Annex C

CONSERVATION ACTIONS OF ENDANGERED WATERBIRDS AND THEIR HABITATS IN THE YELLOW SEA ECOSYSTEM

NARRATIVE REPORT OF LAST PHASE

Introduction

[Brief Introduction summarizing progress]

The coast wetland along EAAF is key stopover site for waterbirds, and it supports majority of waterbirds population stopover, breeding and wintering in these areas. However, the waterbirds population have a decreased trend in recent years. It is necessary to conduct conservation actions for endangered waterbirds and their habitat, and maintain the stability of waterbirds population.

We had done a lot of work since the project agreement was signed. The inception workshop was launched on June 21. The fishermen training report was conducted on June 22 in Qinghe River Estuary Wetland, Lianyungang, 10 fishermen were accepted about training. Waterbirds habitat quality report on Important Bird Areas (IBAs) in YSLME and along waterbirds flyway had been done, We supplemented 14 new IBAs involved with four provinces or municipalities: Liaoning, Hebei, Tianjin, Jiangsu mainly along the coast of study area, the index of habitat suitability (HIS) of the habitats of the new IBAs reduced and have suffered serious natural wetland loss due to long-term coastal reclamation. 16 key flyways and stopover sites of 4 identified endangered species, Great knot, Relict, Black-faced Spoonbill, Oriental Stork were identified along the coasts of Yellow sea and Bohai sea in China in YSLME. 10 videos about protection actions, including locations, people, events, and results was created. WeChat public account of YSLME was created.

Follow previous arrangement, we had completed the remainding report, below was the detail introduction of each report:sSpecial reports on the protection of endangered waterbirds, organizing youngsters to watch birds. And fill in the bird-watching records (including name of the bird-watching points, longitude and latitude, name and population size of the bird species), carrying out wetland natural education for youngsters. Appoint waterbird experts to give lectures on how to recognize endangered waterbirds and on wetland natural education for youngstersm, carrying out wetland natural education for youngsters, appoint waterbird experts to give lectures on how to recognize endangered waterbirds and on wetland natural education for youngsters, mobilizing local residents to carry out water bird patrol. Engage local people in conducting regular patrol for endangered waterbirds during their southward migration and northward migration, fill in the bird-watching records on the community's display boards, and disseminate knowledge on endangered waterbirds, a report on the Win-win pattern of Sustainable Fisheries and Waterbird Conservation in Fish ponds, feasibility analysis report of the model application in other project areas and APP promotion. Field

survey the areas where there are 4 identified endangered waterfowl species in other project areas, try the application effect of APP in these areas.

Summary Activity Target vs. Progress

[What did you plan to do this quarter? What did you actually do]

Activity	**Planned** [What had you planned to do for each activity in the reporting period?]	**Actual** [What did you actually do for each activity in the reporting period?]	**Notes** [Add any relevant notes]
Special reports on the protection of endangered waterbirds	Conducted the protect action of endangered species	We had completed the all protection actions of endangered species	
Organizing youngsters to watch birds. And fill in the bird-watching records (including name of the bird-watching points, longitude and latitude, name and population size of the bird species).	Organizing youngsters to watch birds along the coastal wetland in Tianjin	We had completed the actions	
Carrying out wetland natural education for youngsters. Appoint waterbird experts to give lectures on how to recognize endangered waterbirds and on wetland natural education for youngsters.	Carrying out wetland natural education for youngsters. Appoint waterbird experts to give lectures on how to recognize endangered waterbirds and on wetland natural education for youngsters	We had completed the actions in Tianjin	
Mobilizing local residents to carry out water bird patrol.	Local residents to carry out water bird patrol. Engage local	We had organized the some local residents to carry out	

Engage local people in conducting regular patrol for endangered waterbirds during their southward migration and northward migration, fill in the bird-watching records on the community's display boards, and disseminate knowledge on endangered waterbirds.	people in conducting regular patrol for endangered waterbirds during their southward migration and northward migration	waterbirds patrol in Tianjin.	
A report on the Win-win pattern of Sustainable Fisheries and Waterbird Conservation in Fish ponds.	A report on the Win-win pattern of Sustainable Fisheries and Waterbird Conservation in Fish ponds.	We had surveyed and drafted a report on the Win-win pattern of Sustainable Fisheries and Waterbird Conservation in Fish ponds along the coasts of Lianyungang city.	
Feasibility analysis report of the model application in other project areas.	Feasibility analysis report of the model application in other project areas.	We had analyse the feasibility and gave some advices of the Win-win pattern of Sustainable Fisheries and Waterbird Conservation in Fish ponds in other areas.	
APP promotion. Field survey the areas where there are 4 identified endangered waterfowl species in other project areas, try the application	APP promotion	We had surveyed the areas where there are 4 identified endangered waterfowl species in other project areas and analysed the application effect of APP in these area	

effect of APP in these areas.			

