Implementing the Strategic Action Programme for the Yellow Sea Large Marine Ecosystem: Restoring Ecosystem Goods and Services and Consolidation of a Long-term Regional Environmental Governance Framework (UNDP/GEF YSLME Phase II Project)

Proceedings of the 1st Meeting of the Regional Working Group on Monitoring and Assessment (RWG-A) of the UNDP/GEF YSLME Phase II Project

Incheon, RO Korea
21–22 November 2017

Cover photo (Song Sun): A polyp of *Nemopilema nomurai*, the most damaging of the three jellyfish species plaguing Chinese coasts. While 1 millimetre long, it will give rise to medusae more than 2 metres in diameter and weigh as much as 200 kilograms. The increasing rates of jellyfish outbreaks in Chinese waters might be an indicator of worsening ecosystem health.

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PROCEEDINGS OF THE MEETING

I. Opening of the Meeting

1. The 1st Meeting of the Regional Working Group on Monitoring and Assessment (RWG-A) of the UNDP/GEF YSLME Phase II Project was held in G-tower, Songdo, on 21-22 November 2017 organized by the Secretariat. Members of the RWG-A from RO Korea; representatives from First Institute of Oceanography (FIO) and National Marine Environmental Monitoring Center (NMEMC) from PR China and Korea Institute of Ocean Science and Technology (KIOST), National Institute of Fisheries Sciences (NIFS), Inha University, Marine Environmental Research & Information Laboratory, Human & Marine Ecosystem Research Laboratory, Korea Marine Environment Management Corporation (KOEM) from RO Korea; and staff of the Secretariat participated in the Meeting.

2. Mr. Yinfeng GUO, CTA of PMO, opened the meeting and welcomed all participants to Songdo, RO Korea. He introduced briefly the outcomes from the 1st Meetings of the MSTP and the interim YSLME Commission Council, which launched the 2nd Phase of the Project, the expected outcomes of the meeting in line with the directions of the first meeting of the Interim Commission Council and approved workplans of the RWG-A.

3. Participants were invited to introduce themselves. Each gave a brief description of his/her organization and expertise related to the mandate of the RWG-A. The list of participants is attached to this report as Annex 1.

2. Organization of the meeting

2.1. Election of Chair and designation of rapporteurs

4. As proposed by the Secretariat and endorsed by the Meeting, Mr. Se-Jong JU of RO Korea was elected to serve as the interim Chair of the meeting.

2.2. Adoption of agenda

5. The Chair introduced the agenda, including the list of meeting documents, and invited comments from the participating countries (refer to Annex 2). The four objectives of the meeting are to 1) review and refine the TOR of RWG-A and workplan for 2017-2019; 2) review and build consensus on the approaches and methodologies; 3) discuss and agree on the elements of activities for RWG-A; and 4) identify areas of collaboration with partners and potential collaborative activities for support by the Project. No additional items were suggested.

3. Review and refine documents approved by the 1st Meeting of Interim YSLME Commission Council

3.1. Terms of reference of RWGs and Chairs/Vice Chairs

6. Upon the request of the Chair, the Secretariat introduced the TORs of RWGs and Chairs/Vice Chairs. After presentation by the Secretariat, the Chair opened the floor for discussion and invited participants to provide comments for possible revision, which could be submitted for further consideration at the next MSTP.

7. The Chair suggested to omit specific number "2-4" written in the "2-4 leading regional experts" under the membership component of the RWG-A TOR. He expressed his concerns on restricted participation of experts once the number of experts is fixed.

3.2. TOR of RWG-A

8. Mr. Wonduk YOON of RO Korea asked for clarification on the meaning of the phrase "in collaboration with international organizations and partners" under RWG-A's tasks. He asked if this implies that the RWG-A will be working alongside with other organizations. According to the Chair, the phrase indicates not the aspect of working together, but rather on sharing of scientific data. Taking the jellyfish monitoring as an example, organizations like PICES, IOC/WESTPAC and NOWPAP, together with YSLME, can share relevant data among each other.

9. The Chair recommended to include "green tide" and other specific names of algal blooms under number 3 of the Objectives. He shared that RO Korea is currently facing issues on Sargassum in Jeju Island and Yellow Sea which is not toxic but has transboundary implications through drifting. After a lengthy discussion on the use of terms, Mr. Sangil KIM of RO Korea and Mr. Hao GUO of PR China were asked to discuss and decide later the suitable terms to the Meeting.

3.3. RWG-A workplan (2017-2019)

10. The Secretariat introduced the revision of activities in the RWG-A annual workplan 2017-2019. Upon the request of the Chair, the Secretariat also presented the activities of each objective in the draft document that was submitted for discussion and approval during the previous MSTP meeting.

11. The Chair brought up a concern regarding the inclusion of some deliverables that may be difficult to achieve under number 3: "Regional jellyfish and HAB monitoring program established and implemented in collaboration with partners" and objective 3: "Harmonizing monitoring and assessment methodologies." He questioned the feasibility of making standardized methodologies considering that the two countries might be using different practices. The Chair added that on nutrients monitoring, each institute has its own sampling methods.

12. In response, Mr. Jin-Ho CHAE pointed out that in the case of jellyfish, there is no standardized method but experts can come up with four summarized methodologies on jellyfish blooming using quantifiable methods – 1) sight survey; 2) echo-sound; 3) plankton samples and 4) DNA probe.

13. After lengthy discussion, the Meeting agreed that the deliverables are attainable. Experts will come up with standardized methodologies and exchange contact person's information for better communication and exchange of data in the future.

4. Session 1: Planning IMTA promotion in YSLME

14. Mr. Jae Ryoung OH mentioned that RO Korea has a very limited budget for this year (200,000 US dollars) and that it is nearly impossible for their side to carry out all the 2017 activities. He added that next year, however, will be better as the budget is around 800,000 US dollars. The Chair said if there is a lack of funding, RWG-A should adjust the activities.

15. The Chair suggested that the phrase "in both countries" under Activity 1 be specified to "RO Korea and PR China" to avoid confusions with other nations.

16. After lengthy discussion, as per Mr. Joong Ki CHOI's suggestion, the Meeting agreed to revise Objective 2: "To improve understanding of the impact of climate change on ecosystem structure." Since "ecosystem" is too big as a scope, it will be changed to "plankton structure."

17. The Chair suggested that in order to check the progress and performance of the RWG-A, members should give brief progress reports in the next meeting.

18. After the Secretariat presented the specific activities, Mr. Yinfeng GUO presented an overview of the YSLME Phase II project for experts to have a better understanding.

19. The Chair also asked the Secretariat to provide TORs to all RWG-A members before the next meeting takes place so that experts can have time to review and give their inputs.

5. Discussion on activities to be conducted

5.1. Activity 1 of Output 4.3.1: Stock-taking of vulnerabilities of coastal communities and ecosystem services in YSLME to impact of climate change

20. The Secretariat introduced Activity 1, including consultancy classification, budget line, estimated start of work, background, objectives, expected outputs, activities, inputs, timing and reporting. Since some 2017 activities were delayed or have not been started yet, the Secretariat also prepared and presented a new work plan and opened the floor for discussions.

21. The Chair proposed to modify the date of the fifth activity because November 2017 is too late. The main idea will be kept but the reporting will be changed according to the proposals. He added that the third key outcome seems too big and needs to be modified as well.

22. Regarding the regional adaptive management strategy, Mr. Yinfeng GUO said YSLME is planning to include consultants who can identify research interests of both countries and provide other relevant inputs for further studies. He added that it takes around a month to involve international consultants based on UNOPS' standard processing timeline.

