

Annual Project Report

UNDP/GEF 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
[1st draft: January 16, 2020]

1. Basic Project Information

Project Title: 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 Award ID	00074724
UNDP Project ID	00087001
Project Duration	11 July 2014 – 31 December 2020
Reporting Period	January – December, 2019
Total Approved Project Budget	US\$4,767,833
Participating UN agencies	UNOPS
Implementing Partners/ National collaborating agencies	Ministry of Natural Resources of China, and Ministry of Ocean and Fisheries of RO Korea
International collaborating agencies	
Cost-sharing third parties	
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Project website	www.yslmep.org

2. Executive Summary

The project implementation is in full swing, with a fully operational regional project management mechanism and regional working groups, implemented through four Project Cooperation Agreements, 4 major subcontracts, 25 staff, consultants and interns, and engagement of 6 grantees through Yellow Sea Grant Program. The working mechanism in PR China after institutional restructuring is put in place to sustain the inter-ministerial coordination in implementation of the project. The new institutional and policy contexts in YSLME caused the partners to take a pragmatic and bilateral approach in shaping the regional governance mechanism including financial arrangements. The reorganized Ministry of Natural Resources (MNR) has shown full ownership of the project results in spite of the shift of mandate in management of marine ecology and environment and marine protected areas to other line ministries.

In terms of partnership, six civil society organizations, business associations and academic institutions were engaged under the Yellow Sea Grant Program of the YSLME, enabling them to complement the existing project partners approaches through reaching out to the communities for awareness raising, education, monitoring, and facilitation of communities to participate in conservation through conservation agreement with local authorities to contribute to sustainable fisheries, replication of environmentally friendly mariculture techniques, monitoring and reduction of marine litter, and conservation of migratory waterbirds and mammals. The science conference organized by the project contributed to the better understanding of the state of the Yellow Sea and TDA and SAP update.

With support of government-financed fishing vessel buy-back schemes, fishing closure in time and area, license system, output control, marine ranching program, application of multi-trophic aquaculture and project-supported re-employment training for displaced fishermen, the target of reducing 10 percent of fishing vessels with sufficient social safeguards has a high likelihood of success reassured by progressive and government-supported replication of IMTA in Rongcheng City of Shandong Province.

In component 3, there is slow progress in agreeing to the regional marine environment monitoring and full adoption of the regional strategy in using wetland as nutrient sinks. Implementation of pollution reduction demonstration has not yet confirmed reduction in nutrient loading. The loading study in Haizhou Bay of Jiangsu Province and Han River of RO Korea provides good examples of managing excessive nutrient loadings in coastal areas through modelling. Reducing the quantities of marine litter through monitoring and reduction is now being demonstrated through engagement of NGOs and cross-country collaboration, while achieving this target through establishment of clean beach city alliance has not yet been initiated.

In Component 4, capacity development and experiences sharing in MPA networking, development of training kit for biophysical connectivity, YSLME biodiversity planning, launch of satellite tracking of migration of spotted seals for MPA networking, and the strengthening the effectiveness of MPAs for critical intertidal flats and fish germplasms are fully implemented. The expansion of MPAs for spotted seals and spoon-billed sandpipers are being proactively pursued by the two countries. Studies on coastal areas reclamation trends, partner advocacy of implication of coastal habitat loss to ecosystem services led to the decision of Chinese government to suspend reclamation to maintain the globally important and ecological and biologically significant

intertidals in the Yellow Sea. There is good progress with implementation of project-supported studies on climate impact on YSCWM and coastal communities.

Below is a summary of the assessment of the progress of the project towards achieving the end-of-project targets.

Component 1				
1.1 Governance	1.2 IMCC	1.3 Participation	1.4 Compliance	1.5 Financing
Component 2				
2.1 Reduced fishing	2.2 Restocking		2.3 Mariculture	
Component 3				
3.1 N discharge	3.2 Wetland	3.3 Regulation	3.4 ML reduction	
Component 4				
4.1 Habitat	4.2 MPA network	4.3 Resilience	4.4 Monitoring	

	Targets achieved or project on-track to achieving at closure
	Targets partially achieved, or its achievement is at risk, or unclear
	Targets not achieved or project off-track to achieving at closure

Due to short period of implementation, requirements for quality assurance and need for transformation of scientific assessment and studies into management actions, the partners have agreed to a further extension of the project activities until June 30, 2020, and operational closure until December 31, 2020 to allow the transformation to take place and continuous engagement of

stakeholders and fully operational IMCC to oversee SAP implementation with ecosystem-based approach.

During the eight months extension period, the remaining 40 per cent of project resources should be programmed to address and/or strengthen the following areas towards achieving end of project targets:

Component 1

- Uncertainty around the Regional Cooperation mechanisms and its financial arrangements;
- Improved compliance with regional and global ocean-related treaties

Component 2

- Policy recommendations and proposals to be adopted;
- Better monitoring and availability of data for reduction in fishing efforts

Component 3

- Nutrient reduction recommendations as a result of total pollution loading to be adopted;
- Better monitoring and availability of data for pollution discharge from land-based sources and marine litter; improving regulatory framework

Component 4

- Increased focus on improving MPA network target – YSCWM;
- Insufficient efforts on climate change and application of ecosystem-based community management
- Yet to agree on monitoring of Jelly fish, HAB and ecosystem and adoption for implementation

3. Background

▪ Development Context

Yellow Sea Large Marine Ecosystem is a water body bordered by China, RO Korea and DPR Korea, covering an area of 400,000 km². Rivers discharge about 1.6 billion tons of sediment and 1,500 billion tones of freshwater into the Yellow Sea. The low flushing rate between Yellow Sea and East China Sea of one every seven years, combined with weak water circulation, makes this sea vulnerable to pollution and its coastal areas highly susceptible to localized pollution discharges. Qingdao, Dalian, Shanghai, Seoul/Incheon (RO Korea) and Pyongyang/Nampo (DRP Korea) are the five cities with over tens of millions of inhabitants bordering the sea. This population relies on the Yellow Sea LME's ecosystem carrying capacity to provide capture fisheries resources in excess of two million tonnes per year, mariculture over 14 million tonnes per year, support for wildlife, provision of bathing beaches and tourism, and its capacity to absorb nutrients and other pollutants. Yet fishing efforts increased threefold between the 1960s and early 1980s, during which time the proportion of demersal species, such as small and large yellow croakers, hairtail, flatfish and cod, declined by more than 40 percent in terms of biomass. Other major transboundary problems include increasing discharge of pollutants; changes to ecosystem structure leading to an increase in jellyfish and harmful algal blooms; 40 percent loss of coastal wetlands from reclamation and conversions projects. Severe environmental degradation has cost the country approximately nine percent of its gross national income in 2009. This situation has been further exacerbated by incomplete legislation and insufficient enforcement. The environmental foundation needed to sustain economic growth may be irreversibly altered, and the important human health implications of a deteriorating environment such as increased agriculture and food contamination and air and water pollution, have

resulted in a series of efforts to improve the environment. In recent years, the Government aims to establish an ‘ecological civilization’ which indicates readiness for environmental transformation.

▪ **Project Objectives and Strategy**

The objective of the 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 Strategic Action Programme (YSLME SAP) adopted by China and RO Korea in 2009. To achieve this objective, the project will support the formation of the YSLME Commission oversee the implementation of the YSLME SAP, innovate institutional arrangements, improve management capacity and quality of function. This includes, developing robust governmental coordination mechanisms, strengthening regulatory mechanisms while strengthening the incentive structure to promote environmental protection, developing mechanisms to link land and sea and resource use to carrying capacity, and systems for the participation of a range of stakeholders. The key benefits of the project include recovery of depleted fish stocks and improved mariculture production and quality; improved ecosystem health; maintenance of habitat areas; strengthened stakeholder participation in management and improved policy making; and skills and capacity significantly developed for region-wide ecosystem-based management. This project is in line with Outcome 2 of the Priority Area of Improved and Sustainable Environment of the UNDAF 2016-2020 in China: more people enjoy a cleaner, healthier environment as a result of improved environmental protection and sustainable green growth.

4. Project Implementation Status and Progress Report

UNDP China CPD Indicator(s)

Indicator Description	Progress Report
<p>Indicator 2.1.3: Number of Biodiversity policy (regulation, ordinances, guidelines, etc.) identified and taken up/committed to revise by the government.</p>	<p>Under project support, Chinese Academy of Fisheries Sciences under the Ministry of Agriculture and Rural Affairs (MARA) prepared the criteria and regulation for assessment of performance of conservation areas for aquatic genetic resources. Yellow Sea Fisheries Research Institute (YSFRI) under MARA has also prepared the responsible fisheries certification standard for adoption by MARA as a regulations and guidelines for improving the management effectiveness of conservation areas for fisheries resources and their sustainable use. YSFRI is also in the process of developing the regional guidelines for implementation of the FAO Code of Conduct for responsible fisheries. Based on consultation with the YSFRI, the approach was suggested to use the responsible fisheries certification standards prepared by China as the basis starting for consensus building with ROK. The agreed framework and scope will become the substance of the regional guidelines. Efforts will be made to initiate discussion leading to the adoption of the responsible fisheries certification standard and the criteria and regulation for assessment of performance of conservation areas for aquatic genetic resources in PR China.</p>

UNDP SP Indicator(s)

Indicator Description	Progress Report
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<p>Indicator 2.5.1: Extent to which legal, policy and institutional frameworks are in place for conservation, sustainable use and access and benefit sharing of natural resources, biodiversity and ecosystems.</p>	<p>The Institute of Oceanography of the Ministry of Natural Resources (FIO/MNR) completed a study to support the government of Rudong in Jiangsu Province of PR China to establish Xiaoyangkou wetland as a National Marine Protected Area. This site is selected as the critical stopover habitat for critically endangered spoon-billed sandpiper along the East Asia and Australian flyway with highest irreplaceability index. A proposal to set a total of 42.88 km² as MPA was reviewed and discussed by State Oceanic Administration (SOA). After institutional restructuring, efforts will be made to coordinate the submission of proposal again for approval by the National Forestry and Grassland Administration that has taken over the authority of SOA.</p> <p>Surveys and production of overlays to analyse gaps and conservation needs of critical species and habitats, i.e. seal, endangered migratory birds, fish spawning and nursery grounds, cold water mass, etc. are being conducted by FIO, NMEMC and YSFRI in PR China. Results of the technical assistance will lead to development of marine biodiversity protected area development plan in PR China.</p> <p>YSLME biodiversity conservation plan for RO Korea (submitted in July 2018) and China (submitted in December 2019) has been consolidated into YSLME Biodiversity Conservation Plan (2020-2030). Review is in progress by the two countries for adoption by the 5th meeting of the Interim YSLME Commission Council to be held in second half of 2020.</p>
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YSLME II Project Indicators