Comments

[Add any additional comments / photos / explanations / information on Output, above.]

1. **Special reports on the protection of endangered waterbirds**
   Date: April 2019 to present
   Location: binhai new area
   Staff: volunteers, community residents, college students, primary and middle school students, the masses
   Objective: since the beginning of the activity, volunteers have done a lot of work for waterbird protection, setting up warning boards in places where waterbirds are prone to danger, organizing experts to analyze, suggest and discuss waterbird protection, organizing students in primary and middle schools and local residents to conduct bird-watching and bird-caring activities, and improving people's awareness of waterbird protection. Rescue a variety of injured birds and successfully release them into the wild.
   Impact: in the future, we will do a lot of work to better protect endangered waterbirds, get more people involved, and enhance public protection of the environment and birds.

The protection actions of endangered species.

2. **Organizing youngsters to watch birds. And fill in the bird-watching records (including name of the bird-watching points, longitude and latitude, name and population size of the bird species).**
   Date: October 2, 2019
   Location: northern xinjiang wetland
   Staff: college students from all over the country

Objective: to let college students know the species, migration and habit of birds in coastal wetland.

Influence: the activity enhanced the students' understanding of endangered waterbirds, enhanced their enthusiasm for bird care and enhanced their awareness of environmental protection.

Organizing youngsters to watch birds

3. **Carrying out wetland natural education for youngsters. Appoint waterbird**

experts to give lectures on how to recognize endangered waterbirds and on wetland natural education for youngsters.

Date: July 8, 2019; October 11, 2019

Location: jiangbei wetland protection center, zao jia town middle school

Staff: students from the United States and Australia, teachers and students of zaojia middle school

Objective: to teach youngsters how to identify endangered waterbirds and wetland nature education.

Impact: let teenagers have a deeper understanding of birds, and they have a deeper understanding of the natural environment and the protection of endangered waterbirds.

Carrying out wetland natural education for youngsters.

4. **Mobilizing local residents to carry out water bird patrol. Engage local people in conducting regular patrol for endangered waterbirds during their southward migration and northward migration, fill in the bird-watching records on the community's display boards, and disseminate knowledge on endangered waterbirds.**

Time: October 12, 2019; October 23, 2019

Location: tai shen tang beach
Staff: volunteers, local residents
Objective: to organize local residents to survey and record migratory endangered birds, and to disseminate knowledge about endangered birds to the general population
Impact: summarize and record the bird data for future scientific research. Improve the residents' awareness of bird protection, drive the surrounding people to have a deeper understanding of birds, and increase the public's awareness of bird protection.

Mobilizing local residents to carry out water bird patrol

5. **A report on the Win-win pattern of Sustainable Fisheries and Waterbird Conservation in Fish ponds.**

Project Background

Lianyungang City is located in the northeast of Jiangsu Province. Qingkou River estuary, where Qingkou River flows into the sea, lies at Ganyu District in the northern section of Lianyungang City. With rich biodiversity, Qingkou River estuary serves as an important foraging place for waders along the East Asian-Australasian Flyway (EAAF). Every migration season, tens of thousands of water birds pass by and stop here to supplement their physical strength to continue their migration. Among them, nine species of water birds are listed as globally threatened species under IUCN Red List of Threatened Species, and the population of eight species exceeds 1% of the total population of that bird species (along the flyways or region).

In recent years, the conflict between the growth of fishery resources and the waterbirds protection in Qingkou River estuary has become more intense. Some aquaculture ponds are playing a crucial role in the migration and staging process of waterbirds, providing an alternative habitat for the birds. However, this intensive and

unsustainable aquaculture practice has seriously polluted the living environment of fish in the offshore areas. On the other hand, environmental pollution poses a major threat to the survival and safety of water birds. Therefore, how to maintain the balance between sustainable management of fishery resources and protection of migratory endangered water birds has become an issue that needs to be addressed urgently.

