

CEARAC Medium Term Strategy for Marine Biodiversity Conservation in the NOWPAP Region (DRAFT)

1. Background

Many Global Environmental Assessment Reports such as Millennium Ecosystem Assessment have mentioned loss of biodiversity and degradation of ecosystem services in the world, and the needs of global actions for biodiversity conservation has been recognized. In 2010, COP 10 (10th meeting of the Conference of the Parties to the Convention of Biological Diversity) was held in Nagoya, Japan. The meeting adopted the Strategic Plan for Biodiversity 2011-2020, including Aichi Biodiversity Targets. Unfortunately however, it is quite certain that several targets cannot reach the goals in 2019, and discussion on the Post-2020 Biodiversity Framework as a stepping stone towards the 2050 Vision has started. In addition, 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals were adopted at UN Summit in 2015. In 17 Sustainable Development Goals (including 169 Targets), Goal 14: Life below Water and Goal 15: Life on Land request all of the member states to take actions for biodiversity conservation. To achieve the global common targets, they accelerate practical actions for biodiversity conservation in their respective countries.

The northwest Pacific (NOWPAP) sea areas covers temperate and cold sea areas, and diverse marine species are living in this area. At the same time, NOWPAP region is one of the most populated areas in the world and faces rapid economic growth in its sounding countries. There are strong anthropogenic pressures on its marine biodiversity (CEARAC 2018). At the 14th NOWPAP Intergovernmental Meeting (IGM) held in 2009, the member states agreed marine biodiversity conservation is one of the high priority marine environmental issues in this area, and requested Regional Activity Centres (RACs) to promote relevant activities immediately. Based on the IGM decision, each RAC has started projects on marine biodiversity conservation with support from the NOWPAP member states. In 2012, the member states adopted NOWPAP Medium-term Strategy 2012-2017 (MTS 2012-2017) which shows basic policies and visions on NOWPAP activities. Marine biodiversity conservation is included as one of the main themes of the MTS and it is planned to develop Regional Action Plan for Marine and Coastal Biodiversity Conservation (RAP BIO) under close cooperation among the NOWPAP member states, Regional Coordinating Unit (RCU) and RACs by 2017. RAP BIO is the basic policy to state the future vision and roles of the member states, RCU and RACs on marine biodiversity conservation in the NOWPAP region. Unfortunately, RAP BIO was not developed by 2017 and the work was carried on into the next MTS 2018-2023 which was adopted in 2018. As one project for the 2018-2019 biennium, development of a roadmap for RAP BIO has been initiated and it is expected that RAP BIO will be developed by 2023.

Now the ideas of establishing regional goals for marine environmental conservation and Ecological

Quality Objectives (EcoQOs) are applied into the NOWPAP framework. EcoQOs is used in European sea areas such as Baltic Sea and Mediterranean Sea, and NOWPAP IGM agreed to use it for environmental conservation in the NOWPAP region. Pollution Monitoring Regional Activity Centre (POMRAC) developed five EcoQOs on marine biodiversity conservation and prevention of marine pollution in 2017 (POMRAC 2017), and the member states approved them. The NOWPAP EcoQOs on marine biodiversity conservation are the followings:

- Biological and habitat diversity are not changed significantly due to anthropogenic pressure: and
- Alien species are at levels that do not adversely alter the ecosystems.

CEARAC is expected to propose how to contribute to the future vision and action plans for marine biodiversity conservation in the NOWPAP region. At the 14th CEARAC Focal Points Meeting (FPM) held in 2016, CEARAC Focal Points (FPs) of the NOWPAP member states recommended the Secretariat of CEARAC to show the clear future vision on CEARAC's marine biodiversity activities based on outputs/outcomes of the past relevant activities of CEARAC as well as gaps among the member states. Then, the Secretariat proposed a new project for developing a CEARAC Medium-term Strategy for Marine Biodiversity Conservation (CEARAC MTS) for the 2018-2019 biennium at the 15th CEARAC FPM (August 2017), and it was approved by the 22nd IGM (December 2017). CEARAC MTS aims to state our vision on how to contribute to marine biodiversity conservation in the member states and NOWPAP region. CEARAC MTS is also expected its contribution to the development of NOWPAP RAP BIO and the achievement assessment of NOWPAP EcoQOs.