Indicator Description	Progress Report
<p>1. Ensuring Sustainable Regional and National Cooperation for Ecosystem-Based Management</p> <p>Indicator 1.1: Status of YSLME Commission and subsidiary bodies at regional level</p>	<p>At the ICC-3 a consensus was reached among the ICC members to support a study on the flexible and innovative options for a sustainable YSLME governance mechanism. Consequently, Grandview Institution was contracted to conduct the study, the reports were reviewed by the members of the Task Force on Rules of Governance of the two countries in 2019. YSLME Commission, YSLME Stewardship or YSLME Forum, integration into existing multilateral ocean governance mechanism were proposed by the Grandview Institution as the three possible options, yet following a meeting between PR China and RO Korea during the ad hoc ICC (Qingdao, July 15-16, 2019), the two countries opted to integrate the YSLME mechanism under the existing Sino-Korea Marine Science Cooperation Framework and a joint committee to operationalize the agreement. Legal documents for establishing the YSLME governance mechanism and sustainable financing mechanism prepared by the Ocean Governance Specialist and Financing Specialist were reviewed but were not accepted by the ad hoc ICC due to their irrelevance to the needs of PR China. The two countries agreed to prepare a MOU to conclude the YSLME mechanism. The infrastructure of the</p>

<p>Indicator 1.2: Status of Inter-Ministerial Coordinating Committee (IMCC)</p>	<p>mechanism, staffing and location of the PMO will be developed bilaterally.</p> <p>TDA/SAP updates meeting was held on 5 August and August 12-13, 2019, in ROK and PRC respectively with participation of all Chairs of NWGs and invited experts. The commented and revised TDA update report were sent to Prof. Paul Gremillion for further revision. The two meetings reviewed and provided comments to the text of the updated TDA and the cause-chain analysis. The international consultant (Paul Gremillion) has consolidated the draft updated TDA and SAP (2020-2030) and second draft was submitted on September 9, and third draft submitted on October 17, 2019 for review at the pre-ICC-4 workshop. Final draft of the updated TDA is due for submission on January 20, 2020.</p> <p><i>Overall assessment: On track. Uncertainties exist in continued engagement of stakeholders and operation of IMCC and SAP implementation with ecosystem-based approach. ICC-4 should also review and decide whether to revise “establishing YSLME Commission” in the results framework.</i></p> <p>In PR China, the IMCC before April 2019 included State Oceanic Administration (now known as Ministry of Natural Resources, MNR), Ministry of Agriculture (now known as Ministry of Agriculture and Rural Affairs, MARA), and provincial governments of Liaoning, Shandong and Jiangsu. With the reorganization of the SOA into the Ministry of Natural Resources (MNR), the management of marine ecology and environment and marine protected areas previously under the mandates of the SOA is now shared by Ministry of Ecology and Environment (MEE) and National Forestry and Grassland Administration (NFGA). Under this circumstance, the MNR issued the notification on the working mechanism under the phase II of the UNDP/GEF YSLME Project that specifies the members of the inter-ministerial coordination committee, expert committee, and adjusted the membership of the NWGs and National Coordinator. The new IMCC includes MNR, MEE, MARA and NFGA as members.</p> <p><i>Overall assessment: On track. In spite of reorganization of the governmental agencies, IMCC is still operational with updated membership and effective coordination. The future of the IMCC under the new governance mechanism remains to be clarified.</i></p>
<p>Indicator 1.3: Number of the YS Partners in support of YSLME SAP;</p>	<p>By the end of October of 2019, more than 40 national and local governments, regional organizations and regional seas programmes, academia, NGOs and private sector participated in YSLME events. Among these, 19 partners collaborated with YSLME Phase II Project in the conduct of 19 workshops, seminars and training courses and awareness raising activities.</p> <p><i>Partnership with academia for increasing scientific knowledge (SDG14.a):</i> Dates, partners and activities of some of these partnership events conducted in 2019 are as follows:</p> <ul style="list-style-type: none"> • On July 15-19, 2019, the 3rd YSLME Science Conference was held in Qingdao, PR China, in collaboration with FIO, NMEMC, YSFRI, KOEM, KIOST, Anyang University, WESFI, IUCN, etc. • On June 16-17, 2019, PMO joined KOEM and NMEMC/PRC to organize the 2nd China-Korea Workshop on Harmful Marine Organisms in YS in Jeju, RO

<p>Indicator 1.4: Status of recognition and compliance to regional and international treaties and agreements</p> <p>Indicator 1.5: Agreement on the financial arrangement for the YSLME Commission</p>	<p>Korea.</p> <ul style="list-style-type: none"> On June 11-12, 2019, a China-Korea workshop on Yellow Sea Cold Water Mass (YSCWM) in the Yellow Sea was held in Penglai, PR China with 19 participants, and organized by FIO/PRC, KIOST and KOEM/ROK and PMO. On May 14, 2019, an <i>ad hoc</i> expert meeting of RWG-A was held in Qingdao on for participants to share views on how to achieve the targets of each activity within the available timeframe. <p><i>Overall assessment: Achieved. The partnership become YSLME's responsibility and strategy for SAP implementation, their activities are well coordinated to avoid overlapping and are regularly updated of YSLME progress of activities.</i></p> <p>Through PCA with FIO, FIO reviewed to progress of China in implementation of CBD and RAMSAR with recommendations for integration of SDG14, CBD and RAMSAR targets into YSLME targets (final report submitted on August 31, 2019). Through PCA, YSFRI prepared the responsible fisheries standards (submitted on August 23, 2019). Chinese Academy of Fisheries Sciences through GSA prepared the criteria and regulation for assessment of performance of conservation areas for aquatic genetic resources. YSFRI is in the process of developing the regional guidelines for Code of Conduct for responsible fisheries. Based on consultation with the YSFRI, the approach was suggested to use the responsible fisheries certification standards prepared by China as the basis starting for consensus building with ROK. The agreed framework and scope will become the substance of the regional guidelines. The PMO has yet to initiate the consultation with ROK immediately.</p> <p><i>Overall assessment: in progress. Results of the review #1, #2, #3 and #5 are yet to be fed into legislative reform agenda of PR China and SAP. Efforts should be made to initiate discussion leading to the adoption of the responsible fisheries certification and the criteria and regulation for assessment of performance of conservation areas for aquatic genetic resources in PR China.</i></p> <p>The Financing Specialist contracted by UNOPS submitted the YSLME Partnership Trust Fund to the countries was reviewed at the ad hoc ICC held on July 15-16, Qingdao, China, 2019. The proposed trust fund was rejected by the countries as the work is not contextualized to the YSLME and country contexts.</p> <p><i>Overall assessment: in progress. Financing agreement to the post-YSLME governance mechanism is yet to be discussed and signed. Meanwhile, the budgeting cycle of both governments allows timely earmarking of fund for operation of YSLME mechanism immediately after project closure. And Secretariat staffing is agreed in advance, allowing timely budgeting for staffing and operation</i></p>
<p>2. Improving Ecosystem Carrying Capacity with Respect to Provisioning Services</p> <p>Indicator 2.1: Number of fishing boats decommissioned from the fleet in YSLME waters</p>	<ul style="list-style-type: none"> Assessment of effectiveness of license system and closure by PR China was submitted by YSFRI on August 23, 2019, and assessment of effectiveness of license system submitted by RO Korea. A contract was issued to Nanjing University to assess the socioeconomic implications of fishing vessel

buy-back scheme was also submitted. PCA with YSFRI was amended to provide funding to Yantai University through YSFRI for training of 150 displaced fishermen for employment.

- Based on these report, PR China has set the national targets to reduce 20,000 fishing vessels with a total capacity of 1.5 million KW and to reduce fishing landings by 15 percent during the 13th FYP (2016-2020). In addition, fishing closure in Yellow Sea from May 1 to September 16 has been introduced in 2017 by Ministry of Agriculture of China (now known as Ministry of Agriculture and Rural Affairs) to restore the declining fish stocks. Based on information provided by PR China in the review of SAP implementation (June 2018), the number of fishing vessels will be reduced from the baseline level of 21,713 (Liaoning: 7,084; Shandong: 10,355; and Jiangsu: 4,274) in 2015 to 18,797 by 2020 (Liaoning: 6,177; Shandong: 8,976; and Jiangsu: 3,644) by 2020. If fully implemented in PR China, a 13.4 percent reduction of fishing vessels by 2020 would be achieved, exceeding the targeted reduction of 10 percent by 2020. There is a continued reduction in fisheries outputs in the two countries, evidenced by a significant reduction in RO Korea up to 2017 and a decrease of annual total allowable catch from 13 million tons to 10 million tons from inshore and offshore capture fisheries, or 25 percent reduction to be achieved in 2018 in PR China. In commensurate with the efforts of reducing fishing vessels and outputs, the project also intervened in assurance of social safeguards of displace fishermen. A study on the social and economic implication of the implementation of the fishing vessel buy-back scheme in PR China was conducted, suggesting to focus on livelihood support and vocational skills training to enhance the employability of displaced fishermen. Three trainings for re-employment of displaced fishermen joining the fishing vessel buy-back scheme were conducted by Yantai University to train a total of 150 fishermen. The study on *fishery license system* was conducted (Prepared and reviewed by Dr. Xianshi JIN and Dr. Xiujuan SHAN from YSFRI). The final report entitled *assessment report of effectiveness of license system and recommendations for improvement of license system in China* was submitted on 25th of August. The study found that: (1) license system has already restricted the quantity of marine fishing vessel numbers that had fishing activities in the Yellow Sea. However, the total tonnage and horsepower increased, which means management still needs to be strengthened to control the fishing vessel quantity, tonnage and horsepower in a reasonable range, so that the fishery resources in the Yellow Sea can be utilized in a reasonable and sustainable manner; (2) although China has taken a series of measures to reduce the number of fisherman within the fishery industry, it has positive effect on fisherman's income, which is the best feedback for the future implementation of various fishery systems. The study recommends that: (1) to completely control fishing intensity and protect marine fishery resources, China should implement input control management together with output control, improving the existing input control management system and introducing advanced output control management system; (2) conduct comprehensive surveys and stock assessment of fishery resources to serve scientific management and decision-making for fishery management.