5.2. Activity 2 of Output 4.3.1: Prepare communication package to raise awareness of vulnerabilities to impact of climate change

23. After the presentation, Ms. Sunyoung CHAE of RO Korea suggested to present the TOR in the RWG-G meeting as it is more related to RWG-G's mandate.

24. The Meeting agreed that the Activity 2 is for information sharing in the RWG-A, and will be further reviewed in RWG-G.

5.3. Activity 4 of Output 4.3.1: Workshops/training programs on climate change and its impact on coastal and marine ecosystem services and adaptation

25. The Secretariat presented the list of workshops and their corresponding activities. The Meeting agreed to decide venues of the activities during the meeting. The Chair pointed out Mr. Jae Ryoung OH's earlier concern about workshops that are scheduled for the end of 2019 and recommended to have the workshops during the early months of 2019.

26. After a lengthy discussion, below are the points agreed by the participants: Each activity has two workshops.

No.	Title	2018	2019	Remarks
1	**Monitoring and study of relationships between change in SST and YSCWM and structure of plankton, and adaptive management strategy**	China	RO Korea	
2	**Jellyfish monitoring program (combined with 3 and 4) – will consult with MOF later**	China	RO Korea	Because the topics of activities 2, 3 and 4 are closely related, workshops on the three activities will be held back-to-back to save time and budget with experts involved. Mr. Wonduk YOON pointed out a concern that there will be a Jellyfish workshop in Korea next year, which might be a conflict on the scientists' availability. The Chair suggested that Ms. Sunyoung CHAE make an arrangement to move the workshop from Korea to China. He also suggested to the representatives from China to put the two workshops together.
3	**HAB monitoring program**			
4	**Regional monitoring of N/P/Si, climate change, jellyfish and HAB**			
5	**Conference on monitoring networking**	**This activity is left open for further discussions.** Mr. Yinfeng GUO said the idea is still vague and there's still no clear concept.		
6	**Regional strategy for long-term forecast of ecosystem, modelling and scenario analysis and sharing of estuary data**	RO Korea	China	There will be one estuary from RO Korea's side, and another one from China's side. The Chair was asked to confirm with Prof. CHOI. The venues might be switched depending on Prof. CHOI's input.
7	**Regional assessment and policy recommendation (introduced sp.)**	RO Korea	China	
8	**Experience sharing and dissemination**	**This activity has been eliminated.** The Chair said there is no particular workshop needed as experience sharing and dissemination are always included in every workshop's program. He suggested to dedicate the budget of this program to Activity 1, which has a relatively smaller budget compared to the other activities.		

6. Discussion on regional activities to be conducted through PCA

6.1. Activity 3 of Output 4.3.1: Monitoring and studies of relationships between the changes in sea surface temperature and characteristics of YSCWM and structure of plankton communities and development of regional strategy for adaptive management (FIO)

27. After presentation, Mr. Jae Ryoung OH suggested to recommend the inclusion of this study to the RWG-F. The Meeting agreed to revise the second report by December 21, 2019 and submit a regional strategy for adaptive management of the demo site.

28. Mr. Yinfeng GUO suggested to focus on chemical and plankton and consider coastal areas, seasonal migration pattern, and cold-water mass. Mr. Joong Ki CHOI said the cold-water mass is a very limited concept as it is only observed during summer season. He suggested not to use just cold-water mass and extend the timeline to a whole year.

29. After lengthy discussion, the Meeting agreed to add Shandong province and draft a synthesis report along with a regional strategy for developing adaptive management for the demo site.

30. The Meeting also agreed to change date for submission of draft from February 31, 2018 to December 31, 2018, by reflecting any views to be shared at the workshop. A draft regional strategy is expected to be submitted before June 30, 2019, followed by submission of the 2nd report to be submitted earlier than December 31, 2018 since the output needs to be provided to Shandong. Once completed, the Secretariat shall circulate the TOR to concerned bodies.

6.2. Activity 1 of Output 4.4.2: Make regional assessment (including trend of introduced species in the region) and make policy-relevant recommendations (FIO)

31. After presentation, the Chair proposed to include definitions of the three-similar species, collect and review existing data of regional marine ecosystems, including fishes, planktons and benthos. He also suggested to specify what "introduced species" refer to in the TOR. After discussions, the experts agreed to share information with each other and specify definition of introduced species.

32. The Meeting agreed to add more information after the "environmental" part under Activity 1. RO Korea may nominate experts for these activities. It was also agreed upon that the 3rd Activity, "Establish and implement regional conservation plan to preserve biodiversity" to be deleted as it is similar to the other activities written in the TOR. And the term "proposal" was advised to be replaced by "report".

6.3. Activity 2 of Output 4.4.2: Develop regional strategies for long-term ecosystem forecasts, and conduct modelling and scenario analysis and sharing of estuary data (FIO)

33. After presentation and discussion, the Meeting agreed to draft the management strategy for developing regional long-term ecosystem and have the TOR focused on one specific "estuary" area each in both counties, and advised to have experts from both RO Korea and PR China to share their views on scope to deal with and potential estuary areas. Considering the limited amounts of financial resources, however, the scope of this study was suggested to be reduced. Experts from both countries can decide and change it later."proposal" was advised to be replaced by "report".

6.4. Activity 4 and 5 of Output 4.4.2: Create regional jellyfish and HAB monitoring programs (NMEMC)

34. The Secretariat introduced Activities 4 and 5 of 4.4.2, including the budget line, estimated start of work, background, objectives, expected outputs, activities, inputs timing and reporting.

35. The Chair proposed to delete the "DPRK" part since the country does not have monitoring networks and programs. Mr. Sangil KIM suggested having a cooperative works for understanding on the mechanisms of drift seaweed Sargassum focusing the current status of Sargassum horneri in key habitat, procuring the samples to genomic tests of Sargassum, and sharing monitoring information about the outbreak and moving of Sargassum

    The chair asked Chinese position on the suggested co-survey after they go back to China and the chair emphasized that establishing a Committee will be a good starting point for jellyfish and HAB monitoring.

36. Mr. GUO said PMO will prepare TORs for the Committee and ask the countries to nominate members. The first Committee meeting next year will review the results of the first three bullet points. With this, he suggested that experts come up and consolidate reports based on the outcome of the workshop. The results will be incorporated to YSLME's regional control proposal, which will then be reviewed during the meeting.

37. The Meeting agreed to consider separation of the two committees, Jellyfish and HAB, because both have different methodologies and mechanisms. The first task is to build the committees, each consisting at least 3-4 experts per country. The committees will decide what they should focus on.

38. The Chair suggested to put contact information of persons involved from both countries for future communication. He also suggested to replace "proposal" with "report" in the TOR, and also in other TORs.

39. Mr. Wonduk YOON of RO Korea discussed with Mr. Hao GUO about jellyfish monitoring in the Yellow Sea using ships of opportunity, such as ferry boat between RO Korea and PR China, and agreed to put it as one of the activities. Mr. Wonduk YOON of RO Korea informed this agreement to Chair.

6.5. Activity 6 of Output 4.4.2: Establish a comprehensive regional monitoring system: develop regional monitoring strategies for N/P/Si changes, climate change, jellyfish blooms and HAB (NMEMC)

40. Currently, there is no existing TOR for Activity 6 of Output 4.4.2. The Chair suggested that PMO prepare a TOR for all parties to have a better understanding of the activity. Mr. Yinfeng GUO agreed and asked experts to provide their input and guidance in making the document, which is expected to be done before the workshops on jellyfish and HAB take place.

41. In response to Mr. GUO's request, the Chair said RO Korea can provide experts who can assist and share their expertise. He also encouraged PR China to also provide experts and work together with RO Korea. At least one expert per field (HAB, jellyfish and nutrients) is recommended. The Chair mentioned that Dr. Jaehyun RHO of RO Korea can help.