Survey Methodologies

Objectives of Survey

(1)To acquire data and information related to aquaculture ponds in Qingkou River estuary and Linghong River estuary, and understand clearly the current status of the aquaculture ponds;

(2)To investigate the bird species that use aquaculture ponds as the alternative habitats for water birds, and provide reference for the win-win model of sustainable fishery in aquaculture ponds and water birds protection.

Survey Areas

Qingkou River estuary and Linhong River estuary in Lianyungang City, Jiangsu Province, China

Targets of Survey

Table 1 30 aquaculture ponds surveyed

DATE	SITE	NUMBER	contractor	Investigator
2019-10-19	Jinhai Development Land	1	Chen Fengzhao	Han
2019-10-19	Wuqi Salt Field	2	Xu Lianhuan	Han
2019-10-19	Wuqi Salt Field	3	Zhao Xuechuan	Han
2019-10-19	Wuqi Salt Field	4	Dong Yongxiang	Han
2019-10-19	Wuqi Salt Field	5	Fang Weiyong	Han

2019-10-19	Wuqi Salt Field	6	Xu Qin	Han
2019-10-19	Songzhuang	7	Liu Xizhi	Han
2019-10-20	Songzhuang	8	Hong Yang	Han
2019-10-20	Songzhuang	9	Liu Zhiqiang	Han
2019-10-20	Songzhuang	10	Yan Changcheng	Han
2019-10-20	Songzhuang	11	Yin Weijie	Han
2019-10-20	Songzhuang	12	Liu Fangtian	Han
2019-10-20	Songzhuang	13	Zheng Zhijie	Han
2019-10-27	Songzhuang	14	Li Erli	Han
2019-10-27	Songzhuang	15		Han
2019-10-27	Songzhuang	16	Zhang Yuecui	Han
2019-10-27	Songzhuang	17	Li Chuanbo	Han
2019-10-27	Songzhuang	18	Wan Xiaojie	Han
2019-10-27	Songzhuang	19	Yin Guoxiang	Han
2019-10-27	Songzhuang	20		Han
2019-10-27	Songzhuang	21	Chen Yanqiu	Han
2019-10-27	Songzhuang	22	Liu Xinmin	Han
2019-10-27	Songzhuang	23	Zhao Yushi	Han
2019-10-27	Wuqi Salt Field	24		Han
2019-10-27	Jinhai Development Land	25-29		Han
2019-10-27	Jinhai Development Land	30		Han

Components of Survey

(1)Sustainable fishery survey on aquaculture ponds

(2)Survey on the staging of water birds which use aquaculture ponds as their alternative habitats

Tables of Survey

See Appendix 1 for the Table of Survey.

Findings of Survey

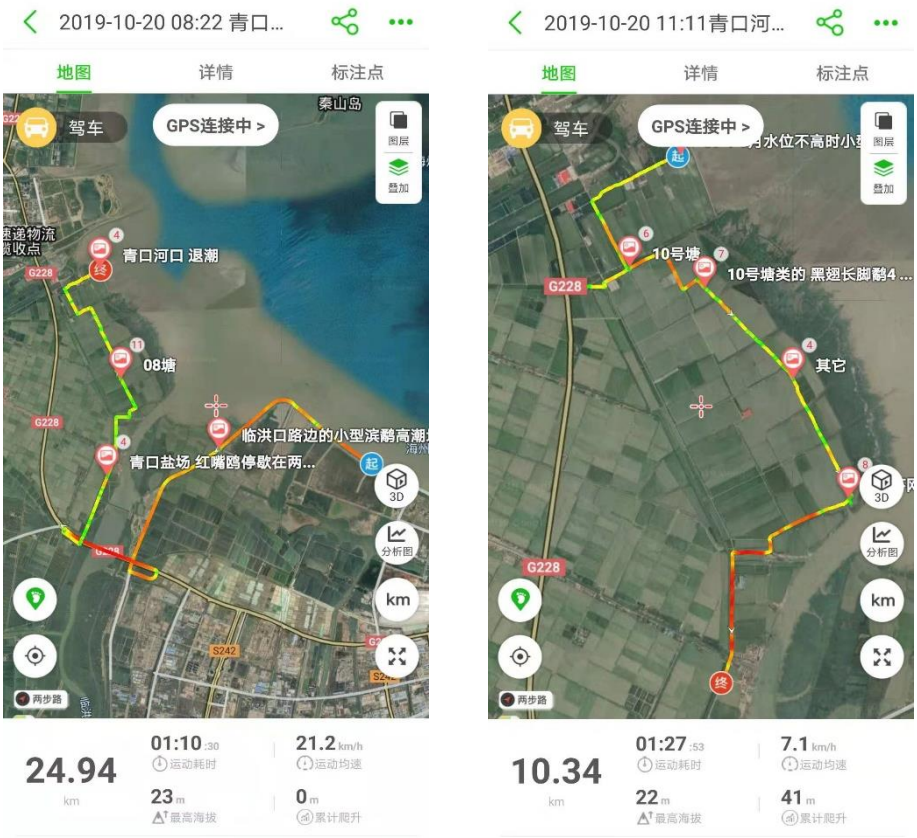
We carried out on-site survey on the sustainable fishery of aquaculture ponds in Qingkou River estuary and Linhong River estuary of coastal areas in Lianyungang City, Jiangsu Province. The survey on the staging sites of water birds using aquaculture ponds as their alternative habitats was based on interviews and on-the-spot observation. Through the comprehensive analysis of the two survey plans, we proposed relevant suggestions and solutions for developing a win-win model between sustainable fishery in aquaculture ponds and water bird protection.

