably climate change and ocean acidification. He gave an overview of the researches being conducted towards better understanding of marine climate change and its drivers.



Mr. Malek also gave his welcome remarks. He thanked BATAN and Indonesians for kindly accepting to be the host of the meeting. The PMO highlighted the objective of the meeting and wished every participant for a productive meeting.

Ms. Adelina Bulos (LCC/PHI) also gave a short welcome note wherein she thanked the Indonesians for kindly accepting the hosting and organizing of the meeting in short notice. She also expressed her thanks to all the participating GPs and colleagues and recognized them for their active contribution and cooperation.

After the introductory and welcome session the group appointed Mr. Ronald Szymczak (AUL) to be the Chairperson of the meeting. Ms. Adelina Bulos was tasked to be the Rapporteur and Mr. Vajira Waduge (SRL) agreed to be the second rapporteur. The group then adopted the draft meeting agenda. A copy of the agenda is shown in Annex I. This was followed by some announcements from Dr. Ali Arman Lubis (INS), the meeting organizer for some administrative and logistical matters. A group picture taking concluded the session.

### **3. PROJECT OVERVIEW and COUNTRY REPORTS**

The meeting proper was started by a presentation from the PMO. He presented an overview of the RCA including its vision as well as its membership. He informed that RAS (Regional Project for Asia and the Pacific) has 22 participating countries. He also explained the different classification of regional project i.e. agreement or non-agreement. Briefly, he also informed the group of the research project selection mechanism of RCA. The PMO also introduced a platform network for the maintenance and storage of the data and results of the project. Further communication /networking among existing group was encouraged to promote the sustainability of project activities and impact monitoring. This will be discussed further during the course of the meeting.

The LCC gave an overview of the RAS7024 regional project. The activities conducted in the three year implementation which included regional training courses and conduct of expert mission in the Ps were presented. She also discussed the regional project's log framework matrix showing the outcome, out and activities. Likewise, the regional work was presented as well as the action plan for the one-year extension. She made mention of the meetings conducted within the project and in the end, she presented an overview of each of the individual GP's project activities and accomplishments.

After the overview, presentation of country reports followed. Each of the GPs presented their country reports highlighting the results and accomplishment on their national projects implementation. These reports were aimed at presenting the outcomes and impacts rather than specific data and results. These reports can be found in Annex III.

#### 4. CLIMATE CHANGE REPORT CARD

Following the individual government parties (country representatives) individual reports, the Chair discussed on the Climate Change Report Card (CCRC) which was initiated and drafted during the Monaco workshop conducted last December in Monaco. A short discussion on the process to update and revisit the CCRC was conducted and the GPs were asked to identify the necessary revisions and updates in the process and country templates, as maybe necessary. The Chair together with the participants went through the whole process of updating and revisiting of the whole package starting from the cover up to the last page.

When the updating and corrections to the report card were completed, the participants were split into six working groups according to thematic areas (coral reefs, open ocean, near shore estuaries, pollution baseline data, capacity development and aquaculture/river discharge).

#### 5. TECHNICAL TOUR

The meeting was complemented with a scientific visit to Nusa Lembongan, the study site of the Indonesian national project. A sampling demonstration for collection of coral core samples was conducted. The participants were informed on the necessary activities and materials at the pre-sampling phase as well as in the collection itself and storage of collected coral samples. Different techniques to divide or pre-sample the core were also introduced.

#### 6. CONCLUSIONS

- i. Nuclear and isotopic techniques (NITs) provide powerful and effective means for marine ecosystem climate change studies.
- ii. During this 4 year (2012-15) project 13 Asia-Pacific (RCA) countries utilised NATs for analytical and ecosystem process studies in coral reefs, ocean, coastal and aquaculture situations to quantify biological health impacts, seawater movements, temperature, acidification, sedimentation, nutrient fluxes and establishment of contemporary and historical pollution baselines.
- iii. The participants agreed that the climate change report card format was appropriate to disseminate the regional project achievements at the executive level. The report card is back-stopped by ecosystem based reports which combine the outcomes of the countries research activities into ecosystem issues associated with marine climate change.
- iv. All GPs have made significant progress with their projects.
- v. Specifically, AUL, CPR, INS, NZE, PAK, SRL, THA and VIE achieved the project objectives. However, additional support is needed at the national level by the participating countries for sustainability.
- vi. BGD, MAL and PHI were constrained by late or inadequate national funding and expect to achieve objectives in the near future.
- vii. MYA was constrained by lack of human skills/resources, as well as funding.
- viii. The capability development achieved through RTC's held during the project has been useful to assist countries to develop their national projects.
- ix. Expert Missions are an extremely efficient vehicle for training and capability development, verified by the progress reported by those GPs who received EMs.
- x. The project established a foundation and effective network for future regional marine climate change studies.
- xi. The meeting agreed to utilise the CLP4NET to host project-produced materials and act as a resource for future networking and project development/funding.

#### 7. RECOMMENDATIONS

To IAEA;

- i. Support a future regional project addressing marine climate change.
- ii. Support future national projects addressing marine climate change.
- iii. Support dissemination and outreach of the project outcomes (e.g. Climate Change Report Card) via a regional Executive Seminar and/or other mechanisms.

To Governments and NRs;

- i. Government agencies should strongly support ongoing funding to participating national agencies beyond the timeframe of this project to ensure work of national significance in marine climate change continues.
- ii. Apply nuclear and isotope techniques in national research programmes and support further development of nuclear and isotopic capabilities and facilities for marine climate change research.
- iii. Use the generated information for policy development and climate change adaptation strategies in marine environments.
- iv. Provide technical and financial support for the production of information packages at the national level.

To NPCs;

- i. Each NPC should report outcomes of their findings to their national stakeholders to increase awareness of the use of nuclear and isotopic technique applications for marine climate change research.
- ii. The PHI NPC (LCC) will provide project materials to be uploaded under CLP4NET.
- iii. The CLP4NET should be utilised to prioritise marine climate change thematic areas.