42. The Chair stressed that the monitoring strategy on nutrient is a more relevant issue. Putting this into consideration, Mr. Yinfeng GUO suggested to reduce the scope by omitting jellyfish and HAB and focus on N/P/Si by considering limited budget available and ongoing programs on both jellyfish and HAB.

43. Mr. Jung Hoon KANG of RO Korea pointed out that there is a need to recognize the relationship between HABs and jellyfish blooms in making the TOR. Mr. CHOI from RO Korea said experts can write a brief explanation and make a conceptual story.

6.6. Activity 7 of Output 4.4.2: Prepare training modules on ecosystem-based management in LME 1) design, plan and implement an integrated ecosystem-based monitoring system of LME; 2) ecosystem carrying capacity (ECC): case study of algae blooms in YSLME; 3) ECC: case study of Jellyfish outbreak in YSLME (FIO)

44. After presentation by the Secretariat, the Chair suggested that the Secretariat prepares a TOR for activity 7 as well. He recommended to include information on drifting macroalgae blooms which is expected to be provided from both Activities 6 and 7 since macroalgae is considered closely linked to climate change and nutrient.

45. The Chair added that Activity 7 should be closely worked on with the rest of the activities as the training modules will be prepared based from what's been discussed from the activities.

46. Mr. Wonduk YOON asked about target audience of the training modules - experts, students or the public. In response to the inquiry, Mr. Yinfeng GUO responded that the training modules are for experts to have uniformed knowledge with experience on their expertise.

47. As suggested by Mr. Yinfeng GUO, the Meeting discussed the creation of teams. Mr. Wonduk YOON of RO Korea suggested a person from KOEM for the first module; Dr. Sangil KIM for the second module and a person from NIFS for the third module. The Chair said if proposed Korean experts decline, possible substitutes will be considered among the NWG members.

7. Agenda of next RWG meeting

48. PR China will host the next RWG-A meeting in 2018. The dates and venue will be announced later in consultation with PMO. PMO will share the list of workshops scheduled in China so that delegates can decide on the final dates accordingly.

49. The agenda for the next meeting will include the review of reports and progress of all activities in RWG-A, including those of consultants and subcontractors. The documents should be submitted to PMO a month prior to the meeting for circulation and provide time to review. Workshop programs and training modules will also be discussed along with issues and recommendations, which will be brought up to the 2nd MSTP meeting by the Chair.

50. The Chair also asked the meeting to review the delivery of financial resources as a part of the implementation on all activities of RWG-A.

51. Mr. GUO suggested to hold the meeting back-to-back with the workshop to reduce the number of events.

8. Other business

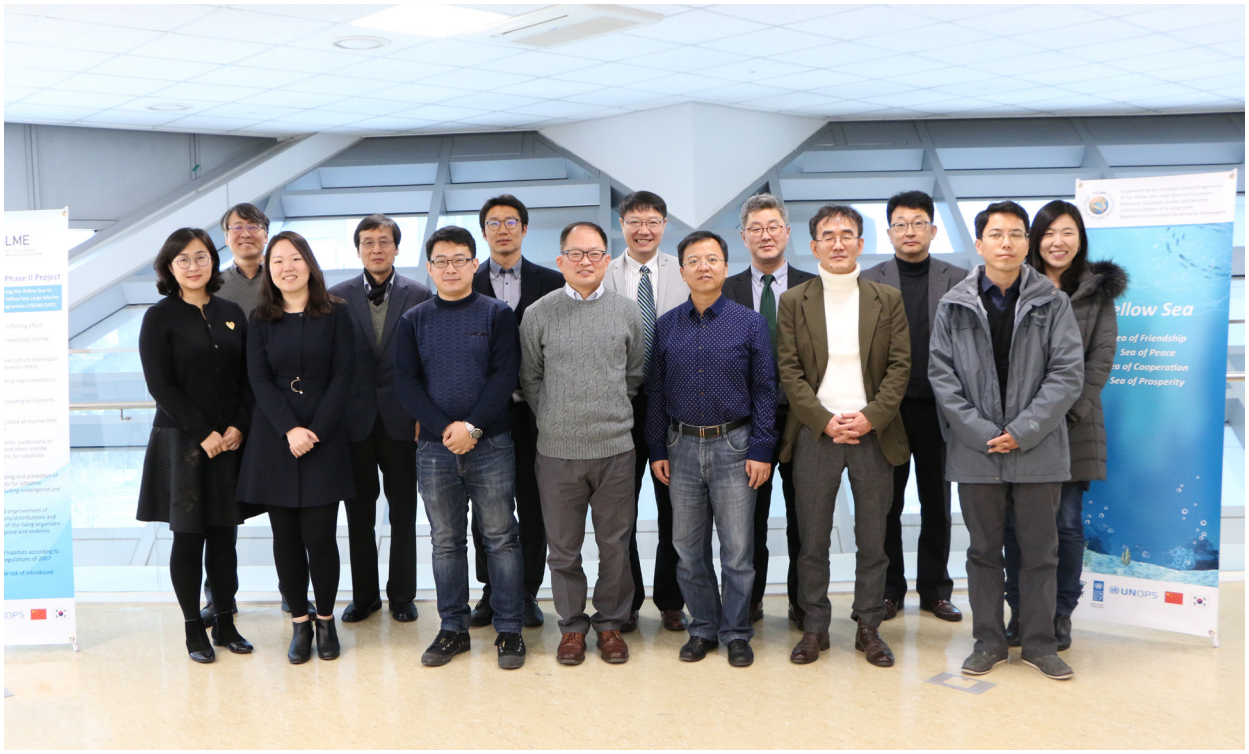
52. Ms. CHAE from RO Korea encouraged the Secretariat to provide the complete list of workshop schedule in the next MSTP meeting.

9. Wrap-up and closure of the meeting

53. In the wrap-up, the representatives of RWG from PR China and RO Korea expressed their appreciation to the Secretariat for organizing the meeting. The Meeting understood that close and enhanced cooperation from two participating countries is necessary to deal with critical works ahead.

54. The Chair expressed his appreciation to all participants for their active participation and friendship in the discussions.

55. Following the closing remarks, the Chair declared the closure of the meeting at 12:20 P.M. on 22nd November 2017.



Participants of the 1st meeting of RWG on Monitoring and Assessment of the UNDP/GEF YSLME Phase II Project.

Annex 1. List of Participants

PR CHINA

Mr. Shouqiang WANG
Program Director, CPC Center
First Institute of Oceanography, (FIO)
State Oceanic Administration, P.R. China
No. 6, Xianxialing Road, Qingdao, 266061, P.R. China
Tel: +86-532-88893382
Email: wangshouqiang@fio.org.cn

Ms. Dan YI
Associate Researcher
First Institute of Oceanography, (FIO)
State Oceanic Administration, P.R. China
No. 6, Xianxialing Road, Qingdao, 266061, P.R. China
Tel: +86-532-88892039
Email: yidan@fio.org.cn

Mr. Shenghao LIU
Associate Researcher
First Institute of Oceanography, (FIO)
State Oceanic Administration, P.R. China
No. 6, Xianxialing Road, Qingdao, 266061, P.R. China
Tel: +86-532-88893382
Email: shliu@fio.org.cn

Mr. Hao GUO
Principal Researcher
Marine Ecology Department
National Marine Environmental Monitoring Center (NMEMC)
State Oceanic Administration
42 Linghe Street, Dalian, P.R. China
Tel: +86-411-84783228
Email: hguo@nmemc.org.cn