Overall assessment: On track. Though with good progress under a conducive policy framework in both countries, the following factors will determine the likelihood of success in achieving the targets of the project. 1) Means of verification of vessel reduction should be agreed to track program of implementation assuming that local governments are willing to release data on fishing vessel reduction. 2) Baseline year and number of fishing vessels to be

Indicator 2.2: Status of major commercially important fish stock from restocking and habitat improvement

reduced for RO Korea needs to be tracked to showcase the progress of the project. 2) YSLME disaggregated data should be available. 4) the policy recommendations of the license system in PR China should be brought to the attention of MARA/PRC for consideration in future fishery policy making.

The following consultancy through PCAs have been Completed:

- 1) Through PCA, YSFRI monitored the results of demonstration sites on marine ranching in Shandong. One report, prepared and reviewed by Dr. Xiujuan SHAN from YSFRI and Dr. Lei WANG from Yantai University *entitled Analysis of the Construction Progress of Haiyang Fuhan National Marine Ranching Demonstration Area* (submitted on 25th of August, 2019), analyzed the expected benefits for the goal of marine ecological environment protection, fishery resource recovery and sustainable development of fishery industry.
- 2) Another study on monitoring of implementing results in demonstration sites (Act. 3 of Output 2.2.1) was undertaken Dr. Qiusheng YAO and Dr. Lei WANG from Yantai University. The final report entitled *Construction and effect analysis of artificial reefs in the Pipakou waters of Haiyang City* was submitted on 25th of August. The demonstration of use of artificial reef in 53 hectares show significant improvements in marine ecology of the deserted sea areas, with a 50 percent of coverage of the reefs by algae and shellfish.
- 3) A study on seagrass transplanting in application of improved techniques of replanting seagrass and macroalgae has been conducted by YSFRI. Through seed sorting, germination and transplantation, a total of 10,000 eelgrass shoots were cultured and transplanted from October 2017 to August 2019 with evidenced increase of biodiversity by more than 5 species compared with naked surrounding sandy and muddy patches.
- 4) Visit of Korean experts to marine ranching sites in PR China and reciprocal visit by Chinese experts to Jeju and Gunsan of RO Korea were completed. The study visit in RO Korea shows that marine ranching for fishery, tourism and mix purposes has a cost-benefit ratio of 6:1 according to assessment of FIRA.

Fishing vessel buy-back scheme, license system, total allowable catch (TAC) and marine ranching through artificial reef, fish fry release, reforestation and sea closure to fisheries are the key measures in PR China and RO Korea to recover fish stocks and improve fishermen's income. Currently RO Korea applies TAC system to 11 species with 70 TAC observers, while PR China piloted the system in 2017 with two species. Swimming Crab (*Portunus trituberculatus*) is under TAC in both countries, providing an ideal example for learning in application of TAC to improve management effectiveness of fish stocks. In line with targets of the UNDP/GEF YSLME Phase II Project to recover depleted fish stocks, the Project organized the Korea-China Workshop on Stock Assessment in Tongyeong, RO Korea on 30-31 July 2018 co-hosted by MOF of RO Korea, SOA and Ministry of Agricultural and Rural Affairs of PR China (MARA). Attended by more than 20 fisheries experts and researchers from 9 research institutes, universities, public agencies of PR China, RO Korea and United States of America, the workshop facilitated the exchange of experiences among participating countries in stock assessment methodologies and processes using Swimming Crab and small yellow croaker as two case species. Use of TAC as a conservation and management measure for joint stock management in Yellow Sea

is still at infantry stage.

Marine ranching through artificial reef is common approach to adopted by both countries to restore depleted fish stocks. In PR China, three groups of national marine ranches are piloted and supported by Ministry of Agriculture and Rural Affairs with a total of 64 operations in Yellow Sea, East China Sea and South China Sea in 2017. In RO Korea, a total of 36 marine ranches are established to restock the fish population including in the Yellow Sea. Initial study by Shandong Ocean and Fisheries Department indicates positive results of marine ranching in restocking fish population. According to FIRA of ROK, efforts to establish marine forests in ROK was made at 21 and 24 sites respectively in 2015 and 2016, creating areas of 3,236 ha and 3,064 ha with support of project funding 35.7 million USD and 34.7 million USD respectively. This initiative is encouraged nationally through a national Act enforced since 2012 by designating 10th May every year as Marine Gardening Day. Projects on Marine Ranches have also been implemented by applying at 19 sites in 2015 and 2016 with support of project funding 19 million USD in 2015 and 2016 respectively.

Marine ranching has produced some tangible results in project demonstration sites. Based on the project monitoring of demonstration projects in Shandong Province, the restocking of fish through artificial reef has been monitored and evaluated in coastal areas of Haiyang City, with an investment of CNY 37 million from 2013 to 2017 in a sea area of 57 ha. Stones, tubular concrete reef, rectangular concrete reef, steel frame reef, square concrete reef, waste fishing vessels were deployed following technical advice from the project-recruited consultants. Seabed algae field in the artificial reef areas has been formed, and algae and shellfish start to stick to the reefs after one year of deployment, dominated by *Ulva pertusa*, Sea mustard, *Ostrea plicatula*, reaching 50% coverage of reef area. Fish, shrimp and crab populations are also increasing significantly. Based on the assessment in October of 2012, the abundance of 23 economic species in the reef area have increased 2.29 times. The number of fish caught per net is 90, 3.5 times increase. Catch per unit time is 7,154 g per net, an increase of 2.82 times than in 2012. In 2017, Shandong Fushan Marine Science and Technology Co. Ltd won the bidding to build and deploy 1,800 square steel-integrated monolithic reefs (3m X 3m X3m) and establish marine ranching observation system in a sea area of 7.8 ha in Haiyang Fuhuan National Marine Ranching Demonstration Area in the external waters of Pipakou located in the east of Haiyang City, Shandong Province. With a total funding of CNY26 million, the project was approved in 2017 and is now being implemented in 2018 for completion in 12 months. The YSLME Project will continue to use the monitoring indicator system of marine ranching construction of Shandong Province to assess the results of fish stock enhancement through of the artificial reefs before and after construction. Monitoring of enhancement results will continue and be reported to ICC in December 2018.

Marine ranching visit for Korean experts to Fuhuan of Haiyang and Hailufeng of Qingdao provides chances for exchange in improving the results and cost-efficiency of marine ranching programs in both countries. A return visit by Chinese experts marine ranching sites in Jeju and Gunsan was organized on October 14-18 with participation of video production company.

Overall assessment: on track. Studies in selected locations in China indicate an

Indicator 2.3: Level of pollutant discharge from mariculture operations

increase of CPUE by 2.8-3.5 times and high cost-benefit from investment in RO Korea. In the following months, the Project needs transform these studies and recommendations into knowledge products for awareness raising and consideration by the MARA in its future planning and investment for fish stock enhancement. Sharing of learning results from study visits for improving the restocking is another area for PMO to follow up.

The following activities have been completed in 2019:

- 1) Through PCA with YSFRI, a survey of coastal areas suitable for operation of IMTA and economic analysis of benefits from replication of IMTA across Shandong Province of PRC was conducted (report submitted in May 2019).
- 2) Through PCA, YSFYI provides technical support to three enterprises in Shandong to replicate the IMTA and report submitted.
- 3) Based on the experience of IMTA application in PR China and ROK, good aquaculture practice (GAP) is being prepared through a PCA with YSFRI.
- 4) Responsible Mariculture Initiative was launched on October 30.
- 5) Promoting plan for IMTA in Shandong was submitted by YSFRI through a PCA.

Thus far, the project has achieved significant progress as shown below:

IMTA demonstration:

In PR China, mariculture through IMTA was demonstrated in Sungo Bay with stocking of kelp and oyster and in Haiyang in a pond-based IMTA. Results show the average length, width and wet weight of kelp in IMTA sites were 323.75 cm, 43.45 com and 1,227 g respectively in IMTA modes, higher than 373.75 cm, 39.50 cm and 830.5 g under monoculture of kelp. The yield increased by 14.8 percent, labour costs reduced by 10 percent, and economic benefits increased by 57.85 percent. The comprehensive benefit of the IMTA demonstration area increased by 131.1 percent. DO, total inorganic nitrogen concentration, chlorophyll-*a* concentration in the surface, phytoplankton and POM can meet the high standard established in the national sea water quality standards. In the land-based pond IMTA demonstration, the nitrogen and phosphorus in the seawater is significantly reduced in the IMTA pond, with a total of CNY193,000 net project in the 1 ha outdoor pond stocked with sea cucumber and scallop.

In RO Korea, IMTA was demonstrated from 2011 onwards in coastal areas beyond YSLME by NIFS of RO Korea on IMTA of sea tangle, Gulfweed, Korean rockfish, Pacific Oyster and sea cucumber indicating that sea cucumber grew 2.7 times faster; survival rate of Korean rockfish increased by 33.4% (from 56.8% to 90.5%); no fish disease occurred in IMTA (40% of Rockfish farmed in monoculture infected with disease). In the IMTA in Namhae of Korean rockfish, sea cucumber, Pacific Oyster, *Undaria* and *Saccharina japonoca*, studies found no significant difference in growth of body length and weight of Korean rockfish; no disease found in rockfish (36.7% under monoculture); Pacific Oyster grow faster by >20% in shell height and whole and meat weight, and 22.5% higher fatness; and sea cucumber grew >40% faster.

Scaling up IMTA in coastal areas of Shandong and outside Shandong

The project explored to use various approaches in replicating IMTA through further demonstration in land-based aquaculture, scaling up carrying capacity assessment in mariculture, training module development and organization of training courses in project impact areas, etc.