Survey methodologies

Survey on Sustainable Fishery in Aquaculture Ponds

(1) Scope of survey

The main survey scope of the Qingkou River estuary area is Qingkou Salt Pan and Songzhuang, while that of Linhong River estuary area is Wuqi Salt Pan and Jinhai Development Zone.



Route map of the survey

(2)Contracting form

The contracting of fish ponds consists of two forms: collective and individual contracting.

(3)Objects of aquaculture

A survey of the coastal areas of Lianyungang City in Jiangsu Province found that the farming is divided into two methods: farming with fresh water, and mixed farming with fresh water and seawater. In different survey areas, fish ponds have different objects for aquaculture. The aquaculture model in Qingkou River estuary area is mixed raising of fish and shrimps with fresh water and seawater. The main objects of aquaculture include *Penaeus orientalis*,, *Portunus trituberculatus, Sinonovacula constricta*, *Synechogobius hasta*, *E.carinicauda*, *Scapharca subcrenata*, and *Tetraodontidae*, etc. In Linhong River estuary area, an aquaculture model with fresh water is adopted, with the main aquaculture objects including *Penaeus vanname*, carp and *Penaeus orientalis*, etc.

Catches from the aquaculture ponds

(4)Fishing methods, time, duration and frequency of different aquaculture objects

The survey found that fishing time, duration, frequency and method vary according to different aquaculture objects. As for *Penaeus vanname* and *Penaeus orientalis*, the fish fry release and breeding mainly occur in April each year. The adult shrimps are caught since August and the catching will last until October, mainly with ground cages and purse nets. As for carps, their fish fry release also occurs in April each year. The adult carps are caught since July, mainly with purse nets. As for Portunidae, the timing for fish fry release generally occurs in the first ten days of April, which is a bit later than that of *Penaeus vanname* and *Penaeus orientalis*, and the catching time often depends on the market value of crabs. In general, the male crabs are sold in the market around the Mid-Autumn Day and October 1, while the sale of female crabs often begins from the first ten days of November. The crabs are mainly caught with wire nets.

Trawl (left) and ground cage (right)


(5)Method of sale

As for the sale of fishing objects, each aquaculture pond under survey has its regular customers. During the production season, the fish or shrimps will be caught according to the needs of customers. Only a small number of aquaculture farmers sell their products on two sides of the roads near the aquaculture ponds.

Aquaculture ponds sell their catches.

(6)Economic gains

The survey on sustainable fishery of fish ponds showed that the annual average

income of such ponds reaches RMB 100,000-150,000, and some ponds can earn RMB

300,000-500,000 a year. However, apart from aquaculture, the contractors have basically no other sources of income.

(7)Problems facing the aquaculture ponds

Most of the aquaculture farmers are facing high risk of aquaculture. This is mainly due to the following factors:

1)： *Penaeus vanname* and *Penaeus orientalis* are the main objects of aquaculture, whose raising involves high risks and high return. They are facing two main problems:

A：As the growth environment of prawns is diverse, there is no specific growth environment for them. For individual prawns, however, the aquaculture method in large number and high density increases the risk of diseases, which may lead to hypoxia in the water body and ultimately the death of a large number of shrimps.