RO KOREA

Mr. Se-Jong JU
Principal Research Scientist
Deep-Sea and Seabed Resources Research Division
Korea Institute of Ocean Science & Technology
787 Haeanro, Ansan, Gyeonggi-do, 15627, RO Korea
Tel: +82-31-400-7684, +82-10-3447-0526
Email: sjju@kiost.ac.kr

Mr. Jung Hoon KANG
Principal Research Scientist
South Sea Research Institute,
Korea Institute of Ocean Science & Technology
41 Jangmok-myon, Geoje, Gyungnam, 656-834, RO Korea
Tel: +82-10-5059-1249
Email: jhkang@kiost.ac

Mr. Wonduk YOON
Mr. Wonduk YOON
Head Researcher
Human & Marine Ecosystem Research Laboratory
B1601 Gunpo IT Valley 17, Gosan-ro 148 beon gil, Gunposi, Gyeonggi-do, 15850, RO Korea
Tel: +82 10-9015-2454
Email: wondukyoon@humer.co.kr

Mr. Joong Ki CHOI
Professor
Department of Oceanography
Inha University
100 Inha-ro, Namgu, Incheon 402-751
RO Korea
Tel: +82-10-8778-8094
Email: jkchoi@inha.ac.kr

Mr. Sangil KIM
Researcher
Oceanic Climate & Ecology Research Division,
National Institute of Fisheries Sciences
216 Gijanghaean-ro, Gijang-eup, Gijang-gun, Busan 46083, RO Korea
Tel: +82-51-720-2248
Email: kelpkim@gmail.com

Mr. Jinho CHAE
Head Researcher
Human & Marine Ecosystem Research Laboratory
B201 Gunpo IT Valley 17, Gosan-ro 148 beon gil, Gunposi, Gyeonggi-do, 15850, RO Korea
Tel: +82-10-5616-3969
Email:jinhochae@gmail.com

Mr. JaeRyoung OH
ROK National Coordinator
Principal Researcher
South Sea Research Institute, Korea Institute of Ocean Science and Technology(KIOST)
41 Jangmok-myon, Geoje, Gyungnam, 656-834, RO Korea
Email: jroh@kiost.ac.kr; jaekordi@gmail.com

Ms. Suyeon KIM
Deputy Director
Marine Environment Policy Division,
Marine Policy Office,
Ministry of Oceans and Fisheries (MOF)
Government Complex Sejong, 5-Dong, 94, Dasom2-Ro, Sejong-City, 30110,
RO Korea
Tel: +82-44-200-5285
Email: kimsuyeon2016@korea.kr

Ms. Sunyoung CHAE
Assistant Manager
International Affairs Team
Korea Environment Management Corporation(KOEM)
28, Songpadaero 28 gil, Songpagu, Seoul, 05718
RO Korea
Tel: +82-2-3498-8588, +82-10-7374-5838
Email: sychae@koem.or.kr

SECRETARIAT

Mr. Yinfeng GUO
CTA/Manager
18th Floor, G-Tower, 175 Art center-daero,
Yeonsu-gu, Incheon 22004, RO Korea
Tel: +82-70-4161-2241
Email: YinfengG@unops.org

Mr. Sangjin LEE
Environmental Economist
18th Floor, G-Tower, 175 Art center-daero,
Yeonsu-gu, Incheon 22004, RO Korea
Tel: +82-70-4161-2242
Email: SangjinL@unops.org

Ms. Xiaoxuan CHEN
Environmental Law Intern
5th Floor, G-Tower, 175 Art center-daero,
Yeonsu-gu, Incheon 22004, RO Korea
Tel: +82-70-4161-2243
Fax: +82-70-4175-4898
Email: XiaoxuanC@unops.org

Ms. Nera Mariz PUYO
Communication Intern
5th Floor, G-Tower, 175 Art center-daero,
Yeonsu-gu, Incheon 22004, RO Korea
Tel: +82-70-4161-2244
Fax: +82-70-4175-4898
Email: NeraP@unops.org

Annex 2. Agenda of the Meeting

21 November (Tuesday)	
09:00~09:30	Registration for participants
09:30~09:50	**Opening of the meeting** • Welcome addresses • Introduction of the members and participants
09:50~10:00	**Organization of the meeting** • Election of Chairs and designation of rapporteurs • Adoption of agenda
10:00~11:00	**Review and refine the following documents approved by the Interim YSLME Commission:** • Terms of Reference of RWGs and Chairs/Vice Chairs; • TOR of RWG-A; • RWG-A workplan (2017-2019)
11:00~11:15	Coffee break
11:15~12:10	**Review workplan for 2017 and activities, and work arrangement among RWG-A members** (the Chair will facilitate a discussion and agree on draft elements of the "Yellow Sea Adaptive Management Strategy" and process for review and adoption by the two countries)
12:30~14:00	Lunch
14:00~15:30	**Discussion on activities to be conducted** • **Activity 1 of Output 4.3.1:** stock-taking of vulnerabilities of coastal communities and ecosystem services in YSLME to impact of climate change; • **Activity 2 of Output 4.3.1:** prepare communication package to raise awareness of vulnerabilities to impact of climate change • **Activity 4 of Output 4.3.1:** workshops/training programs on climate change and its impact on coastal and marine ecosystem services and adaptation (the Chair will facilitate a discussion on major outcomes derived from RWG-H since some activities are cross-cutting issues)
15:30~15:45	Coffee Break
15:45~18:00	**Discussion on regional activities to be conducted through PCA** • **Activity 3 of Output 4.3.1:** monitoring and studies of relationships between the changes in sea surface temperature and characteristics of YSCWM and structure of plankton communities and development of regional strategy for adaptive management – FIO • **Activity 1 of Output 4.4.2:** make regional assessment (including trend of introduced species in the region) and make policy-relevant recommendations – FIO • **Activity 2 of Output 4.4.2:** develop regional strategies for long-term ecosystem forecasts, and conduct modelling and scenario analysis and sharing of estuary data • **Activities 4 and 5 of Output 4.4.2:** Create regional jellyfish and HAB monitoring programs – NMEMC
1800~	Dinner

22 November (Wednesday)	
09:30~11:00	**(Continued) Discussion on regional activities to be conducted** • **Activity 6 of Output 4.4.2:** Establish a comprehensive regional monitoring system: develop regional monitoring strategies for N/P/Si changes, climate change, jellyfish blooms and HAB – NMEMC • **Activity 7 of Output 4.4.2:** Prepare training modules on ecosystem-based management in LME 1) design, plan and implement an integrated ecosystem-based monitoring system of LME; 2) ecosystem carrying capacity (ECC): case study of algae blooms in YSLME; 3) ECC: case study of Jellyfish outbreak in YSLME
11:00~11:20	Coffee Break
11:20~11:40	Agenda of next RWG meeting
11:40~12:10	Other Business
12:10~12:20	Wrap-up and closure of the Meeting
12:30~14:00	Lunch

Annex 3. Terms of reference

Activity 1 of Output 4.3.1

Stock-taking of vulnerabilities of coastal communities and ecosystem services in YSLME to impact of climate change

TERMS OF REFERENCE

Consultant to synthesize progress with coastal and marine ecosystem and community impact assessment in the Yellow Sea

Consultancy:	National
Estimated start of work:	September 2017
Duty Station:	Home-based

Background and Justification

UNDP/GEF is providing assistance through UNOPS to countries bordering Yellow Sea in support of their efforts to address among others the increasing trends of depleting fishery stocks, loss of coastal wetland, land and sea-based pollution and implementation of the Yellow Sea Large Marine Ecosystem Strategic Action Programme (YSLME SAP) adopted by China and RO Korea. One of the assistance programs to implement the SAP is the UNDP/GEF/UNOPS project entitled Implementing the Strategic Action Programme for the Yellow Sea Large Marine Ecosystem: Restoring Ecosystem Goods and Services and Consolidation of a Long-term Regional Environmental Governance Framework, or the UNDP/GEF YSLME Phase II Project. The project was launched in July 2017.