- 1) Paradigm shift to use of carrying capacity. In scaling up the IMTA, eminent experts from YSFRI of PR China proposed to national government to adopt **carrying capacity** as the key management measures to align aquaculture development on a sustainable path. The proposal received positive feedback and MARA was commissioned to review and translate into management measures.
- 2) The Project is supporting the **replication of IMTA across coastal areas of Shandong Province**, a leading mariculture producer in PR China. The final report entitled *Survey report of coastal areas suitable for operation of IMTA and economic analysis of benefits from replication of IMTA across of Shandong Province of PR China* was submitted on 16th of August. Based on the review of sea use type, sea jurisdiction, marine development function zones and ocean conditions in Shandong Province, the study estimated that 589,754 ha of coastal areas in Shandong Province are suitable for land-based, bottom culture, long-line and case culture IMTA. Applicable IMTA models include shrimp-crab-shellfish-sea cucumber in pond, shellfish-seaweed or shellfish-seaweed-sea cucumber bottom culture. In shallow sea mariculture, shellfish-seaweed, shellfish-seaweed-sea cucumber, fish-shellfish-seaweed, abalone-seaweed-sea cucumber for longline and cage farming are recommended. The study serves as a very good basis in the development of the promotion plan.
- 3) To help transfer the knowledge of IMTA, the project has published a 170-page **training module** for IMTA in Chinese and English for use in training courses. *A final knowledge product documenting the experiences of PR China and RO Korea in IMTA is at the final stage of consolidation. A training center* with 120 m² meeting room for use in training on IMTA has been constructed by Dongchu Fishery Cooperation, a community-based enterprise specializing in aquaculture of kelp, abalone, scallop, sea urchin and sea cucumber with technical assistance from YSFRI/PRC. Two **training courses** for Chinese mariculture managers and academia were conducted in 2018.
- 4) Launch and operationalizing **Responsible Mariculture Initiative**. The project awarded under the YSGP a 100,000 USD grant to a consortium of China Aquatic Product Processing and Marketing Alliance (CAPPMA) and Qingdao Marine Conservation Society (QMCS) in collaboration with the Aquaculture Stewardship Society (ASC). The project aims at addressing the multiple negative environmental and social impacts of unsustainable mariculture enterprises along the Yellow Sea coast across the provinces of Liaoning, Shandong and Jiangsu Provinces in China and also involve Republic of Korea's (ROK) mariculture enterprises and NGOs operating along ROK's Yellow Sea coast. It will focus on addressing habitat destruction, overfishing, fishing down the food chain, illegal and improper chemical use, eutrophication, increasing incidents of disease in wild stocks, degradation of worker's welfare and health by promoting better developed and operated mariculture enterprises via technical guidelines and market incentives supported by relevant policies and laws. On October 30, the Responsible Mariculture Initiative was launched by CAPPMA, QMCS and ASC, attracting commitments of 31 members in the supply chain. Aquaculture Stewardship Society standards will be promoted to mariculture enterprises as well through study visits, training on the certification process and exchange of experience.

	<p>5) The first draft of the <i>GAP of IMTA</i> was prepared and the Chinese version will be sent to MARA for review and consideration as a voluntary standard for application under the responsible mariculture certification system.</p> <p>The promotion has some initial positive results in Shandong Province. In July 2019, a notification for adoption of sustainable mariculture in particular IMTA was issued to all fishery enterprises by Rongcheng Fisheries Management Bureau, indicating promising replication of the project results in Shandong Province.</p> <p>A twinning between YSLME and Caribbean Regional Fishery Mechanism is being proposed for support by IOC/UNESCO to transfer the knowledge in three Caribbean countries, signalling widespread recognition of YSLME as a source of knowledge and expertise in sustainable mariculture.</p> <p><i>Overall assessment: On track, while the Responsible Mariculture Initiative and promotion plan are yet to operationalized and developed during the remaining period of the project. However, absence or inadequate enforcement of water quality standards in sea areas used for mariculture provide leeway for non-compliance and unwillingness to accept IMTA</i></p>
<p>3. Improving Ecosystem Carrying Capacity with respect to Regulating and Cultural Services</p> <p>Indicator 3.1: Level of pollutant discharges particularly Nitrogen in YSLME tributaries</p>	<p>The status of implementation of activities under this outcome are summarized as below:</p> <ol style="list-style-type: none"> 1) Through individual contract, the regional marine environment monitoring network was proposed and submitted in October 2018 together with the study on water quality standards. Comments from ROK were integrated in the final product. 2) The loading study of Han River of ROK was submitted. 3) Through PCA with NMEMC of Ministry of Ecology and Environment, the following studies are ongoing: 1) assessing deposition flux of nitrogen and phosphate in various forms and final loading report of Haizhou Bay of Jiangsu Province; 2) marine environment monitoring from sources of atmosphere, fertilizer use and sea and production of data products. In addition, the diagnostic analysis of ID sources and sinks of pollutants is also ongoing. <p>Thus far, the achievements under this outcome include the following:</p> <p>During the project implementation period, the following actions at national level have been adopted and implemented in PR China that will lead to reduction of N during the 13th FYP period (2016-2020)</p> <ul style="list-style-type: none"> ○ In 2015, China issued “Water Pollution Control Action Plan”, which has strengthened pollution control in industrial agglomeration areas. The Plan requires that by the end of 2017, the industrial agglomeration area should be built into a centralized sewage treatment facility, and an automatic online monitoring device was installed, and that the urban sewage treatment facilities in the sensitive areas would meet the grade I-level A emission

standards. Results of implementation of the Plan were not reported. Considering the action plan proposed that by 2020, the national water environmental quality must make staged-based improvements and the urgency, complexity, toughness, and long-term nature of water pollution control efforts requires full implementation of the Plan, the CPC Central Committee and the State Council have emphasized great importance to the prevention and control of water pollution and published a new notification on the battle of pollution prevention and control in June of 2018. The new notification and opinion from The CPC central committee highlights the Action Plan for Prevention and Control of Water Pollution must be fully implemented and the targets raised in the “Water Pollution Control Action Plan” need to be fulfilled based on time schedule. The responsibilities of local governments for protection of water environment was also highlighted in the notification from The CPC Central Committee. Progress report on implementation of “Water Pollution Control Action Plan” has not yet been published by the ministry of Ecology and Environment.

- On July 11, 2016, State Council of China issued the Action Plan for Soil Pollution Prevention and Control. It clearly points out that a coordination mechanism among government, community, enterprises, and residents will be established.
- On November, 2016, the General Office of the CPC Central Committee and the General Office of the State Council issued the Opinions on Full Implementation of River Chief System; it has been made clear that the major leaders of Party and government organizations need to shoulder the posts as river chiefs.
- The Ministry of Transport issued the Special Action Plan for Ship and Port Pollution Prevention and Control (2015-2020) in 2015 to explore and establish a new mechanism for the reception and disposal of ship pollutants, and promote the construction of receiving facilities for pollutants and improve receiving and disposing capabilities to meet the demand for receiving and disposing pollutants from ships
- As imported solid waste, China banned imports of 24 types of solid waste since 2017 in a fresh move to reduce environmental pollution, which covers waste plastics, unsorted scrap paper, discarded textiles, and other kinds of waste.
- On March 26, 2018, the Ministry of Ecology and Environment reviewed and adopted in principle the “Action Plan for the Implementation of the Proposal for the Reform of the Import Management System for the Prohibition of the Importation of Solid Waste into the Prohibition of Foreign Garbage for the 2018-2020”.

Actions taken in RO Korea include:

- According to the Marine Environment Comprehensive Plan (2011-2020), more efforts by setting up strict law are being addressed to prevent pollutants from marine-based sources of pollution by strengthening legal framework, which is in line with recent trends globally. Strict restriction of ship-based pollutants (SOx and NOx), and ballast water as well initiated by International Maritime Organization (IMO).
- To understand characteristics of discharge of pollutants along coastal areas, comprehensive survey has been carried out since 2011. Valuable

information on sources, water and sediment quality and transporting routes has been collected. Results of this survey provides insight of status of coastal environment especially ecosystems.

- To enhance efforts to reduce pollution, national action plan for the management of land-based sources of pollutants was established in 2013. This national plan has a goal to manage water quality in 50 out of 65 coastal areas planned to be managed in national scale which accounts for 75% achievement until 2020. Additional attempt to reduce non-point sources of pollution is also being made by setting up guidelines to follow. The funding for these activities especially contaminated sediment removal was allocated 10 million USD in 2017 and 12 million USD in 2018. Monitoring activities at sites completed are also being carried with financial support of 0.23 million USD in 2017 and 0.35 million USD in 2018. Distribution of contaminated sediment in designated areas is being conducted with financial support of 0.4 million USD in 2017 and 0.5 million USD in 2018.
- In ROK, a project on nutrition reduction and eutrophication phenomenon causing from land-based sources is being implemented in Han River watershed as a target site using data available. Outcomes of the project will be available in January 2019 which will contribute to the development of national strategy.

Demonstration intervention: _____

- 1) Through PCA with NMEMC of MEE, a study on updated objectives and actions of NSAP for 2018-2020 in relation to pollution reduction reviewed by Dr. Ziweiyao, the report summarized that nitrogen and phosphate, faecal substance, heavy metals, persistent organic pollutants, polycyclic aromatic hydrocarbons and marine litter as the major contaminants in Yellow Sea. In the report, it mentioned that since 2001 to 2016, the area of the yellow sea under the fourth-grade standard of seawater (highest polluted area) is less than 14% of the total water area that meet the first grade of seawater quality standard (the clean area). In 2016, the highest polluted areas were reduced by 14,000 square meters compared with 2012. The main pollutants of the seawater in the Yellow Sea were inorganic nitrogen, active phosphate and oil.
- 2) At regional level, through consultancy the regional marine environment monitoring network is being developed together with the water quality standards. With inputs from ROK, the program will be ready for review and adoption for implementation by the ICC-4. Sources and sinks of pollutants, environmental status and trends in the Yellow Sea are under review by the project to improve understanding of the environmental capacity and level of reduction of total loading of nutrients from baseline level.
- 3) Nutrients from sea-based (mariculture and shipping) and atmospheric sources from PR China and RO Korea are ongoing. By the year 2015, the total mariculture area and the yield reached 2,317,760 hectares and 18,756,1277 tons respectively in PR China (MAO, 2016). Along with the development of the scale of aquaculture, especially in China, the negative effects of the mariculture waste both on the culture system and on the ambient aquatic ecosystem are being studied. Method for assessment of sea-based and deposition fluxes of nutrients and heavy metals from atmosphere-based sources have been developed by NMEMC for endorsement by the RWG-P.