2. Feasibility assessment for development of CEARAC MTS

At the 16th CEARAC FPM held in 2018, potential topics that CEARAC should tackle with in the future and tools to be developed were selected based on the member states' strategies and needs on marine biodiversity conservation. Then, the following six potential topics and useful tools were selected:

- 1) Assessment of marine biodiversity;
- 2) Harmful invasive species;
- 3) Specific migration species;
- 4) Conservation of biological habitat including tidal flat, salt-marsh and seagrass/seaweed beds;
- 5) Plankton species related to aquaculture and fisheries; and
- 6) Environmental DNA (e-DNA)

To implement activities on any of potential topic above, it is essential to have sufficient related information and data in each member state and support from the member states' experts. Therefore, feasibility assessments were conducted in each member state by nominated experts to clarify the possibility to implement activities on the six potential topics. The results of the feasibility assessments are attached as Annex to this report.

Regarding the topics 1), 2) and 3), several member states answered difficulties of implementing any

related activities because of the limitation of available data or even no data. Therefore, it is difficult to plan and implement CEARAC activities on these three topics from 2020 on under the current situation; however, it is strongly expected to accumulate relevant data and information in each member state for future use. On the other hand, NOWPAP EcoQOs aim to reduce anthropogenic impacts on marine biodiversity and prevent damage from invasive species, which are indeed relevant to the potential topics 1) - 3). To deal with this contradiction, utilization of monitoring and analytical techniques of remote sensing and e-DNA could improve the lack of available data. Thus, CEARAC tries to apply these useful tools as much as possible to accumulate data and information for future activities.

Regarding the selected potential topics 4), 5) and 6), positive comments were provided from the member states, so CEARAC should focus on them and implement related activities. During the past biennia, CEARAC has conducted marine environmental monitoring using remote sensing techniques and promoted development and application of monitoring tools with remote sensing techniques, for example, eutrophication status assessment and seagrass/seaweed distribution mapping. Over three decades marine observation data by satellite is available now, and the change of coastal habitats by anthropogenic impacts can be assessed using satellite images. Conservation of biological habitats is one of high prioritized topics CEARAC can/should implement and contribution to NOWPAP EcoQOs is expected through implementing CEARAC's past, on-going and future activities on this topic.

CEARAC Working Group 3 has experiences on activities of red tides and harmful algal blooms (HABs), and enhanced information-sharing through developing database. Red tide is a phenomena by specific phytoplankton species, which is increased rapidly and gives damage to fisheries and aquaculture. Such rapid-growing blooms of phytoplankton change marine biodiversity and ecosystem temporarily. In recent years, changes of distribution of harmful algae blooms causative species due to global warming have been reported and a new issue, occurrence of massive algal blooms such as green tides and golden tides in the NOWPAP region has emerged. To share such information is necessary to conserve marine biodiversity, so topic 5 (Plankton species related to aquaculture and fisheries) is a high priority issue in the NOWPAP region.

E-DNA is a new analytical technique developed in the field of molecular biology. This technique can amplify the DNA of marine species included in sea water and it helps to monitor marine species living in the target sea area. Therefore, scientists recognize this techniques is a very useful tool to assess marine biodiversity and to estimate the distribution of specific species. Actually, the use of e-DNA techniques has started globally. In the feasibility assessment, limitation of available data on marine biodiversity and invasive species is mentioned. To use e-DNA and collect data may resolve problems of limitation of available data. This technique has high potential for biodiversity activities, with some problems to be resolved; analytical equipment and analytical cost are high and there may be gaps on the use of e-DNA among the member states because the technology has just been developed in recent years. Other international organizations are considering using e-DNA technology, so it is expected that NOWPAP also start using it for marine biodiversity conservation in our region and be a front-runner of this field. Since a major responsibility of CEARAC is to use special monitoring techniques and to develop special monitoring

tool using those techniques, e-DNA is a good match with our responsibility.

Based on the results of feasibility assessment and past CEARAC's experiences as well as our future direction, CEARAC Medium-term Strategy is shown in the next chapter.

3. CEARAC Medium-term Strategy for Marine Biodiversity Conservation in the NOWPAP region

While RAP BIO will show the role of each RAC for marine biodiversity conservation in the NOWPAP region, CEARAC's basic policies described in CEARAC MTS should be correspondence with future role of CEARAC and be reflected in RAP BIO. In parallel with development of CEARAC MTS, the project of development of a roadmap for RAP BIO has been implemented in the 2018-2019 biennium. Through developing CEARAC MTS, CEARAC can contribute to the development of RAP BIO.