The objective of this regional project is to achieve adaptive ecosystem-based management of the Yellow Sea Large Marine Ecosystem bordered by China, RO Korea and DPR Korea by fostering long-term sustainable institutional, policy and financial arrangements for effective ecosystem-based management of the Yellow Sea in accordance with the YSLME SAP.

There are four components of the project:

1. Sustainable national and regional cooperation for ecosystem based management.
2. Improved Ecosystem Carrying Capacity with respect to provisioning services.
3. Improved Ecosystem Carrying Capacity with respect to regulating and cultural services.
4. Improved Ecosystem Carrying Capacity with respect to supporting services.

The key outcomes sought are:

1. Establishment of a self-sustaining cooperative mechanism for ecosystem-based management.
2. Recovery of depleted fish stocks and improved mariculture production and quality.
3. Improved ecosystem services by ecosystem-based management;
4. improved inter-sectoral coordination and mainstreaming of ecosystem based management principles at the national level, maintenance of habitat areas, strengthened stakeholder participation in management and improved policy making.
5. Skills and capacity significantly developed for region-wide ecosystem-based management.

In the YS, climate change has resulted in increasing sea surface temperatures, changing the characteristics of the Yellow Sea Cold Water Mass (YSCWM) as a fish habitat and changing the structure of plankton communities. In Outcome 4.3 of Component 4 entitled "Adaptive management mainstreamed to enhance the resilience of the YSLME and reduce the

vulnerability of coastal communities to climate change impacts on ecosystem processes and other threats identified in the TDA and SAP", the project will help better understanding of impacts of climate change to the coastal communities in the YS. Output 4.3.1 of Outcome 4.1 specifically seeks to adopt regional strategies on site-based ICM plans enhancing climate resilience. Impacts of climate change in the YS ecosystem, in particular the impacts of the plankton community, had been studied in the demonstration sites of the first project. There is a need for further efforts to determine the impacts of climate change. As one of proposed activities, vulnerability studies on coastal communities and ecosystem services in YSLME to impact of climate change were planned. Findings of this study conducted in national/regional scale would contribute to the development of regional strategies on adaptive management to enhance climate resilience.

Objectives

The objective underlying the proposed consultancy is conducting stock-taking vulnerabilities of coastal communities and ecosystem services in YSLME to impact of climate change.

Expected Outputs

The consultant is expected to deliver the following results:

- A stock-taking report on vulnerabilities assessment and management measures of coastal communities and ecosystem services in YSLME to impact of climate change;
- Management measures and further research recommended for consideration and integration into the YSLME Biodiversity Conservation Planning Workshop by both countries (China and RO Korea)

Activities

The consultant under supervision of the Chief Technical Advisor and in close collaboration with the local project team, will:

1. Review of existing studies on assessment vulnerabilities of coastal communities and ecosystem services to impact of climate change in relation to YSLME, or the vulnerabilities of coasts and oceans in general if YSLME-specific assessments have not been done;
2. Analyze level of vulnerability, scope, potential impact, and identify opportunities and solutions, as well as capacity needs;
3. Conduct field visits and consult with stakeholders and interest groups (coastal communities) in at least one local government to confirm and verify the knowledge, awareness of impact, capacity, constraints and opportunities for improvement of local and national capacity to adaption;
4. Prepare an information package for dissemination to stakeholders about the impact of climate change to ecosystem services and communities in collaboration with communication intern
5. Prepare the draft review report and submit it for consultation and review, including presentation at a Biodiversity Conservation Planning Workshop for consultation with different stakeholders in May 2018
6. Incorporate comments and submit a final comprehensive report in hard copy (in English) and electronically

Inputs

UNDP/GEF YSLME Phase II Project management Office (PMO) will provide the background information and documents, and will be responsible for providing financial support and the logistics support to participation in the Biodiversity Conservation Planning Workshop by the PMO.

Timing

The consultancy will begin in mid-September 2017 and complete in 31 December 2017.

Reporting

The consultant will produce a review report on ecosystem-based restoration activities conducted. The consultant will submit both electronically and in hard copy in the number of 2 copies to the PMO. The initial draft should be submitted to

PMO before 31 October for inclusion in workshop documents. Second version should be submitted before 1 December for review by PMO. Final version should be submitted before 31 December for publication as a knowledge product of the YSLME. All reports should be submitted in English.

Competencies

- A good understanding of ecosystem-based restoration both in China and Korea linked to biodiversity conservation
- Advanced university education at MSc or Ph.D. level with expertise in the area of climate change and marine science
- At least 5 years of professional experience in vulnerability studies to the impact of climate change projects
- Strong skills in analysis and evaluation, and experience in implementing environmental projects
- Ability to produce high quality reports, publications in English
- Previous experience with GEF projects and ecosystem-based restoration project is an added plus
- Excellent writing skills in Chinese and English

Payment and Submission

The consultant will be paid for a lump sum of USD 8,000 for consultancy upon submission of the report to Mr. Yinfeng Guo, CTA/Manager at email: yinfengg@unops.org. Costs for participation in the YSLME Biodiversity Planning Workshop and field visits will be covered by separate project budget.

Activity 3 of Output 4.3.1

Monitoring and studies of relationships between the changes in sea surface temperature and characteristics of YSCWM and structure of plankton communities and development of regional strategy for adaptive management

TERMS OF REFERENCE

Draft a report for the relationships between the changes of YSCWM and structure of plankton communities and develop a regional strategy for adaptive management

Consultancy classification: subcontract (FIO)
Budget line: 72100, Activity 3 of Output 4.3.1, Component 4. Budget: USD 30,000;
Estimated start of work: December 1, 2017 and complete in 31 December 2019

Background

Component 4 addresses improving ecosystem carrying capacity with respect to supporting services. In Outcome 4.3 of Component 4 entitled "Adaptive Management mainstreamed to enhance the resilience of the YSLME and reduce the vulnerability of coastal communities to climate change impacts on ecosystem processes and other threats identified in the TDA and SAP", one of the end-of-project targets is CC adaptation strategies incorporated in regional strategies such as Yellow Sea Cold Water Mass (YSCWM) and plankton communities. Currently there does not exist a regional strategy on YSCWM and plankton communities through during the demonstration projects in the first phase the impacts of climate change in the YS ecosystem in particular the impacts on the plankton community had been studied. It is therefore necessary for the project to conduct further monitoring and studies for better understanding of relationships between the changes in sea surface temperature and characteristics of YSCWM as a fish habitat and structure of plankton communities, and identifying appropriate adaptive strategies. Based on the project document, major efforts on adaptive management in response to climate change will include preparation of regional strategies on adaptive management, site-based ICM plans established by PEMSEA to enhance climate resilience for selected sites in YSLME.

Objectives

The objective of this proposal is to draft a report for the relationships between the changes of YSCWM and structure of plankton communities and develop a regional strategy for adaptive management (provincial). Create monitoring and assessment proposal for the changes of YSCWM and structure of plankton communities, develop adaptation strategies at the target demo sites.

Expected Outputs

A report for the relationships between the changes of YSCWM and structure of plankton communities;
A draft regional strategy for adaptive management for demo site (provincial).