For 10% reductions in N discharge, with project support NMEMEC has been

Indicator 3.2: Types of technologies applied for pollution reduction

undertaking studies to calculate nutrient loading using exports coefficient model in Haizhou Bay, Jiangsu Province of PR China. Haizhou Bay lies on the western margin of the South Yellow Sea, near the city of Lianyungang, and receives water inflow mainly from the Linhong River, Qingkou River, Longwang River and Xiuzhen River. The bay has an area of approximately 876.39 km², has a major fishery base, with aquaculture industries boosting economic growth in Lianyungang by 4.3 times from 1995 to 2005 (OFBL, 2011). According to the recent reports, the Linhong River carried 2.26×10^8 tons of domestic sewage and industrial wastewater in 2010 (EPAL, 2011; OFBL, 2011). And according to the record in the sea area of Jiangsu from 1997 to 2014, red tides hit Jiangsu Province 33 times, and the Haizhou Bay was frequented as well. Results of the study were presented at the 3rd YSLME Science Conference and report is yet to be submitted in mid November, 2019. Modelling of nutrients in Han River of ROK is ongoing and progress was introduced at the second meeting of the RWG on Pollution Reduction (Pusan, June 3-6).

Overall assessment: in progress, targets will be met mostly through national efforts to address land-based pollution. For the loading study results to lead to nutrient reduction, there should be strong and effective coordination in translating the results of loading study into fertilizer use reduction targets in upstream areas with regular monitoring at watershed level

Through Individual consultant contract, the regional strategy for using wetlands as nutrient sink was submitted by Dr. Guoxiang LIAO. Through a PCA with North China Sea Environment Monitoring Center (NCSMEC), wetland survey of Jiaozhou Bay is ongoing.

Major progress of the outcome includes:

- In addition to enhancing sewage treatment capacity and sewage collection system, developing a regional strategy to use wetland as nutrient sinks is under support by the Project. The draft regional strategy submitted by the consultant reviewed the roles of wetland in nutrient removal for the Yellow Sea Coastal area and the mechanisms of nutrient retention; the status and changes of coastal wetland in the Yellow Sea in both PR China and RO Korea; nutrient loads from river discharges and atmosphere, wastewater treatment and nutrient removal in the Yellow Sea wetland; and the mechanisms of using natural and artificial wetland as nutrient sinks for wastewater treatment.
- In the YSLME demonstration city of Dalian supported by government co-financing, reduction of nutrient inputs from an upstream river into vulnerable Linshui Bay and restoration of bay area are prioritized by national and local governments with earmarking of 320,000,000 yuan (equivalent to 48 million US dollars) from the two sources. In 2017, the central government support focused on strengthening the coastal embankment, restoration of sand beach, restoration of estuarine wetland while local investment of Dalian City upgraded the sewage treatment capacity of existing facilities. In Linshui Bay of Dalian, the technologies of restoration of coastal wetland in estuarine areas and upgrading the sewage treatment capacity of existing treatment facilities are used by the subcontractors. Level of reduction will be calculated by

<p>Indicator 3.3: Status of legal and regulatory process to control pollution</p>	<p>NMEMC with support of YSLME Phase II Project.</p> <ul style="list-style-type: none"> The monitoring of the coastal wetlands of Jiaozhou Bay conducted by NCSEMC is ongoing. The consultancy will assess the status of biological and environmental factors of the bay for consideration and integration into the planning for restoring the ecological services of the Bay. <p><i>Overall assessment: in progress and achieving the end of project targets is unlikely. The demonstration project started very late due to difficulties in identifying local government to demonstrate the concept of using wetland as nutrient sink. For the monitoring of wetland of Jiaozhou Bay to be resultful, there should be frequent consultation and coordination with Jiaozhou Bay management committee to allow early engagement and government buy-in of the results of the study to ensure integration of the results into future bay-wide environmental planning.</i></p> <p>Completed activities under this outcome include:</p> <ol style="list-style-type: none"> 1) Policy expert (Mr. Ruijun Sun) submitted the Report on the legal review of PR China and RO Korea regarding marine pollution control and compliance assessment with international ocean-related environmental agreements. 2) Training module for microplastics monitoring. 3) conduct of a training to improve the capacity of coastal provinces. <p>In ROK, Marine Environment Management Act took effect since 2007 and was revised in 2011. By following the Act, Marine Environment Comprehensive Plan (2011-2020) was developed in collaboration with relevant stakeholders with a goal of sustainable use and management of marine environment. Plans with goals were well addressed to control pollution being occurred in coastal areas.</p> <p>Training module for microplastics monitoring was prepared by the consultant with peer review by Korean experts for use in training in the YSLME region. Chinese version is also developed and used in conduct of a training for officers in Shandong, Liaoning and Jiangsu of PR China held on July 30-31, 2019.</p> <p>Revision of the marine environmental protection law in PR China provides a timely opportunity to transform the results of the assessment into policy recommendation for consideration in the revision process.</p> <p><i>Overall assessment: in progress. The targets are ambitious as harmonization of legislation may take longer time than the project period allows. Opportunities of existing legal reform in marine environmental protection law should be explored. In addition, scaling up the microplastics monitoring methodologies as a provisional monitoring protocols may also be considered.</i></p>
<p>Indicator 3.4: Status of the control of marine litter at selected locations</p>	<p>Completed activities:</p> <ol style="list-style-type: none"> 1) Through PCA contract with NMEMC, a study on reviewing of existing polices and regulations regarding solid waste disposal of PRC reviewed by Dr. Weiwei ZHANG. (completed)

- 2) Though Subcontract, Shandong Marine Resources and Environment Research Institute studied and submitted report on developing regulatory measures for marine litter management in Weihai city of PR China.
- 3) Baseline report of the marine litter in YSLME was completed, awaiting inputs from RO Korea.

Ongoing activities:

- 1) Two GSAs were signed with Shanghai Rendu Ocean NPO Development Center and BlueRibbon Ocean Conservation Association (BROCA) on marine litter monitoring and reduction in fishing village in Weihai City respectively.

Progress of activities under this outcome is summarized below:

Based on the review of the project consultant Dr. Weiwei ZHANG, there are no laws or regulations specifically issued to address marine litter in PR China. Yet a series of relative laws and regulations have been enacted to prevent and control of marine litter pollution, including Marine Environmental Protection Law; Law on the prevention and control of environmental pollution by solid waste (1996); Regulations on the prevention and control of pollution by land-based pollutants (1990); Regulations of the people's republic of china on control over dumping of wastes in the ocean; Regulations of the People's Republic of China Concerning Environmental Protection in Offshore Oil Exploration and Exploitation; Administrative Regulations on the Prevention and Treatment of the Pollution and Damage to the Marine Environment by Marine Engineering Construction Projects; and Regulation on the Prevention and Control of Vessel-induced Pollution to the Marine Environment. Programs to prevent and mitigate marine litter in PR China are also reviewed. In last part of the report, the study suggests to 1) amend the relevant laws and regulations 2) issue national marine pollution and control action plan 3) formulate local regulations for prevention and control marine litter.

In the 1st RWG meeting on Pollution Reduction, it was agreed that the project would use the NOWPAP marine litter monitoring guidelines to conduct the baseline survey. In China, Weihai was selected as the demonstration site for reducing marine litter. A subcontract is being implemented to monitor the status of marine litter in two sites in Weihai, assess the legal and regulatory framework gaps, and propose incentive policies in recycling economies. A consultation meeting in Jinan was held to determine the scope of demonstration with initial interest from local government to support the collection of abandoned fish cages in aquaculture, collection of garbage from fishing boats before closure season, and support to establish a coastal city partnership to integrate marine litter into overarching environmental agenda of local governments.

In ROK, beach litter survey along the coastline has been conducted 6 times per year at 382 sites to monitor and observe types of litters and their abundance. The sampling sites were selected in every 10km. An intensive survey was carried out in Jeolla-Namdo province to make an inventory of litter in land, river, coast and estuary by OSEAN (Our Sea of East Asia Network) to estimate marine litters in this province in November 2017. Beach litter survey methodology of the CSIRO

(Commonwealth Science and Industrial Research Organization) was used for this survey. Both KIOST and OSEAN have carried out a research on the abundance and accumulation patterns of plastic marine debris on 6 beaches in the Korean YS since 2016. At Provincial level, starting from year of 2015, Chungcheongnamdo developed comprehensive plan for the conservation of marine environment. In line with approach described in the plan, 43 projects for the conservation of marine environment with funding of 18 million USD is being implemented in areas of building infrastructure, collection and disposal of marine litter. In particular, around 9,000 tonnes of marine litter are being collected with a help of financial support of 4.2 million USD.

In the second meeting of the RWG on Pollution Reduction, difference in methodologies in terms of frequency of monitoring, availability and cope was observed. Encouraged by the vision of zero marine litter and commitment of reducing 5 percent of marine litter each year by Chungcheongnamdo and the interest of Taean city, establishing a city alliance around the YS to reduce marine litter will be launched by the project.

In the report submitted by Shandong Marine Resources and Environment Research Institute to develop regulatory measures for marine litter management in Weihai city of PR China, the status of the control of marine litter at Weihai was reviewed including the marine litter distribution, classification and sources. In conclusion, the study emphasized to improve incentives for public participants in the following part 1) incentives from law and regulations 2) incentives about social mechanism 3) financial incentives 3) capacity building on media and data sharing.

The 335,500 CNY YSGP grant implemented by Blue Ribbon Ocean Conservation Association contributes to this component in Jingzi Village of Weihai City by effectively resolving the contradiction between local marine resources environmental protection and community development, to make local villagers participate deeply in activities of decision-making, protection and management, to transfer themselves from managed to managing, and to gradually get benefits from marine environmental protection. It will set up a platform to promote regional cooperation and exchanges between Chinese and Korean marine NGOs. At this location, it will reduce marine litter including micro-plastics, and strengthen public education.

A further YSGP grant of 46,312 USD was awarded to Shanghai Rendu Ocean NPO Development Center (Rendu) for a marine debris monitoring project to strengthen the marine debris survey network in 6-8 locations in the Yellow Sea area. It will focus on fishery and aquaculture marine debris. Based on the survey data collected, Rendu will produce an analysis report and propose potential solutions.

Overall assessment: on track. Consultancy in marine litter reduction in Weihai was completed, and dialogue was conducted by PMO for consultancy firm to communicate the results of the study with Weihai municipal government for consideration in improving their management measures to address marine litter.