B：The price of shrimp's feedstuff (*Potamocorbula*) has gone up, thus reducing the profit margin and increasing the economic risk of aquaculture.

2) Water pollution: The freshwater aquaculture areas of Wuqi (57) Salt Pan are surrounded by salt pans. Brines from the salt pans often seep into the water bodies, and the surrounding chemical plants also discharge sewage into the water bodies. Qingkou River estuary area also suffers from seawater pollution due to drugs used by mariculturists who plant laver in the sea and raise *Sinonovacula constricta* in the mudflat areas.

3) Rise of contracting costs

(8)Change of water level during the operation process of aquaculture ponds

Based on the interview of fishermen and contractors of aquaculture ponds, we reached a conclusion on the change of water level in these aquaculture ponds:

In early April each year, fish fries begin to be released into aquaculture ponds, and the depth of water level in the ponds is kept at about 80cm；

From June to September, due to the rising air temperature, as well as the high density of fish and shrimps in the aquaculture ponds, a high water level is required to maintain oxygen content, and the water level is often kept at 100 -110 cm；

October is the production season of aquaculture ponds. After the Mid-Autumn Festival and October 1 (the National Day), shrimp and male crabs have been basically caught, and the density of aquaculture in the ponds has then decreased, with the water level being reduced at 80-100cm. At the end of October, some farmers begin to drain part of the pond water, leaving only shallow water for razor clams at the bottom of the ponds.

In early November, female crabs begin to be caught. When all the female crabs are caught, the whole aquaculture period that needs high water level is over. Farmers begin to drain water to catch *E.carinicauda* and *Synechogobius hasta (*razor clam*)*. After all the fish and shrimps are caught, the water pump is used to re-fill the pond with shallow water to meet the demand of razor clams in the ponds with a water level of 10cm.

From December to before the Spring Festival (late January or early February next year), water is emptied in the ponds, and razor clams will be dug manually. After the catching is completed, the ponds will be disinfected.

From January to February after the Spring Festival, water is re-filled into the ponds. However, water slowly increases rather than being directly pumped into a high level. The main purpose of this process is to cultivate algae in the water so that razor clam fries can be released in February. The algae provide a food source for the growth of razor clams.

From March to early April, the water level in the ponds is 5-20cm, which is especially suitable for waders to stage.

Water supply and drainage methods in aquaculture ponds

Survey on the Staging of Water Birds Using Aquaculture Ponds as Their Alternative Habitats

(1)Current status on the water birds staging in aquaculture ponds and analysis on the root causes

In October 2019, we investigated the sustainable fishery resources in the aquaculture ponds in the Qingkou and Linhong river estuary areas of Lianyungang. During the same period, we conducted a survey on water bird species in the aquaculture ponds through field survey and interview. The survey results show that the utilization rate of aquaculture pond area by water birds is particularly low, and the water birds staging here include herons, gulls and a small number of waders.

Black headed gulls feeding in an aquaculture pond

In the spring migration season, only a few pied avocets, black-tailed godwits, bar-tailed godwits, gray plovers, great knots and dunlins are found. The waders use the pond dyke to rest efficiently. When the tide ebbs and the tidal flat is exposed, they start to fly away and head for the estuarine mudflats. During the period of flat tide and low tide, small-sized waders use the nearby fish ponds to stage with high efficiency. During

the spring and autumn migration periods, fish ponds are in normal production. From December to next March, most fish ponds are exposed in the sunshine, which will be used by overwintering birds efficiently. The aquaculture ponds can only be used by overwintering waders and gulls from middle-late November to early next April in a year. The main reasons for water birds to stage here are large human interference and high water level in aquaculture ponds.