Activities

The subcontractor under supervision of the Chief Technical Advisor and technical guidance of Regional Working Group on Assessment and Monitoring, will conduct the following activities:

- Collect and review the existing data of YSCWM: Temperature, DO, DIN, PO4-P, SiO3-Si, DON and DOP, Chl a, zooplankton, phytoplankton.
- Review of the Yellow Sea regional database, and the documents of 5 workshops for YSCWM which organized by FIO and KIOST.
- Review the existing monitoring and assessment methods.
- Gaps analysis by coordinating with the Demo site. Select the main threat and risk for the region.
- Comparative study on the existing methods. Develop the appropriate methods with the help of Regional Workgroup.
- Draft a synthesis report along with a regional strategy for developing adaptive management for the demo site including Shandong Province, and present for feedback.

Inputs

UNDP/GEF YSLME Phase II Project Management Office (PMO) and FIO will provide the background information and documents, and will be responsible for providing financial support and the logistics support to participation in the planning workshop by the PMO.

Timing

The consultancy will start work on November 1, 2017 and complete on December 31, 2019.

Reporting

The consultant will produce the following reports within the specified timeframe:

1. By 31 December 2018, draft a report for the relationships between the changes of YSCWM and structure of plankton communities;
2. By 30 June 2019, submit a draft synthesis report along with regional strategy for developing adaptive management for demo site including Shandong Province.

The consultant can submit reports in English electronically to Mr. Yinfeng Guo, CTA/Manager at email: yinfengg@unops.org.

Activity 1 of Output 4.4.2

Make regional assessment (including trend of introduced species in the region) and make policy-relevant recommendations

TERMS OF REFERENCE

Draft a report for regional assessment (including trend of introduced species in the region) and policy-relevant recommendations

Consultancy classification: subcontract (FIO)
Budget line: 72100, Activity 1 of Output 4.4.2, Component 4. Budget: USD 20,000;
Estimated start of work: December 1, 2017 and complete in 31 December 2019

Background

Component 4 addresses improving ecosystem carrying capacity with respect to supporting services. In Outcome 4.4 of Component entitled "Application of ecosystem-based community management (EBCM) preparing risk management plans to address climate variability and coastal disasters", this project will support a series of activities leading to the development and application of EBCM by initiating regional monitoring, LWE-wide assessment and information exchange, considering the impact of climate change and coastal disasters at national and regional levels. Output 4.4.2 activity 1 seeks to make regional assessment (including trend of introduced species in the region) and make policy-relevant recommendations.

The Yellow Sea is located between continental North China and Korean Peninsula. It is separated from the West Pacific Ocean by the East China Sea in the south, and is linked with the Bohai Sea. It covers an area of about 400,000 km^2, with a mean depth of 44 m. As a semi-enclosed slope and warm water sea, Yellow Sea shows typical characteristics of large marine ecosystem, shallow but rich in nutrients and resources. The Yellow Sea LME (YSLME) has productive and varied coastal, offshore, and transboundary fisheries. Over the past several decades, the fishery populations in the Yellow Sea have changed greatly. Many commercial species are threatened by unsustainable exploitation and by natural perturbations. The regional marine ecosystem should be assessed for maintaining the supporting services of YSLME for nutrient cycling, primary and secondary production and their transfer, and maintenance of biodiversity, habitat preservation, reduce the risks from introduced species, etc. Therefore, making regional assessment (including trend of introduced species in the region) and making policy-relevant recommendations is important for the development of EBCM.

Objectives

The objective of this proposal is to draft a report for regional assessment (including trend of introduced species in the region) and policy-relevant recommendations. Create monitoring and assessment proposal for the changes of the structure of plankton and benthos community, scenario analysis and data sharing.

Expected Outputs

A report for the regional assessment (including trend of introduced species in the region); a draft for the policy-relevant recommendations.

Activities

The subcontractor under supervision of the Chief Technical Advisor and technical guidance of Regional Working Group on Assessment and Monitoring, will conduct the following activities:

- Collect and review the existing data of regional marine ecosystem: fishes, plankton, benthos, introduced species, etc.

- Review the existing assessment methods, to the extent possible and develop national and regional assessment program covering YSLME.
- Make a regional assessment on the trend of introduced species; identify their potential damage for regional marine ecosystem; draft the policy-relevant recommendations for controlling and monitoring the pathway of introduced species, such as ballast water discharge to reduce the risk of introduced species.
- Consolidate the assessment results into YSLME regional control proposal in coastal disaster management of EBCM.
- Draft the policy-relevant recommendations for the regional marine, and present for feedback.

Inputs

UNDP/GEF YSLME Phase II Project Management Office (PMO) will provide the background information and documents, and will be responsible for providing financial support and the logistics support to participation in the planning workshop by the PMO.

Timing

The consultancy will start work on December 1, 2017 and complete on December 31, 2019.

Reporting

The consultant will produce the following reports within the specified timeframe:

1. By 31 December 2018, submit a report for the regional assessment (including trend of introduced species in the region).
2. By 31 December 2019, submit a draft report for the policy-relevant recommendations.

The consultant can submit reports in English electronically to Mr. Yinfeng Guo, CTA/Manager at email: yinfengg@unops.org

Activity 2 of Output 4.4.2

Develop regional strategies for long-term ecosystem forecasts, and conduct modelling and scenario analysis and sharing of estuary data

TERMS OF REFERENCE

Developing regional strategies for long-term ecosystem forecasts, and conducting modelling and scenario analysis and sharing of estuary data

Consultancy classification: subcontract (NMEMC)
Budget line: 71200, Activity 2 of Output 4.4.2, Component 4. Budget: USD 8,000
Estimated start of work: December 1, 2017 and complete on December 31, 2019

Background

Component 4 addresses improving ecosystem carrying capacity with respect to supporting services. In Outcome 4.4 of Component 4 entitled "Application of ecosystem-based community management (EBCM) preparing risk management plans to address climate variability and coastal disasters", this project will support a series of activities leading to the development and application of EBCM by initiating regional monitoring, LWE-wide assessment and information exchange, considering the impact of climate change and coastal disasters at national and regional levels. Over the last decade, the tenets of EBCM have occupied center stage in our efforts to rebuild marine ecosystems. EBCM takes into account interactions among ecosystem components and management sectors, as well as cumulative impacts of a wide spectrum of ocean-use sectors.

Importantly, EBCM considers humans as an integral part of the ecosystem, since humans derive a portfolio of services from the ecosystem and also act as a driver influencing ecosystem processes. Output 4.4.2 of Outcome 4.2 seeks to establish monitoring network, regular basin-wide assessments, promote information exchange and understand periodic scenarios of ecosystem change in YSLME region. As one of the proposed activities, "developing regional strategies for long-term ecosystem forecasts, and conducting modelling and scenario analysis and sharing of estuary data" is critical to prepare risk management and address coastal disaster for the development of EBCM in YSLME region.

Under the overfishing and climate changes stressors, the YSLME changed significantly, as well as the biomass of fisheries resources. The smaller pelagic species became dominant species instead of larger demersal species. Climate change is a serious challenge for conservation and natural resource managers and is expected to lead to the extinction of significant numbers of species in the next century. Climate-induced long-term changes in ecosystems, despite its devastating nature, cannot be managed by human. In such circumstances, forecasting the future changes and developing adaptive management scheme are the best strategy. To date, most assessments of climate change have focused on identifying which species are threatened, often through the use of species-based ecological niche models. Rather, changes in an ecosystem's overall status might be more informative than those of individual species from taxa that happen to be well known. Basic science and technologies exist for forecasting future changes of ecosystems, e.g., species distribution models. Regional efforts should be focused on integrating models and developing scenario-based projections for the future ecosystem changes. Therefore, developing regional strategies for long-term ecosystem forecasts, and conducting modelling and scenario analysis and sharing of estuary data is important for the development of EBCM.