3.1 Basic policy of CEARAC MTS

The basic policies of CEARAC MTS are as follows:

- A) CEARAC focuses on activities which are related to coastal environmental assessment and development of assessment tools for special monitoring programmes, as shown in the Memorandum of Understandings (MoU with the United Nations Environment Programme (UNEP).
- B) CEARAC contributes to the development of RAP BIO, and implements our tasks shown in RAP BIO and conserves marine biodiversity in the NOWPAP region after RAP BIO is approved.
- C) Through the monitoring and assessment programmes of marine biodiversity, CEARAC contributes to NOWPAP EcoQOs and its achievements.

3.2 High priority activities for future CEARAC marine biodiversity activities

CEARAC implements following activities on a preferential basis.

(1) Conservation of biological habitats including tidal flats, salt-marshes and seagrass/seaweed beds in the NOWPAP region

[Rationale]

In the feasibility assessment reports, this topic was answered feasible and in high priority.

CEARAC developed "A manual for seagrass and seaweed beds distribution mapping with satellite images" (2015). Using this manual, CEARAC implemented case studies in selected sea areas in the member states to confirm its effectivity, and made a seagrass bed distribution map. CEARAC can expand targets habitats based on the past experience on habitat mapping with satellite images.

In the NOWPAP EcoQOs, to prevent significant changes of biological habitats by anthropogenic pressures is one of NOWPAP's targets. Information on distribution and historical change is helpful to assess the achievement of EcoQOs.

In addition to seagrass/seaweed beds, important habitat for marine biodiversity conservation, such as tidal flats and salt-marshes, are distributed in the NOWPAP region. They are important habitats for

migratory birds for their feeding areas and wintering spots. So, any activity on this topic will contribute to conservation of marine biodiversity including specific migratory species.

[Future direction and potential activities]

CEARAC developed a manual for mapping seagrass/seaweed distribution in the NOWPAP region. After development of a seagrass/seaweed distribution mapping manual, CEARAC continues this activity. In addition, blue carbon, absorption and fixation effect of carbon by seagrass beds is focused as a countermeasure against global warming. For not only conservation of marine biodiversity but also addressing global warming, further activities on seagrass are expected.

For mapping of other coastal habitats, namely tidal flats and salt marshes, development of a new mapping tool is required. Fortunately, Murray N.J. et al. (2019) developed a mapping tool for intertidal areas using satellite images and provided data of their historical distribution from 1984 to 2014 using Google Earth Engine through “Global Intertidal Change”. Therefore, it is not necessary for NOWPAP to develop a mapping tool by ourselves. Mapping of tidal flats and salt marshes in the NOWPAP region using the developed tool is one of the potential future activities of CEARAC.

When the distribution map of tidal flats and salt marshes in the NOWPAP region is developed, many research papers/reports are available accordingly. Researchers in China and Korea have a distribution map of tidal flats in the Yellow Sea, and the Ministry of the Environment, Japan developed a distribution map of tidal flats in the Seto Inland Sea and Ariake Sea. Through the comparison of data from Global Intertidal Change and national data, we can develop a distribution map in the NOWPAP region. The developed distribution map will be used for assessment of EcoQOs.

Tidal flats and salt marshes are important habitats for feeding, resting and wintering of migratory birds. Specific migratory species is selected as one of potential future topics; however, the limitation of available data was reported. A distribution map can provide information for their conservation, and CEARAC could start project on specific migratory species using collected data and information through this activity. In tidal flats in the NOWPAP region, several endangered species, Japanese horseshoe crab (*Tachypleus tridentatus*), spoon-billed sandpiper (*Calidris pygmaea*) and others are living in there. Protection of coastal habitats will contribute to protect of endangered species. Data and Information Network Regional Activity Centre (DINRAC) is developing a NOWPAP Red List, so we can collaborate each other.

(2) Plankton species related to aquaculture and fisheries

[Rationale]

Based on the feasibility assessments, this topic is selected as a high priority one.

CEARAC Working Group 3 has implemented activities of coastal environmental assessment using indicators on red tides and harmful algal blooms (HABs). CEARAC collected information on HAB occurrences in the NOWPAP member states and shared it among them, and developed “Booklet of countermeasures against HAB”. Through these activities, CEARAC has contributed to marine environmental conservation, so CEARAC has enough knowledge in this field.