4. Improving Ecosystem Carrying Capacity with respect to Supporting Services

Indicator 4.1: Areas of critical habitats;

Completed activities:

Biodiversity conservation planning:

- YSLME biodiversity conservation plan for Korea (submitted in July 2018) and China (submitted) to serve as the basis for consolidating the YSLME Biodiversity Conservation Plan (2020-2030)

Coastal habitat conservation

- Report by consultant on *improving the effectiveness and impacts of Ecological Restoration project in the Yellow Sea* (submitted 10 Aug. 2019).
- A study on “Coastal reclamation and impact to critical coastal habitats of YSLME” (submitted on June, 2019)
- PCA with FIO to 1) assess the Implementation of CBD and RAMSAR with recommendations for integration of SDG14, CBD and RAMSAR targets into YSLME SAP (submitted on 27 Aug. 2019); and 2) Two management plans including monitoring programs and capacity development programs for two MPAs, and study on impact of reclamation (submitted on 27 Aug. 2019)
- Assessment of ecosystems services of Rudong mudflat and Aoshan bay coastal area (submitted on 27 Aug. 2019)

Ongoing:

- Feasibility study for designating YSCWM as a new MPA, PCA with FIO

Overall progress is summarized below:

- Up to now, approximately 880,000 ha of YS mudflat areas have been reclaimed. This comprises 37% of the inter-tidal areas of the Chinese portion of the YS, which have been reclaimed since 1950, and 43% of the mudflats on the ROK coast, which has been reclaimed since 1917.
- In order to better understand the implication of reclamation projects to PPAs, a consultant Dr. Yu LIU was hired to review the past and future reclamation to the critical coastal habitats identified by RAMSAR and Birdlife International. A draft report for maintenance of the existing critical habitats to improve the ecosystem carrying capacity of supporting services of YSLME were submitted and currently in revision. Detailed information on conservation status and gaps and also recommended management measures were proposed. The study contributed to the conservation of intertidal mudflat.
- On 27 August, 2019, assessment report on ecosystem services of Rudong mudflat and Aoshan Bay coastal area were submitted by FIO of PRC as an outcome of activities initiated by YSLME.
- In 2018, the Ministry of Natural Resource of PR China requested suspension of all reclamation projects in coastal areas, and this new order will place much hope to protect remaining but critically important intertidal of YS.
- A similar initiative to expand MPA coverage of marine and coastal areas is under consideration in Ganghwa Island of RO Korea, one of tidal flats of the Han River estuary in Yellow Sea, the larger of the only two known breeding sites globally for the critically endangered Black-faced Spoonbill (*Platalea minor*).
- Restoration of coastal habitat was supported in ROK through co-financing. In

Indicator 4.2: level of ecological connectivity in expansion of the Yellow Sea MPA system.

RO Korea, a 7 million US dollar project was completed in Ganghwa to restore the ecosystem connectivity of intertidal mudflats through replacing a causeway connecting two islands with a newly built bridge. In addition, a new monitoring project, “Fisheries Resources Changes based on Yellow Sea Ecosystem” will be implemented from 2018. The budget is in total 17.2 billion KRW for 5 years. The project is an expansion of the comprehensive ecosystem monitoring in coastal area to open sea

Overall assessment: on track.

Completed activities:

1. An MPA Network development training kit called “Designing a network of MPAs for the YS based on principles of biophysical connectivity” (submitted in October 2019).
2. Feasibility study to designate Xiaoyangkou of Rudong of Jiangsu as an MPA (submitted in May, 2017)
3. A series of reports were submitted by FIO through PCA as deliverables of PCA, including:
 - 1) Assessment of the relevance of existing zoning schemes to connectivity of existing MPAs and/or potential MPAs on 2 Sep. 2019;
 - 2) The map of priority areas for designation as conservation areas in YS and identify opportunities for improvements in connectivity with existing and new MPAs on 2 Sep. 2019;
 - 3) The feasibility report for designating YSCWM a new MPA; and
4. In support of FIO efforts on spotted seal, the project purchased 10 sets of satellite tracking device. Shipment arrived in Dalian and its inspection report was completed on 7th August 2019.

Ongoing activities:

1. Report on the migratory route of spotted seals based on satellite tracking in the YS;
2. Report on the assessment of genetic diversity, population structure and effective population size based on environmental DNA of spotted seals in the YS;
3. YSLME spotted seal management plan.
4. Ongoing GSAs with Chinese Academy of Fishery Science, Beijing Chaoyang District Yongxu Global Environmental Institute (GEI) and Institute of Geographic Sciences and Natural Resources Research (IGSNRR) support the MPA management effectiveness for fish genetic resources, engagement of communities in migratory birds conservation through conservation agreements, and engagement of volunteers in the monitoring and reporting on the conservation of mudflat and associated migratory waterbirds in the Yellow Sea region.

Planned activities:

MPA networking meeting with site managers in January 2020.

Progress under this outcome is summarized below:

- To date, 31 national MPAs in PRC (8,056 km²) and 16 national MPA in ROK (386 km²) are designated to protect marine mammals, birds, fishes, mollusks, plants and algae in YS. The national MPAs of the PRC and ROK only represent 2.1% of Yellow Sea, far below the 10% Aichi Target. Surveys

<p>Indicator 4.3: Status of incorporation of adaptive management of climate change regional strategies and in ICM plans for selected coastal communities</p>	<p>and production of overlays to analyse gaps and conservation needs of critical species and habitats, i.e. seal, endangered migratory birds, fish spawning and nursery grounds, cold water mass, etc. are being conducted by FIO, NMEMC and YSFRI in PR China through PCAs. Results of the technical assistance will lead to development of marine biodiversity protected area development plan in PR China. The same institute completed a study to support the government of Rudong in Jiangsu Province of PR China to establish Xiaoyangkou wetland as a National Marine Protected Area for consideration by the State Oceanic Administration of PR China. This site is selected as the critical stopover habitat for critically endangered spoon-billed sandpiper along the East Asia and Australian flyway with highest irreplaceability index. A proposal to set a total of 42.88 km² as MPA was reviewed and discussed by SOA and results of the review was not announced due to reorganization of SOA. National Forestry and Grassland Administration of PR China who assumes the management responsibility of MPA is suggested to approve the gazettelement of this MPA. Another example of MPA expansion taking into account ecological connectivity during the project period is the Garorim Bay Marine Species Protected Area in RO Korea. It was designated as MPA site in July 2016 covering areas of 91.237km² with a goal of protection of habitat and breeding grounds of protected marine species including spotted seal, and systematic conservation and protection of key habitats of marine and pelagic species.</p> <ul style="list-style-type: none"> • Capacity development activities are also being conducted to support the biophysical connectivity among MPAs. An MPA connectivity training was held in 23-27 July, 2018, in Seochon, RO Korea to further expand the coverage of coastal areas as MPA in an effectively managed network. The training toolkit on MPA networking was developed by an international consultant for use in future training. Under the concept of MPA networking to improve management effectiveness of transboundary species and MPA expansion, FIO and Liaoning Marine and Fisheries Research Institute will collaborate with NIFS of RO Korea in conducting spotted seal migration through satellite tracking supported by the project. Environment DNA of the species will also be studied to understand better the scientific soundness of MPA network for the species. • Through the PCA, the FIO also studied and submitted a report entitled “A zoning plan including coordination mechanism in line with the master plan of local land use <p><i>Overall assessment: On track. Provincial and local governments may not agree to the establishment of new MPAs</i></p> <p><u>Completed activities:</u></p> <p>A series of reports were received from FIO as deliverables of PCA, including:</p> <ol style="list-style-type: none"> 1. Stocktaking report for the relationships between the sea surface temperature changes of YSCWM and structure of plankton communities on 27 Aug. 2019; 2. Stocktaking report of biological and ecological significance of the YSCWM and existing and potential threats using ecological connectivity as key criteria
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- on 27 Aug. 2019;
3. Vulnerability assessment of sea level rising for coastal communities submitted on 2 Sep. 2019;
 4. Impact assessment of sea ice distribution on coastal zone development and marine species submitted on 27 Aug. 2019;
 5. Impact assessment of sea level rising for wading birds on 2 Sep. 2019; and
 6. Effects of sea ice on the development of Dandong coastal zone and marine species submitted on 27 Aug. 2019

Planned in 2020:

Adaptation plans for the target areas based on identified climate change impacts and their severity

Substantive progress of the project under this outcome includes:

- The studies on relationships between the changes of Yellow Sea Cold Water Mass (YSCWM) and structure of plankton communities and the development of a regional strategy for adaptive management are at completing stage. The report was received on the 27th of August 2019 by delivering regional strategy for developing adaptive management be undertaken by FIO/SOA under a PCA with UNOPS and in collaboration with KIOST of RO Korea. This study was attempted to review environmental changes and the spatiotemporal characteristics of plankton communities in the YSCWM, and also tried to understand their relationships. During the China-Korea workshop on YSCWM held on June 10-11, 2019 in Penglai, PRC, experts from both countries emphasized on the responses of ecosystems in YS to natural forces and forecast of ecosystem changes in the YS as a result of climate change and anthropogenic influence. There was general consensus at immediate actions with more effort would be placed on YSCWM through future cooperative studies possibly including impact of climate change on YSCWM, considering long-term trend of surface warming, increasing extreme events.
- FIO proposed to develop climate change adaptation ICM model framework plan and the report was submitted on the 17th of August. In this report, the impact of climate change in YS was turned out to be a critical factor influencing the rising sea level, higher frequency and severity of various marine disasters, such as storm surge and sea ice. The objective of this consultancy was to develop adaptation strategy of climate change of Dandong via vulnerability assessment of coastal communities and impact assessment of sea level rising. Dandong city locates the north coast of YS, facing DPR Korea across the Yalu river which is also critical spot for migratory birds. Through this study, followings are the results obtained: 1) vulnerability assessment of sea level rising for coastal communities; 2) impact assessment of sea ice distribution on coastal zone development and marine species; 3) impact assessment of sea level rising for the mudflat habitat and wading birds and 4) adaptation strategy for climate change of Dandong city. This project expecting to be completed in December, 2019 was also addressed its impact on economy in Dandong (e.g. mariculture industry), and also stressed on the significance of sea ice supporting as a nest of spotted seals. Stocktaking report of biological and ecological significance of the YSCWM was also submitted by FIO together with a report identifying relationships between the sea surface temperature changes of YSCWM and structure of plankton communities on 27th of August 2019.

