Report of Organizing a Training Course on eDNA Analysis

1. Background

In 2019, CEARAC developed the CEARAC Medium Term Strategy for Marine Biodiversity Conservation (hereafter, CEARAC BIO MTS). The basic policies of CEARAC BIO MTS are:

A) CEARAC focuses on activities related to coastal environmental assessment and development of assessment tools for special monitoring programs, as shown in the Memorandum of Understandings (MoU) with the United Nations Environment Programme (UNEP);

B) CEARAC contributes to the development of the NOWPAP Regional Action Plan on Marine and Coastal Biodiversity Conservation (RAP BIO), and implements our tasks shown in the RAP BIO to conserve marine biodiversity in the NOWPAP region after the RAP BIO is approved; and

C) Through our monitoring and assessment programs of marine biodiversity, CEARAC contributes to NOWPAP Ecological Quality Objectives (EcoQOs) and their achievements.

In the CEARAC BIO MTS, three highly prioritized topics for future CEARAC activities are shown: 1) conservation of biological habitats including tidal flats, salt marshes and seagrass/seaweed beds in the NOWPAP region; 2) plankton species related to aquaculture and fisheries; and 3) environmental DNA. For marine biodiversity conservation, CEARAC applies new monitoring techniques, and shares useful method(s) among the NOWPAP member states. In addition, CEARAC contributes to capacity building for education of young scientists in the NOWPAP region and neighboring areas.

Environmental DNA (eDNA) is the latest analytical method which was developed in molecular biology. It has potential to monitor organisms without conducting harvest surveys, and it is expected to be used for biodiversity conservation. CEARAC expects to use eDNA as a new special monitoring tool in addition to remote sensing.

On the other hand, eDNA techniques were developed rapidly in the last decade. Therefore, the methodology has not been standardized internationally yet, and the level of its application is quite different among countries. Japan is one of the leading countries in this field, so can introduce the knowledge and technology to the other NOWPAP member states.

CEARAC organized a workshop on marine and coastal biological conservation in the NOWPAP region held in November 2019, and the meeting participants exchanged opinions on an activity of eDNA for the 2020-2021 biennium. Experts of eDNA in the NOWPAP member states introduced related studies in each member state. In China and Korea, application of eDNA has just started. Russia has necessary equipment for eDNA analysis, but the actual study/research will be started from now on. It was found

out as a common issue among the member states that developing fruitful database for meta-barcoding analysis is the first step to apply eDNA techniques in the region. Based on the current situation of the NOWPAP member states, it was proposed and agreed to organize a training course on eDNA analysis in the 2020-2021 biennium to share the latest Japanese technology with the NOWPAP member states.

2. Objective

Objectives of this activity are to develop the common manual for an eDNA survey and experiment, and to organize a training course for sharing/introducing the latest technology among the NOWPAP member states.

3. Tasks

3.1 Development of the common manual for eDNA sampling and experiment

The eDNA Society, Japan developed a manual for eDNA sampling and experiment in 2019 which aims to standardize the methodology among the scientists in Japan. With the support from the eDNA Society, the manual was translated into English to share among the NOWPAP member states.

3.2 Organizing a training course on eDNA analysis

Due to the pandemic of COVID-19, the training course which is planned to organize in March 2021 was postponed to March 2022. The plan of the training course is as follows;

Venue: Kobe University, Japan

Date: March 8-12, 2021 (5 days)

Schedule:

	AM	PM
Day 1	Lecture	Water sampling and filtration
Day 2	DNA extraction	1st PCR test
Day 3	2nd PCR test	Quality check
Day 4	Lecture	Data analysis
Day 5	Report	Closing

However, because of continuation of COVID-19 pandemic, oversea travel in the world is restricted. In case of Japan, all travelers from other countries are requested following measures;

1) Application of a new visa at the Embassy or Consulates of Japan
2) Obtainment of a certificate of pre-entry testing result in the country/region of departure within 72 hours before departure
3) Private medical insurance is necessary

4) Submission of “Written Pledge (Residence track” and “Questionnaire”
5) Prohibition of use of public transport, and staying hotel/home during 14 days after entering to Japan
6) Installation and set-up of the necessary applications (LINE, COVID-19 contact tracing and map applications)
7) Reporting health condition every day for 14 days after entering Japan

Under such restrictions, it is difficult to accept foreign participants and organize a face-to-face training course. Therefore, the CEARAC Secretariat would like to propose to cancel organizing a training course in the 2020-2021 biennium but to organize in the next biennium, 2022-2023.

CEARAC Secretariat will discuss with the eDNA Society, Japan about possibility to develop a video manual and to organize a one-day online seminar using the developed video manual. If support from the eDNA Society is available, the CEARAC Secretariat would like to propose an alternative plan to have an online seminar in place of the planned training course. If any financial support is not available, the budget (25,000 USD) for training course will be returned to the NOWPAP Trust Fund.

4. Expected outputs

Through organizing a training course, wider recognition of the state-of-the-art technique of eDNA analysis is expected. However, it is difficult to disseminate this technology only by one training course; therefore, continuous organization of the training course is necessary. In addition, the CEARAC Secretariat plans to encourage trainees to disseminate/introduce their learned technique among the NOWPAP member states.

When all of the NOWPAP member states use eDNA analysis methodology in common and have the similar level of its studies, we can start enhanced activities such as a joint survey on biodiversity and/or non-indigenous species in the NOWPAP region. In the NOWPAP Medium-term Strategy and Ecological Quality Objectives (EcoQOs), actions against prevention of non-indigenous species (NIS) are pointed out as one effective measure for conservation of marine and coastal environment. EDNA will contribute to the future activities of NOWPAP.

5. Budget

Tasks	Budget (USD)
Cost for organizing a training course	10,000
Travel support for selected trainee	9,000 (1,500x6 trainees)
Travel for lectures	6,000 (2,000x3 lecturers)
Total	25,000

6. Schedule

Year		Tasks	Main Body
2020	Q3	Approval of implementation plan by email communication	FPs, CEARAC Secretariat
	Q3	Development of the common manual on eDNA sampling and experiment	Experts of member states, CEARAC Secretariat
	Q3-	Preparation of a training course - Establishment of the steering committee - Asking co-sponsor to related international organization	 CEARAC Secretariat, experts CEARAC Secretariat
	Q4	Open for application	CEARAC Secretariat
	Q4-2021 Q1	Selection of trainees	Steering Committee
2021	March	Organizing a training course	Local organizer, CEARAC Secretariat
		Discussion on activity for the 2022-2023 biennium	CEARAC Secretariat, experts

* As shown in above, if the member states agree to organize a training course in 2022 for safety reason, the schedule will be changed.

7. Others

If 18th CEARAC FPM agree to cancel a training course on eDNA analysis, budget for this project will be returned to the NOWPAP Trust Fund. Possibility of change of project will be discussed with NOWPAP RCU and local organizers. Alternative option is developing training video and organizing one day online seminar.