In the NOWPAP member states, HABs occur regularly and give huge damage to fisheries and aquaculture. Red tide is a phenomena in which some specific phytoplankton species increase rapidly. It disturbs marine biodiversity temporary and causes hypoxia in the sea area. From a marine biodiversity conservation point of view, red tides and HABs are the topic to be focused.

In recent years, it was reported in the member states that non-indigenous species including red tide causative species invade through ballast water, and red tide species change its distribution due to global warming. It means that red tide and HAB species are also recognized as invasive species in the world. In addition, a new problem on massive blooms such as green tides and golden tides has happened in the NOWPAP region. Therefore, CEARAC would focus on this topic for marine biodiversity conservation in the NOWPAP region.

[Future direction and potential activities]

CEARAC tries to update the existing HAB Database and HAB Reference Database adding the latest information on HAB occurrences in the member states. Especially, information on HAB distribution change and massive blooms should be collected preferentially.

From the point of view on non-indigenous species, assessments of species distribution changes and impacts on native ecosystems are required in the future.

A new project on marine biodiversity conservation "Identification of key indicator species and ecosystems of biodiversity change in the NOWPAP region" was proposed from Russia and relevant experts are preparing project documents. The final goal of this project is to select common indicator species for marine biodiversity conservation among the member states. In the NOWPAP region, there are many common HAB species. Such plankton species may be selected as one of indicator species in the new project to understand the distribution and expansion of invasive species in this area.

(3) Environmental DNA (e-DNA)

[Rationale]

The applicability of e-DNA technology to conservation of marine biodiversity is expected in the feasibility assessment reports.

One of the responsibilities of CEARAC is to develop a coastal environmental assessment tool using special monitoring techniques. E-DNA is a new technology developed in the field of molecular biology, and it can be used to monitor marine diversity and specific species. Thus, e-DNA matches with CEARAC's responsibility and future marine biodiversity activities.

In Japan, monitoring of fish species using e-DNA has been conducted, and monitoring of specific species such as invasive species and endangered species is planned. This technique is practical in use and has potential to resolve the limitation of available data on marine biodiversity in the NOWPAP region.

In other sea areas and international organizations, application of e-DNA has started, so NOWPAP can collaborate with them in this field. If NOWPAP has initiative in this topic, NOWPAP can contribute to global biodiversity conservation.

[Future direction and potential activities]

E-DNA is a newly developed technology; therefore, its survey and analysis method has not been standardized internationally. It is supposed that the situation of using e-DNA techniques is different among the NOWPAP member states, so that the first step of this activity is capacity building to standardize the utilization of e-DNA techniques, to develop and distribute a common manual and to develop a network of experts among the NOWPAP member states.

The E-DNA Society, a group of researchers on e-DNA in Japan has developed a manual for survey and analysis on e-DNA in order to share the methodology among stakeholders. Now the E-DNA Society tries to cooperate with other international scientific groups in order to develop a global standardized common manual. If NOWPAP uses this manual, we can standardize sampling and analysis method among the member states.

To disseminate the e-DNA manual and the techniques among the NOWPAP member states, organizing of a training course is necessary targeting experts and young scientists, and technological advancement can be promoted through the training course in each member state.

3.3 CEARAC Medium-term Strategy for Marine Biodiversity Conservation in the NOWPAP region

Based on the responsibilities of CEARAC stated in the MoU with UNEP, NOWPAP Medium-term Strategy 2018-2023, NOWPAP EcoQOs and high priority topics of future CEARAC's biodiversity activities, CEARAC Medium-term Strategy for Marine Biodiversity Conservation is

- I. CEARAC tries to develop coastal habitat monitoring tools for marine biodiversity conservation and to assess the current situation and anthropogenic impact on important habitats in the NOWPAP region
- II. CEARAC tries to develop monitoring tools using new techniques such as remote sensing and e-DNA, and assess the current status of marine biodiversity including non-indigenous species in the NOWPAP region
- III. CEARAC tries to promote the developed monitoring and assessment tools in the NOWPAP member states and to enhance capacity building including human resource development and expert network development

4. Collaboration with other RACs and international organizations

In the NOWPAP MTS 2018-2023, it is expected to strengthen cooperation among RACs and collaboration with other international organizations. NOWPAP MTS also requests contribution to global targets such as the Aichi Biodiversity Targets and Sustainable Development Goals (SDGs). NOWPAP RAP BIO will be developed by 2023, which clearly show roles of each member state and RAC for marine biodiversity conservation in the NOWPAP region. From 2021 on, United Nations Decade of Ocean Science for Sustainable Development (2021-2030) will be started. In 2019, the Regional Consultative and Planning Workshop towards the UN Decade of Ocean Science for Sustainable Development was held

jointly with IOC/WESTPAC and PICES. The workshop recommended strong collaboration among regional UN organizations and relevant international organizations.