Objectives

The objective of this proposal is to develop regional strategies for long-term ecosystem forecasts enhancing the preparedness and response to climate change and coastal disasters, and conduct modelling and scenario analysis and sharing of estuary data via the project website.

Expected Outputs

A proposal for developing regional strategies for long-term ecosystem forecasts, and conducting modelling and scenario analysis and sharing of estuary data.

Activities

The subcontractor under supervision of the Chief Technical Advisor and technical guidance of Regional Working Group on Assessment and Monitoring, will conduct the following activities:

- Review the existing regional strategies for long-term ecosystem forecasts, including fishery production and capture management statistics, marine environmental quality monitoring network of China, RO Korea and DPR Korea.
- Review the existing long-term ecosystem forecasting, modelling and assessment methods.
- Develop regional management strategy for long-term ecosystem monitoring and forecasting programme covering YSLME.
- Consolidate the long-term ecosystem forecast and assessment results into YSLME regional control proposal in coastal disaster management of EBCM.
- Assess the effectiveness of remote-sensing monitoring, forecasting and warning system which constructed by GIS technique for long-term green tide forecasts in Yellow Sea.
- Make the disclosure scheme of environmental monitoring and forecasting information; uniform the forecasting content, format, time, etc. among China, RO Korea and DPR Korea; release the monitoring and forecasting data through the YSLME project website which will contribute to sharing of estuary data in both countries.

Inputs
UNDP/GEF YSLME Phase II Project Management Office (PMO) will provide the background information and documents, and will be responsible for providing financial support and the logistics support to participation in the planning workshop by the PMO.

Timing
The consultancy will start work on November 1, 2017 and complete on December 31, 2019.

Reporting
The consultant will produce the following reports within the specified timeframe:
1. By 31 February 2018, submit a report for developing regional strategies for long-term ecosystem forecasts;
2. By 31 December 2019, submit a report for conducting modelling and scenario analysis and sharing of estuary data available in both countries.

The consultant can submit reports in English electronically to Mr. Yinfeng Guo, CTA/Manager at email: yinfengg@unops.org

Activity 4 of Output 4.4.2

Create regional jellyfish monitoring program: create regional committee to coordinate monitoring, assessment and data sharing and develop national and regional monitoring methodologies of jellyfish booms.

TERMS OF REFERENCE

Marine Specialist to draft a proposal for a YSLME Jellyfish Monitoring Network

Consultancy classification: subcontract (NMEMC)
Budget line: 72100, Activity 4 of Output 4.4.2, Component 4. Budget: USD30,000;
Estimated start of work: November 1, 2017 and complete in 31 December 2019

Background
Component 4 addresses improving ecosystem carrying capacity with respect to supporting services. In Outcome 4.4 of Component 4 entitled "Application of ecosystem-based community management (EBCM) preparing risk management plans to address climate variability and coastal disasters", this project will support a series of activities leading to the development and application of EBCM by initiating regional monitoring, LWE-wide assessment and information exchange, considering the impact of climate change and coastal disasters at national and regional levels. Output 4.4.2 of Outcome 4.2 seeks to establish monitoring network, regular basin-wide assessments, promote information exchange and understand periodic scenarios of ecosystem change in LYS. As one of the proposed activities, jellyfish monitoring at national and regional level is critical to address coastal disaster and prepare risk management for the development of EBCM in LYS.

Over the last decade, a significant increase in jellyfish blooms has been observed worldwide in marine ecosystems and are becoming seen as an indicator of a state shift in pelagic ecosystems. Jellyfish blooms in pelagic ecosystems are regarded as a response to anthropogenic disturbance (e.g., eutrophication, overfishing, translocations, habitat modification) and climate change and can cause numerous deleterious consequences for industry and the community, such as, reduced fishery production from the competition for food with fish, stinging of swimmers by venomous species and clogging coastal power plant cooling water intakes. Understanding the causes, migration mechanism and ecological consequences of the jellyfish bloom will assist in our understanding of the ecosystem responses to globe climate change and human activities. Further, monitoring, forecasting and warning of jellyfish bloom is important for the development of EBCM.

Objectives

The development objective underlying the proposed consultancy is to create regional jellyfish monitoring program, create regional committee to coordinate monitoring, assessment and data sharing, and develop national and regional monitoring methodologies of jellyfish booms.

Expected Outputs

A proposal for a jellyfish monitoring network for EBCM.

Activities

The subcontractor under supervision of the Chief Technical Advisor and technical guidance of Regional Working Group on Assessment and Monitoring, will conduct the following activities:

- Review the existing YSLME jellyfish monitoring network, jellyfish monitoring network of China and RO Korea, to the extent possible and develop an integrated jellyfish monitoring network covering YSLME by all participants.
- Review the existing jellyfish monitoring and assessment methods, to the extent possible and develop national and regional jellyfish monitoring program covering YSLME.
- Review the research progress of jellyfish bloom in YSLME, including dominant species, the distribution of each species along with the consequences and likely causes with the purpose of classifying their hazards and relating these to manage policy.
- Consolidate the jellyfish monitoring and assessment results into YSLME regional control proposal in coastal disaster management of EBCM;
- In order to achieve consistency and coordination to enhance jellyfish monitoring and
- assessment effectiveness on a larger ecosystem-based spatial scales, propose program areas (such as research and monitoring, education and awareness building) and regulatory tools (regulations, permits, enforcement, ICM plan, etc.) as areas of collaboration and coordination.
- Perform regular jellyfish monitoring in the Yellow Sea with sighting method suing ships of opportunity (e.g. ferry boast) between RO Korea and PR China.
- Present the proposal at the YSLME Biodiversity Conservation Planning Workshop and facilitate a discussion on proposal;
- Incorporate comments and consolidate into a final draft YSLME Jellyfish Blooming Monitoring Program in collaboration with jellyfish blooming specialist in RO Korea in hard copy (in English) and electronically.

Inputs

UNDP/GEF YSLME Phase II Project Management Office (PMO) will provide the background information and documents, and will be responsible for providing financial support and the logistics support to participation in the planning workshop by the PMO.

Timing

The consultancy will start work on November 1, 2017 and complete in 31 December 2019.

Reporting

The consultant will produce the following reports within the specified timeframe:

1. By 31 December 2017, submit a draft report for strengthening the YSLME Jellyfish Monitoring Network;
2. By 31 December 2018, submit the Program of YSLME Jellyfish Monitoring Network

The consultant can submit reports in English electronically to Mr. Yinfeng Guo, CTA/Manager at email: yinfengg@unops.org

Activity 5 of Output 4.4.2

Create regional HAB (including macro-algae) monitoring program: create regional committee to coordinate monitoring, assessment and data sharing. Combine with jellyfish committee to develop national and regional monitoring methodologies of HAB

TERMS OF REFERENCE

Developing a proposal for a YSLME HAB Monitoring Network

Consultancy classification: subcontract (NMEMC)
Budget line: 72100, Activity 5 of Output 4.4.2, Component 4. Budget: USD10,000;
Estimated start of work: November 1, 2017 and complete in 31 December 2019

Background

Component 4 of UNDP/GEF YSLME Phase II Project addresses improving ecosystem carrying capacity with respect to supporting services. In Outcome 4.4 of Component 4 entitled "Application of ecosystem-based community management (EBCM) preparing risk management plans to address climate variability and coastal disasters", this project will support a series of activities leading to the development and application of EBCM by initiating regional monitoring, LWE-wide assessment and information exchange, considering the impact of climate change and coastal disasters at national and regional levels. Output 4.4.2 of Outcome 4.2 seeks to establish monitoring network, regular basin-wide assessments, promote information exchange and understand periodic scenarios of ecosystem change in LYS. As one of the proposed activities, HAB monitoring at national and regional level is critical to address coastal disaster and prepare risk management for the development of EBCM in LYS.