(2)Survey on threats of water birds to aquaculture ponds

In October 2019, we surveyed 30 aquaculture ponds in Lianyungang coastal areas. The results indicated that 60% of the aquaculture pond contractors believe that the existence of birds will have a negative impact on the fishery production. This is mainly evidenced by the fact that gulls and herons feed in the aquaculture ponds all the year round on *Penaeus vanname*, *Penaeus orientalis* and fish and shrimps' feedstuff in the ponds. This will adversely affect the economic gains of the contractors. 6.67% of the contractors claim that the feeding of birds, especially gulls and herons, has significant impact on the aquaculture ponds. Waders also pose a threat to the aquaculture ponds where they feed on shrimp fries, as the shrimp fries are relatively small and suitable for birds to eat in May when shrimp fries begin to be released. From July to August when the air temperature is relatively high, the density of fries is also high, which may easily lead to hypoxia and cause fish and shrimps to float upward and be fed on by gulls. 3% of the contractors report that the feeding of birds has no impact on the production of aquaculture ponds. 23.3% of the aquaculture ponds surveyed are left idle, which can be developed. These ponds are highly-efficiently used by waders.

Suggestions on how to achieve a win-win situation between sustainable fishery in aquaculture ponds and water bird protection

(1)Fully ban the sea reclamation projects, and strongly develop tourism, bird-watching festival and other related activities

The survey found that the areas that are efficiently used by birds and distributed in large areas lie in Jinhai Company's development lands near Linhong River estuary. Undisturbed and hydraulically-filled wet mud and idle shallow water areas provide excellent resting places in high tide for waders. However, this situation is only temporary. Only by stopping land development can scientific management practice provide a stable resting place for waders during their migration season. The development of such activities as tourism and bird-watching festival can focus the eyes of the general public and the media on the coastal areas. This can not only promote the local economic development, but also contribute to the protection of water birds.

(2)Build channels as ecological barriers

Channels are mainly used as ecological barriers in coastal areas. Ditches are dug on the coastline with machines or manually, and water is injected into the ditches to form a complete and unobstructed water system and ecological barrier to increase the suitable area and safety of habitats. Channels as ecological barrier is recognized as an important means of ecosystem restoration, which can make organisms restore naturally without human interference.

(3)Control the water level of aquaculture ponds in a scientific and reasonable manner

Water is the most important part of aquaculture pond and habitat management. In aquaculture ponds, it is necessary to create enabling environment for the growth of organisms such as prawns and fish. More importantly, it needs to form a habitat environment conducive to the migration and staging of waders, cranes, storks, geese and ducks. In the process of actual management, water should be replenished or drained reasonably according to the rising and falling rhythm of the tide, and a purse net should be set up at the sluice gate. This can help replace the water in the aquaculture ponds so that the aquaculture objects are living in a relatively good growth environment; on the other hand, it can also avoid the accumulation of harmful elements and the breeding of viruses in the aquaculture ponds, and increase fish and shrimp yield.

(4)Build water birds-friendly aquaculture ponds

When the bird migration season comes, a number of bird-watching spots will be set up in the aquaculture ponds to train contractors to recognize birds and develop a habit of recording water birds, thus assisting our regular water bird survey. As for aquaculture ponds, we can also adopt the method of rewarding contractors of aquaculture ponds which have a large population and species of water birds. This approach can, on one hand, enhance the contractors' awareness of water bird protection, and can, on the other hand, promote the development of local fishery resources in the form of "eco-compensation", and jointly build "water bird-friendly" aquaculture ponds.

Appendix: Table 1

Questionnaire on the Building of a Model of Win-win Situation between Sustainable Fishery in Aquaculture Ponds and Water Bird Protection

Survey time：

Geographic location of the aquaculture pond：

<table>
<tr><td>Operational model of the aquaculture pond</td><td colspan="2"></td><td>Funding investment</td><td colspan="2"></td></tr>
<tr><td>Varieties of aquaculture</td><td colspan="3">1 Time of releasing fries; 2 Time and duration of catching; 3 Frequency of catching; 4 Method of catching; 5 Time of suspending the operation of the aquaculture pond</td><td>Change of water level in the aquaculture pond</td><td>Utilization rate by water birds</td></tr>
<tr><td></td><td colspan="3"></td><td></td><td></td></tr>
<tr><td colspan="6">Economic gains</td></tr>
<tr><td>Method of selling the aquatic products
Unit price of aquatic products
total gains (profit or loss)</td><td colspan="5"></td></tr>
<tr><td colspan="6">Status of water birds using the aquaculture pond as their alternative habitat</td></tr>
<tr><td colspan="2">Whether the birds pose a threat to the aquaculture pond</td><td colspan="4"></td></tr>
<tr><td colspan="2">What kind of threat posed by which bird species (description of the birds),
and the response</td><td colspan="4" rowspan="3"></td></tr>
<tr><td colspan="2">Whether there are water birds which stage in the aquaculture pond
The season, quantity, duration, period of staging and description of birds</td></tr>
<tr><td colspan="2">Whether the staging birds disturb the aquaculture pond</td></tr>
<tr><td colspan="6">Contractor：</td></tr>
</table>