Indicator 4.4: Status of Regional Monitoring Network for application of ECBM

- The report on progress of drifting *Sargassum horneri* in YS focused on distribution of benthic populations of *S. horneri* along with the coasts of Shandong and Jiangsu Provinces was submitted on the 27th of August 2019. The report was found out the need for field surveys for monitoring, by taking consideration of various environmental factors impacting important roles on the distribution and structure of the *Sargassum* sp. In addition, genetic diversity study on *Sargassum* sp. was carried out and submitted the findings as a report on the 27th of August, 2019. In this study, detailed scientific information including morphological variations and genetic homogeneity was introduced, and concluded that distinct physiological and reproductive responses to environmental variations could be occurred. The conclusion was made by stressing on the need of further investigation by monitoring to understand structure of the floating populations and their affiliations with the benthic populations.
- On 27th of August, 2019, an interim report on the progress of drifting *S. horneri* in YS was submitted by FIO. This study contained comprehensive information on location, community structure and its environmental factors of the *Sargassum* sp., which describes distributional pattern and its seasonality.

Overall assessment: On track. Risks exist, i.e. lacking of scientific understanding of the impacts of CC on marine ecosystem due to short period of project intervention; unavailability of best available technologies and practices and lack of private sector engagement make the adaptation strategy unrealistic and unimplementable.

Completed:

1. Through a PCA, the FIO submitted and in revision with following deliverables;
 - 1) Report on distribution of benthic populations of *S. horneri* along the coasts of Shandong and Jiangsu Provinces and seasonal variations of drifting *S. horneri* in western YS submitted 27 Aug. 2019;
 - 2) Progress report on genetic diversity of both benthic and floating populations of *S. horneri* in western YS submitted on 2 Sep. 2019;

Ongoing:

1. Final report on seasonality and inter-annual variability of the floating *S. horneri* in western YS and the environmental drivers for the increasing blooms in recent years (by FIO)
2. Regional strategy for adaptive management (by FIO)

The National Marine Environmental Monitoring Center (NMEMC) of PR China prepared and submitted the draft monitoring programs of jellyfish, HAB and drifting macroalgal blooms and N/P/Si which were reviewed and recommended for adoption by RWG-A meeting held on June 29, 2018. In the plan, surveys are suggested to conduct 3 times at sampling locations, Donggang and Haizhou Bay. Detailed methodologies on sampling and analysis are described for clarification at the meeting. Additional discussion on sampling station, monitoring frequency and key elements of HAB, monitoring is expected to be discussed between both countries. As for Jellyfish monitoring study, detailed methodologies with sampling and stations are described. As for monitoring, it was suggested to set 3 sections with 5 sections for each section. It was recommended to have monitoring

	<p>from July to August every year.</p> <p>To improve effectiveness of monitoring, assessment and data sharing on jellyfish and HAB, the scientific committee was established as an advisory group, expecting contribution not only on better coordination of national efforts especially on data sharing but also enhancing effectiveness of regional efforts by maintaining and operating monitoring program in a systematic way.</p> <p>During the <i>ad hoc</i> expert meeting of RWG-A held on Qingdao, PRC in May 10, 2019, the meeting discussed the possibility of future joint monitoring activities to study jellyfish distribution and abundance in the YS. The meeting participants also discussed possible methodologies for monitoring systems including sampling sites and frequency of sampling and information sharing.</p> <p><i>Overall assessment: On track. Potential risks include: data and information on the relevant monitoring and research will not be fully opened and shared; agreed monitoring programs for HAB, jellyfish and changes in YSLME ecosystem services are not implementable without earmarked funding from both countries.</i></p>
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5. Project Management and Oversight

Due to complexity of the project, a management consultant was mobilized by UNOPE to help OMO to use the management tools to capture the progress and issues to be addressed for better reporting to ICC planned in the fourth quarter of 2019. Under guidance of the consultant, a monthly plan including the efforts of PMO staff time and government-funded activities are highlighted in an monthly plan. Meanwhile, progress of the project was assessed using color coding for ease of communication and understanding of the progress. This assistance is needed under a situation that the PMO was not staffed with a project implementation support officer from January to June which put too much burden on the existing PMO team. This adaptive management and results were fully recognized and summarized as a lesson learnt.

▪ Partnership Effectiveness

By the end of October of 2019, more than 40 national and local governments, regional organizations and regional seas programmes, academia, NGOs and private sector participated in YSLME events. Among these, 19 partners collaborated with YSLME Phase II Project in the conduct of 19 workshops, seminars and training courses and awareness raising activities.

Partnership with academia for increasing scientific knowledge (SDG14.a): Dates, partners and activities of some of these partnership events include:

2019:

- On July 15-19, 2019, the 3rd YSLME Science Conference was held in Qingdao, PR China, in collaboration with FIO, NMEMC, YSFRI, KOEM, KIOST, Anyang University, WESFI, IUCN, etc.
- On June 16-17, 2019, PMO joined KOEM and NMEMC/PRC to organize the 2nd China-Korea Workshop on Harmful Marine Organisms in YS in Jeju, RO Korea.
- On June 11-12, 2019, a China-Korea workshop on Yellow Sea Cold Water Mass (YSCWM) in the Yellow Sea was held in Penglai, PR China with 19 participants, and organized by FIO/PRC, KIOST and KOEM/ROK and PMO.
- On May 14, 2019, an *ad hoc* expert meeting of RWG-A was held in Qingdao on for participants to share views on how to achieve the targets of each activity within the available timeframe.

2018:

- On December 1-2, 2018, Integrated Multitrophic Aquaculture (IMTA) Responsibly Farming Waters by Taking Advantage of Ecosystem Services was jointly organized with Asian Institute of Technology (AIT);
- On November 17-18, 2018, Seminar on the Law and Policy to Promote Regional Ocean Governance was held with Marine Development Studies Institute of Ocean University of China, Center for Global Climate and marine Governance of Korea University and NMEMC.
- On September 17-18, 2018, International Training Course of Physiological Energy Measurement Technique of Bivalves was jointly organized by PMO and YSFRI/PRC.
- On July 30-31, 2018, the Fish Stock Assessment Workshop was held in Tongyeong of RO Korea in collaboration with NIFS.
- On July 23-27, 2018, Workshop on designing a network of MPAs for the YSLME based on biophysical connectivity was jointly organized by PMO with KOEM and MABIK of RO Korea.
- On June 25-26, 2018, PMO organized the China-Korea Workshop on Harmful Marine Organisms in Yellow Sea was held in Kunming in collaboration with SOA/PRC, MOF/ROK, KOEM/ROK, IOCAS/PRC and NMEMC/PRC.

2017:

- On September 14-15, 2017, the Project sponsored the organization of the International Symposium on IMTA with NIFS/MOF of RO Korea.
- On July 14, 2017, an MPA Seminar was organized in Ganghwa Tidal Flat Center with NEAMPAN of UNESCAP and KOEM of RO Korea.

Coordination with regional ocean governance mechanisms: The YSLME II Project maintained close coordination with other global and regional ocean governance initiatives for information sharing, knowledge management and learning. To date, the YSLME II Project staff participated in 21st and 22nd IGMs of NOWPAP, the 9th Partnership Council Meeting of PEMSEA, the EAS Congress 2018, the 19th, 20th and 21st LME consultative meetings, and the meeting on Building International Partnerships to Enhance Science-based Ecosystem Approaches in Support of Regional Ocean Governance organized by IOC/UNESCO and LME:Learn, and the training course on ocean governance held in Vietnam organized by IOC/UNESCO.

Partnership for Capacity development and knowledge transfer: a major area of project intervention and partnership development. Four capacity development activities were organized in 2018.

- YSLME training on IMTA for mariculture operators in Rongcheng City of Shandong Province (May 20, Rongcheng, 32 participants)
- Workshop on designing a network of MPAs for the YSLME based on biophysical connectivity (July 23-27, Seocheon, 29 participants)
- international training course of physiological energy measurement technology of bivalves (September 17-18, Rongcheng, 119 participants)
- The training course on integrated multiprophic aquaculture (IMTA) responsibly farming waters by taking advantage of ecosystem services (December 1-2, Bangkok). The project also provided three resource persons from RWG-M to lecture.

The above trainings are specifically to develop the capacity of mariculture operators and MPA managers to apply IMTA technology and developing ecological network of MPA in YSLME.

- The 1st regional workshop on designing a network of MPAs for the YSLME in Seocheon, RO Korea, sponsored by National Marine Biodiversity Institute (MABIK) of ROK. More than 30 representatives from 17 research institutes, universities, NGOs, regional organizations and local governments of PRC, ROK and USA attended the 5-day workshop. These training were attended by 180 participants from PR China and RO Korea.

Partnership for engagement of local governments in SAP implementation:

- The project supported the study visit of Cheongnam Province of ROK to Shandong Ocean and Fisheries Bureau culminating in signing of an MOU for cooperation in ocean-related industries and cooperation in addressing marine litter.