CEARAC Medium-term Strategy aims to develop a strong cooperation with relevant organizations and contribute NOWPAP and its member states' actions for Aichi Targets, SDGs and UN Decade of Ocean Science for Sustainable Development.

Detailed collaboration areas with other RACs and international organizations are as follows:

[DINRAC]

DINRAC is implementing an activity, "Collection of data and information on species filed in the Red Lists of the NOWPAP member states" in the 2018-2019 biennium. This activity aims to review the existing Red List/Red Databook of the NOWPAP member states, to check the differences between national Red Lists and IUCN Red Lists and to develop a Red List of the NOWPAP region. The third phase of this project will be done in the next biennium 2020-2021. If CEARAC starts an activity on e-DNA, we may be able to collaborate with DINRAC for assessment of endangered species distribution in the NOWPAP region. DINRAC also implements an activity "Report for sea reclamation sites and management project" in the 2018-2019 biennium. So, information on habitats including tidal flats CEARAC may collect will contribute to strengthening collaboration with DINRAC for conservation of biodiversity and habitats in the NOWPAP region.

[POMRAC]

POMRAC developed NOWPAP Ecological Quality Objectives (EcoQOs) in 2017 and started discussion for selecting assessment indicators to evaluate achievement of the EcoQOs. For selection of assessment indicators for marine pollution, eutrophication has been chosen by the experts and CEARAC provides information based on the NOWPAP Common Procedures for assessment of eutrophication status (NOWPAP Common Procedure). CEARAC's future activities based on CEARAC MTS for marine biodiversity conservation will provide useful information for selection of assessment indicators for EcoQOs related to marine biodiversity. CEARAC would like to propose appropriate assessment indicators and contribute to assessments of EcoQOs.

[IOC/WESTPAC]

IOC Sub-Commission for the Western Pacific (WESTPAC) was established by Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization for promotion of international cooperation and coordination of programmes in marine research, ocean observation and services as well as capacity building in the Western Pacific. In IOC/WESTPAC, marine biodiversity is one of priority areas and one scientific study group is established, Ocean Remote Sensing for Coastal Habitat Mapping provides a map of habitats and aquaculture facilities with remote sensing methods. When CEARAC developed a manual of mapping of seagrass/seaweed beds in the NOWPAP region, IOC/WESTPAC support the activity. Therefore, CEARAC would like to continue collaboration with

IOC/WESTPAC for implementation of activities on habitats conservation in the NOWPAP region.

[NEASPEC]

North-East Asian Subregional Programme for Environmental Cooperation (NEASPEC) is an intergovernmental organization which aims environmental conservation in the Northeast Asia, and is developing a MPA network in the region. Habitat mapping implemented by CEARAC will contribute to conservation of habitat in the NOWPAP region which faces various anthropogenic pressures, it would provide useful information on management and newly establishment of MPAs. CEARAC would like to share information with NEASPEC and promote our collaboration.

[PICES]

North Pacific Marine Science Organization (PICES) is an intergovernmental scientific organization which aims to promote and coordinate marine research in the northern North Pacific. PICES has Advisory Panel on Marine Non-indigenous Species (AP-NIS), and collects information on NIS in the North Pacific to understand the distribution of new NIS. The e-DNA is a useful tool to identify the existence of NIS. PICES's expert group focuses on an approach using molecular techniques, therefore a training course on e-DNA is a common interesting topics between PICES and NOWPAP. It is expected to organize a training course jointly and start joint project using e-DNA in the future.

PICES has a range of experiences on study of plankton species. Support from PICES will be very helpful to start a new project on plankton species related to aquacultures and fisheries in the NOWPAP region.