Harmful algal bloom (HAB) is a subset of algal blooms that pose environmental or public health threats. The occurrences of HAB, in terms of frequency and area in Chinese coastal areas, have been increasing since 1980s and caused considerable economic losses. Eutrophication is one the most likely causes that induce HAB. Of concern, especially for resource managers, the potential relationship between HAB and the accelerated eutrophication of coastal waters from human activities. Another concern is algal blooms capable of producing toxins, which could accumulate in predators and organisms higher up the food web. Humans can thus be exposed to HAB-toxins when they eat contaminated seafood. Understanding the causes, migration mechanism and ecological consequences of the HAB will assist in our understanding of the ecosystem responses human activities and globe climate change. Further, monitoring, forecasting and warning of HAB is important for the development of EBCM.

Objectives

The development objective underlying the proposed consultancy is to create regional HAB (including macro-algae) monitoring program, create regional committee to coordinate monitoring, assessment and data sharing, and develop national and regional monitoring methodologies of HAB.

Expected Outputs

A proposal for a HAB monitoring network for EBCM.

Activities

The consultant under supervision of the Chief Technical Advisor and technical guidelines of Regional Working Group on Coastal Disasters. Activities include but not necessarily limited to the following tasks:

- Review the existing YSLME HAB monitoring network, HAB monitoring network of China and RO Korea, to the extent possible and develop an integrated HAB monitoring network covering YSLME by all participants.
- Review the existing HAB monitoring and assessment methods, to the extent possible and develop national and regional HAB monitoring program covering YSLME.
- Review the research progress of HAB in YSLME, including dominant species, the distribution of each species along with the consequences and likely causes with the purpose of classifying their hazards and relating these to manage policy.
- Consolidate the HAB monitoring and assessment results into YSLME regional control proposal in coastal disaster management of EBCM.
- In order to achieve consistency and coordination to enhance HAB monitoring and assessment effectiveness on a larger ecosystem-based spatial scales, propose program areas (such as research and monitoring, education and awareness building) and regulatory tools (regulations, permits, enforcement, ICM plan, etc) as areas of collaboration and coordination.
- Present the proposal at the YSLME Biodiversity Conservation Planning Workshop, and facilitate a discussion on proposal;
- Incorporate comments and consolidate into a final draft YSLME HAB Monitoring Program in collaboration with HAB specialist in RO Korea in hard copy (in English) and electronically.

Inputs
UNDP/GEF YSLME Phase II Project Management Office (PMO) will provide the background information and documents.

Timing
The consultancy will begin in November 1, 2017 and complete in 31 December 2019.

Reporting
The consultant will produce the following reports within the specified timeframe:
1. By 31 December 2017, submit a draft report for strengthening the YSLME HAB Monitoring Network;
2. By 31 December 2018, submit the Program of YSLME HAB Monitoring Network

The consultant will submit reports electronically to Mr. Yinfeng Guo, CTA/Manager at email: yinfengg@unops.org. All reports should be submitted in English.

Activity 6 of Output 4.4.2

Establish a comprehensive regional monitoring system: develop regional monitoring strategies for N/P/Si changes, climate change, jellyfish blooms and HAB

TERMS OF REFERENCE

Establish a comprehensive regional monitoring system

Consultancy classification: subcontract (NMEMC)
Budget line: 72100, Activity 6 of Output 4.4.2, Component 4. Budget: USD 16,000;
Estimated start of work: December 15, 2017 and complete in 31 December 2019

Background
Component 4 addresses improving ecosystem carrying capacity with respect to supporting services. In Outcome 4.4 of Component entitled "Application of ecosystem-based community management (EBCM) preparing risk management plans

to address climate variability and coastal disasters", this project will support a series of activities leading to the development and application of EBCM by initiating regional monitoring, LWE-wide assessment and information exchange, considering the impact of climate change and coastal disasters at national and regional levels. Output 4.4.2 activity 1 seeks to make regional assessment (including trend of introduced species in the region) and make policy-relevant recommendations.

The Yellow Sea LME (YSLME) has productive and varied coastal, offshore, and transboundary fisheries. Over the past several decades, the fishery populations in the Yellow Sea have changed greatly. Many commercial species are threatened by unsustainable exploitation and by natural perturbations. Eutrophication is one of most likely causes that include HAB and also worthwhile to understand relationship between HAB and human activities especially on coastal waters. Jellyfish blooms in ecosystems are also regarded as a response to anthropogenic disturbance, and climate change can also cause numerous deleterious consequences for industry and the community by reducing fishery production. To assess existing supporting services of YSLME for nutrient cycling, reducing risks from Jellyfish blooms as well as HABs, establishing a comprehensive regional monitoring system for N/P/Si changes, climate change, jellyfish blooms and HAB is critical for the development of EBCM as well.

Objectives

The objective of this proposal is to develop regional monitoring strategies for N/P/Si changes, climate change, jellyfish blooms and HAB.

Expected Outputs

A report for the regional monitoring strategies for N/P/Si changes, climate change, jellyfish blooms, microalgae and HAB.

Activities

The subcontractor under supervision of the Chief Technical Advisor and technical guidance of Regional Working Group on Assessment and Monitoring, will conduct the following activities:

- Collect and review the existing monitoring program on coastal and marine ecosystems being influenced by climate change, jellyfish and HABs.
- Review the existing monitoring/assessment methods, to the extent possible and develop national and regional monitoring program covering YSLME.
- Review and establish the relationships between Jellyfish, HABs including drifting macroalgae blooms, climate change and ratio of N/P/Si, and identify coverage by national monitoring and assessment programs;
- Propose monitoring areas to be reflected with existing climate change, jellyfish and HAB in collaboration with specialists.
- Consolidate the assessment results into YSLME regional monitoring strategies.
- Make a regional monitoring system by compromising factors on N/P/Si changes, climate change, jellyfish blooms and HAB occurred in YS with assessment results produced above.
- Draft regional monitoring system including regional monitoring strategies for N/P/Si changes, climate change, jellyfish blooms and HAB.
- Present the progress report at the YSLME Biodiversity Conservation Planning Workshop to be held in Qingdao, PR China, and facilitate a discussion on the progress report with plans to be implemented.
- Incorporate comments and consolidate into a final draft regional monitoring strategies for N/P/Si changes, climate change, jellyfish blooms and HAB in collaboration with specialists on jellyfish blooming, HAB and climate change in hard copy (in English) and electronically.

Inputs

UNDP/GEF YSLME Phase II Project Management Office (PMO) will provide the background information and documents, and will be responsible for providing financial support and the logistics support to participation in the planning workshop by the PMO.

Timing

The consultancy will start work on December 15, 2017 and complete on December 31, 2019.

Reporting

The consultant will produce the following reports within the specified timeframe:

1. By 31 December 2018, submit a report for the regional assessment report on N/P/Si changes, climate change, jellyfish blooms and HAB.
2. By 31 December 2019, submit a draft strategy for development of regional monitoring system.

The consultant can submit reports in English electronically to Mr. Yinfeng Guo, CTA/Manager at email: yinfengg@unops.org

UNDP/GEF YSLME Phase II Project Management Office
Email: yinfengg@unops.org
Website: www.yellowseapartnership.org

Incheon Secretariat
18th floor
G-Tower
175 Art center-daero, Yeonsu-gu,
Incheon 22004
RO Korea
Tel: +82 (0)32 859 7711

Dalian Branch
National Marine Environment
Monitoring Center of State Oceanic
Administration
P.O. Box 303, Linghe Street 42
Dalian 116023
Liaoning
PR China
Telephone: +86 (0)411 8478 0700