▪ **Risk log status and update**

#	Description	Status	Management Response
1	Sustaining EBM of YSLME and stakeholder participation through bilateral mechanism may limit participation of key line ministries in both countries and endorsement of the SAP by all members of the IMCC	<i>Ongoing</i>	1, engaging RWG and line ministries in the development and adoption of the YSLME SAP in China; 2, in the new structure of the post-YSLME Project coordination arrangement, maintain the RWGs and roles of line ministries.
2	Failure to mobilize resources to support the operation of the post-YSLME Project mechanism	<i>ongoing</i>	The budgeting cycle of both governments should allow timely earmarking of fund for operation of YSLME mechanism immediately after project closure Location of the Secretariat and staffing are agreed in advance, allowing timely budgeting for staffing and operation

5	Local Governments are unwilling to release data on fishing vessel reduction	<i>ongoing</i>	Use fishery statistics data to capture the progress of fishing vessel reduction status
6	Absence or inadequate enforcement of water quality standards in sea areas used for mariculture provide leeway for non-compliance and unwillingness to accept IMTA	<i>ongoing</i>	1, the promotion plan for IMTA in Shandong should include marine environment quality assurance in mariculture 2, benefits of IMTA to increase productivity per unit use of sea and labor cost reduction should be widely made available 3, create responsible mariculture initiative to build the constituency of link-minded enterprises
7	Provincial and local governments may not agree to the establishment of new MPAs	<i>ongoing</i>	Policy shift from MPA designation to use of zoning schemes of ecological red line scheme to limit development activities inside the redline to avoid continued loss of coastal wetland of global significance to reclamation.
9	Unavailability of best available technologies and practices and lack of private sector engagement make the adaptation strategy unrealistic and unimplementable	<i>ongoing</i>	Organize a workshop on adaptive management strategy to impact of climate change to share experience on adaptation to impact of sea surface temperature increase to mariculture

- **Communication and advocacy**

❖ *Five project videos are produced and currently is at the stage of review before releasing.*

- **Gender equality and gender activities**

Gender is factored into YSLME activities. Of the 19 events organized by PMO from 2017, a total of 445 participants attended, including 301 males (67.6%) and 144 females (32.4%). Of the 19 UNOPS contracts (ICAs) for YSLME in 2019, 11 are women. In 2019, overall, the project has achieved a ratio of 53 percent male to 47 percent female of all 15 IICAs/LICAs and interns under YSLME Project, In all the meetings and workshops organized by YSLME Project, a total of 648 participants benefited from the exchange and information sharing opportunities, with 74 percent male and 26 percent female. Using these as the baseline, a more balanced participation in YSLME activities in 2020 will be targeted for improved gender parity.

6. Financial Management

	Source of Fund	Budget	Expenditure (excluding commitments)
Expenditure Vs. Approved project budget by source of funding	UNDP		
	Government Cost Sharing		
	Third Party Cost-sharing		
	Other (the GEF)	US\$4,767,833	US\$3,198,627.39(excluding commitments)
	Total	US\$4,767,833	US\$3,198,627.39

As the project was supposed to end on December 31, 2019 at the beginning of the year, all the remaining resources of USD4,767,833 was programmed in 2019. At the ad hoc ICC held on July 15-16, 2019, the parties agreed to extend to the project on a no-cost extension basis to allow the project to generate on-the-ground results and transformation of the results of the scientific studies and assessment into management actions. Consequently, the PMO prepared an extension plan with allocation of USD3,342,057 in 2019, and USD1,425,775 in 2020. By December 31, 2019, the project spent USD3,198,627, or 95.7% of the planned budget in 2019. The balance of USD1,569,206 will be programmed in 2020 subject to approval by UNDP and UNOPS. Remaining budget of the project and delivery in 2019 are summarized in the below table.

An expenditure of USD127,200.61 was recorded under Project Management by mistake as the expenditure due to misrecording already exceed the cap of 5 per cent of the total budget. UNOPS agreed to rectify the misrecording of the expenditure to other relevant budget lines and update the cost categories in the oneUNOPS from 2020 on to avoid future mis-recording to happen.

Output	Annual Budget (incl UNOPS fee)	Accumulated Expenditure	Accumulated Annual Delivery Rate%	Comments
1. Sustainable Regional and National Cooperation	995,973	906,703.08	91%	The ad-hoc ICC and the 4 th ICC were successfully organized.

for Ecosystem-Based Management				
2. Improved Ecosystem Carrying Capacity with respect to provisioning services	724,958	468,016.30	65%	YSFRI (PCA) contract was amended; the awarded amount was descoped and reprogrammed in 2020 workplan
3. Improved Ecosystem Carrying Capacity with respect to regulating and cultural services	806,019	359,761.94	45%	NMECM (PCA) contract was completed and NCSEMC (PCA) contract was extended until 31 March, 2020
4. Improved Ecosystem Carrying Capacity with respect to supporting services	2,240,884	1,336,945.46	60%	FIO (PCA) contract was amended; the total amount was descoped and reprogrammed in the 2020 workplan and the contract was extended by 31 March, 2020
5. Project Management Cost	-	127,200.61		The expenditure will be reallocated to other components
Total	\$4,767,833	\$3,198,627.39	67%	

Expenditure in 2019

workpackage_descr	budgetaccount_descr	Sum of TOTAL_EXPENDITURE
91007-ACTIVITY 1 - Sust. Reg. & Nat. Cooperation	Contracts	51,615.00
	Fees	78,652.37
	General Operating Expenses	175,506.84
	Goods & Equipment	-
	Personnel	378,216.88
	Travel	115,548.06
	PCA Disbursements	109,552.29
	Exch gain/loss	

		131.01
91007-ACTIVITY 2 - Provisioning services	Contracts	32,409.66
	Fees	40,567.15
	General Operating Expenses	4,341.72
	Goods & Equipment	24,700.00
	Personnel	69,647.41
	Travel	40,342.97
	PCA Disbursements	255,580.87
	Exch gain/loss	426.52
91007-ACTIVITY 3 - Regulating and cultural service	Contracts	33,600.00
	Fees	30,876.87
	General Operating Expenses	10,296.89
	Goods & Equipment	-
	Personnel	108,728.11
	Travel	24,444.58
	PCA Disbursements	189,470.08
	Exch gain/loss	3,865.41
91007-ACTIVITY 4 - Supporting services	Contracts	3,989.04
	Fees	115,670.15
	General Operating Expenses	29,436.04
	Goods & Equipment	7,173.16
	Grants	462,749.59

	Personnel	142,898.91
	Travel	119,276.83
	PCA Disbursements	452,056.99
	Exch gain/loss	3,694.75
91007-ACTIVITY 5 - Project Management	Fees	11,059.42
	General Operating Expenses	8,700.39
	Goods & Equipment	1,336.99
	Personnel	106,568.55
	Exch gain/loss	- 464.74
TOTAL		3,198,627.39

7. Management recommendations

- ❖ *Ensure you have reviewed the key judgements made in the report, noted lessons learned from all significant problems identified, and used these judgements and lessons to make appropriate recommendations of action required.*
- ❖ *Based on the review of the progress towards the targets of the project and identified issues, the following recommendations are made for integration and capture as issues in implementation:*

Based on the review of the progress towards the targets of the project and identified issues, the following recommendations are made for integration and capture as issues in implementation:

1. *Uncertainties exist in continued engagement of stakeholders and operation of IMCC and SAP implementation with ecosystem-based approach due to slow in design the regional ocean governance mechanism. PMO should closely monitor and escalate progress with design of the mechanism to ensure full participation and sustainable hand-over of the interim mechanism supported by YSLME project.*
2. *In spite of reorganization of the governmental agencies, IMCC is still operational with updated membership and effective coordination. It is recommended that the future of the IMCC under*

the new governance mechanism remains strong in both countries involving both MOFA of ROK and IMCC members in China.

3. *The partnership becomes YSLME's responsibility and strategy for SAP implementation. In the TDA and SAP development should be well coordinated to avoid late in government buy-in and stakeholders are fully consulted and comments are solicited.*
4. *There are legal review and recommendation for improvements. Results of the review are yet to be fed into legislative reform agenda of PR China and SAP. Efforts should be made to initiate discussion leading to the adoption of the responsible fisheries certification and the criteria and regulation for assessment of performance of conservation areas for aquatic genetic resources in PR China.*
5. *Financing agreement to the post-YSLME governance mechanism is yet to be discussed and signed. Meanwhile, the budgeting cycle of both governments allows timely earmarking of fund for operation of YSLME mechanism immediately after project closure. And Secretariat staffing is agreed in advance, allowing timely budgeting for staffing and operation.*
6. *Though with good progress under a conducive policy framework in both countries in reducing fishing efforts, the following factors will determine the likelihood of success in achieving the targets of the project. 1) Means of verification of vessel reduction should be agreed to track program of implementation assuming that local governments are willing to release data on fishing vessel reduction. 2) Baseline year and number of fishing vessels to be reduced for RO Korea needs to be tracked to showcase the progress of the project. 2) YSLME disaggregated data should be available. 4) the policy recommendations of the license system in PR China should be brought to the attention of MARA/PRC for consideration in future fishery policy making.*
7. *Studies in selected locations in China indicate an increase of CPUE by 2.8-3.5 times and high cost-benefit from investment in RO Korea. In the following months, the Project should look for opportunities and avenues to transform these studies and recommendations into knowledge products for awareness raising and consideration by the MARA in its future planning and investment for fish stock enhancement. Sharing of learning results from study visits for improving the restocking is another area for PMO to follow up.*
8. *While the Responsible Mariculture Initiative and promotion plan are yet to operationalized and developed during the remaining period of the project, adequate enforcement of water quality standards in sea areas used for mariculture should be ensured so as not to provide leeway for non-compliance and unwillingness to accept IMTA.*
9. *For the loading study results to lead to nutrient reduction, there should be strong and effective coordination in translating the results of loading study into fertilizer use reduction targets in upstream areas with regular monitoring at watershed level.*

10. *The demonstration project conducted by NCSEMC in Jiaozhou Bay of Qingdao started very late due to difficulties in identifying local government to demonstrate the concept of using wetland as nutrient sink. For the monitoring of wetland of Jiaozhou Bay to be resultful, there should be frequent consultation and coordination with Jiaozhou Bay management committee to allow early engagement and government buy-in of the results of the study to ensure integration of the results into future bay-wide environmental planning.*
11. *The targets are ambitious as harmonization of legislation for pollution reduction may take longer time than the project period allows. Opportunities of existing legal reform in marine environmental protection law should be explored. In addition, scaling up the microplastics monitoring methodologies as a provisional monitoring protocols may also be considered.*
12. *Consultancy in marine litter reduction in Weihai was completed, and dialogue should be conducted by PMO for consultancy firm to communicate the results of the study with Weihai municipal government for consideration in improving their management measures to address marine litter.*
13. *Provincial and local governments may not agree to the establishment of new MPAs. Alternative options of designating Xiaoyangkou may be needed in consultation with NFGA.*
14. *In climate adaptive management regional strategy development, efforts should be made to ensure sound scientific understanding of the impacts of CC on marine ecosystem due to short period of project intervention, and availability of best available technologies and practices and full participation of private sector so as to make the adaptation strategy unrealistic and implementable.*
15. *On ecosystem assessment to assist informed decision making, efforts should be made to ensure data and information on the relevant monitoring and research are fully opened and shared; agreed monitoring programs for HAB, jellyfish and changes in YSLME ecosystem services are implementable witht earmarked funding from both countries.*