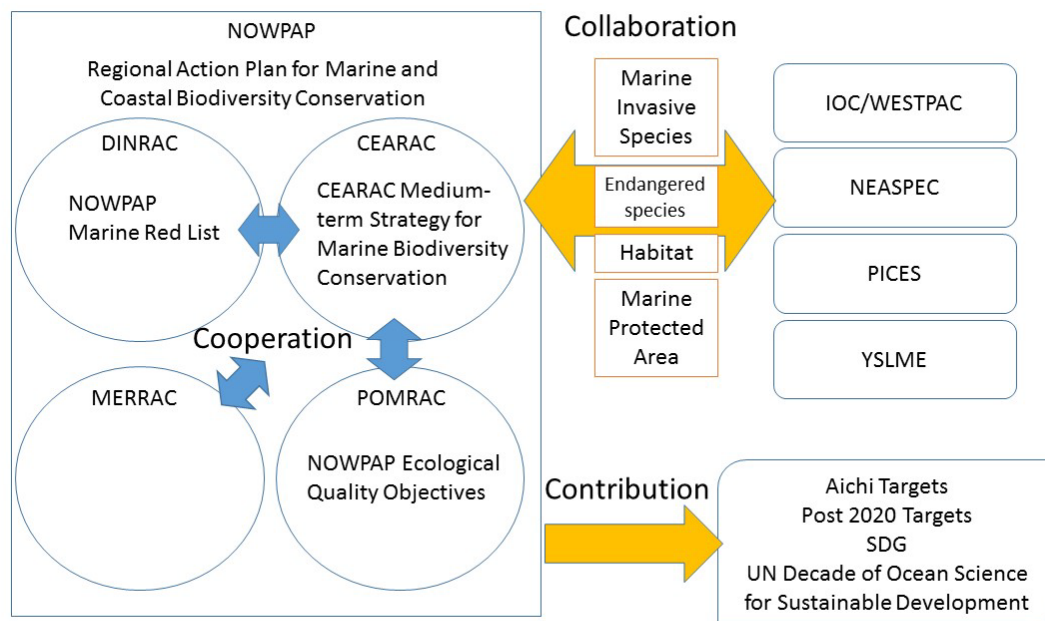
[YSLME]

Yellow Sea Large Marine Ecosystem (YSLME) is a bilateral international cooperation between China and Korea for conservation of marine environment in the Yellow Sea. In addition to sustainable use of fishery resources, habitat conservation and prevention of marine pollution, marine biodiversity conservation is a main theme for their activities. In the first phase, YSLME established an MPA network between China and Korea for conservation of marine species including spotted seal. In the current second phase, YSLME plans to develop a strategic action plan for marine biodiversity. Yellow Sea is part of the NOWPAP region; therefore, strong collaboration with YSLME is expected.

The year of the Aichi Targets, 2020 is approaching; however, many targets face difficulty to be achieved. Thus, discussion on new targets after 2020, post-2020 targets, has been started. SDG 14: Life Below Water has targets by 2020, 2025 and 2030. In order to achieve these targets, UNEP, Regional Seas Programme and NOWPAP are expected to contribute to them. In 2017, the United Nations proclaimed a Decade of Ocean Science for Sustainable Development mentioning from 2021 to 2030. This Decade will provide a common framework to ensure that ocean science can fully support countries' actions to sustainably manage the Oceans and more particularly to achieve the 2030 Agenda for

Sustainable Development (SDGs). Decade requires strengthen the international cooperation through strengthening dialogues, developing partnerships, developing capacity-building and leveraging funds/investment. Regional workshop was held in 2019 and it was suggested to strengthen collaboration among relevant international organizations and UN organizations. Through CEARAC MTS and our future activities, CEARAC would like to contribute to the Decades.

CEARAC hopes CEARAC MTS and our future activities will contribute to these global targets for marine biodiversity conservation.



5. Role expected to CEARAC

Biodiversity and biological habitat in the NOWPAP region face various anthropogenic pressures. In order to conserve marine biodiversity and habitats in this region, NOWPAP tries to develop RAP BIO, EcoQOs and so on with the NOWPAP member states. CEARAC is expected to contribute such NOWPAP's actions based on CEARAC's past experiences and knowledge on coastal environmental monitoring and assessment.

The basic policy and future vision shown in CEARAC MTS can respond to these expectations. Based on the past outcomes/outputs and future available outcomes/outputs, CEARAC would like to contribute marine biodiversity conservation in the NOWPAP region.

In 2030, achievement of NOWPAP MTS 2018-2023 will be evaluated. CEARAC expects that CEARAC MTS can contribute to achievement of NOWPAP MTS 2018-2023, especially RAP BIO and related activities which will be implemented from 2020 on.

Reference

CEARAC (2018): Assessment of major pressures on marine biodiversity in the NOWPAP region

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