6. Feasibility analysis report of the model application in other project areas.

The conflict between mariculture industry and protection of water birds and their habitats has existed for a long time in the offshore areas of Yellow Sea Ecoregion. This is mainly evidenced by the seawater pollution due to mariculture, which has seriously reduced the quality of water bird habitats, and ultimately resulted in the reduced water bird populations and biodiversity. In general, the fish farming in the offshore areas can provide fundamental provisioning service and one of the major economic sources for the local fishermen. However, the feeding of water birds, in particular waders, on fish and shrimps in the aquaculture farms has, to some extent, negatively affected the livelihood of local fishermen.

We took the Qingkou River estuary and Linhong River estuary in Lianyungang city, Jiangsu province, China as case studies. By combining questionnaire and field survey, we examined the main methods of mariculture, fishing methods, the existing problems and the utilization of aquaculture areas by water birds in the two sites. Our objectives are to: (1) explore a win-win model between mariculture and water bird protection in the two survey sites; (2) raise public awareness of the rule by law and of coastal water bird protection; (3) fully ban the reclamation of sea and other relevant engineering projects; (4) strongly develop tourism, bird-watching festival and other activities; establish ecological barrier ditches; (5) control the water level of aquaculture ponds in a science-based and reasonable manner; (6) carry out micro-geomorphic renovation; and (7) build "water bird-friendly" aquaculture ponds.

Coastal wetlands, especially China's coastal wetlands, have been reclaimed in recent decades. Therefore, a large number of coastal mudflats have been transformed into aquaculture areas. How to balance water bird protection and mariculture is not only an issue related to Lianyungang, but to the entire Yellow Sea Ecoregion. Based on the survey at two sites in Lianyungang and the exploration for a win-win model between mariculture and water bird protection, it is very important to assess the replicability and applicability of the model in the whole ecoregion.

First, it is necessary to find an ecoregion with the geographic environment similar to that of Lianyungang, and study whether the best practice in Lianyungang is applicable to the survey areas, and whether the mariculture practice and the attitude of fishermen towards water bird protection differ greatly in the two areas. Since the geographic conditions in Yellow Sea Ecoregion vary greatly, it is important to adapt measures according to local actual conditions.

Second, although the geographic conditions are quite different from each other, encouraging the aquaculture farmers to develop a sense of responsibility of loving and protecting birds remains the same. It is necessary to enable the aquaculture farmers to develop a sense of responsibility of loving and protecting birds in the whole Yellow Sea Ecoregion, and establish an eco-compensation mechanism in the area. When more farmers are turned into bird-watching enthusiasts and bird lovers,

the essential conflict between mariculture and water bird protection will no longer exist.

7. APP promotion. Field survey the areas where there are 4 identified endangered waterfowl species in other project areas, try the application effect of APP in these areas.

To conduct water bird survey and develop a mobile APP related to water birds in Tianjin Binhai New Area, the prerequisite is that this area is a hot spot for water bird distribution. The 4 endangered species identified in this report need to exist in this area for a long time and have a certain population. To develop a water bird APP, sufficient water bird records and photos are needed for the database.

During the southern and northern migration seasons of water birds, we visited Lianyungang in Jiangsu, the coast of Tangshan in Hebei, the coast of Tiaozini in Dongtai, Jiangsu, and the coast of Yancheng in Jiangsu to investigate the species number and the population of single species of waterbirds in a single season, especially whether the population of 4 endangered species is significant. In addition, by using the website crawler tool, we tried to confirm whether the existing photos and bird-watching records of the four endangered species in the above-mentioned survey areas that are searched from ebird, China BirdRepot, Global Biodiversity Information Database (GBIF), published documents and wild bird networks can meet the minimum data requirements for the development of such an APP. It is also necessary to test the number of users of this APP in these areas after the trial version of the water bird APP has been launched, because the number of users determines the amount of data that can be stably received in the background system of the database. If there are only a few users, the background data will be little, making it impossible for bird watchers in this area to access the background database, and the APP function will not work effectively and efficiently.

Water bird survey in the field