

# Small Grants Programme 2006 Final Reports

**UNDP/GEF Project entitled “Reducing Environmental Stress  
in the Yellow Sea Large Marine Ecosystem”**

**Ansan, Korea, April 2008**





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# Foreword

This publication contains the reports of “Small Grants Programme 2006” conducted under the UNDP/GEF Project entitled, “Reducing Environmental Stress in the Yellow Sea Large Marine Ecosystem” (YSLME). It provides information on the activities carried out by the groups and organisations funded by the Small Grant Programme under YSLME Project in 2006.

The YSLME project’s role is to support the structures to achieve better environmental management as well as reduce environmental stress in the Yellow Sea. This involves working with a range of partners, from national stakeholders to local communities. YSLME Project recognizes the importance of helping people, especially local communities, in understanding environmental issues and developing solutions. The Small Grants Programme, launched in 2006, is one of the ways in which the project aims to achieve this.

The overall objective of the Small Grants Programme is to help increase local capacity and participation in the Yellow Sea’s management by providing small funds to organisations and local groups. Specifically, the programme aims to:

- Encourage and educate local communities of the Yellow Sea’s coastal area to facilitate marine conservation efforts;
- Provide the coastal communities with opportunities to observe the biodiversity and ecosystems in the Yellow Sea; and
- Build the capacity of the local communities to manage the marine and coastal environments.

In 2006, the Small Grants Programme focused on enhancing education for the coastal communities. Six projects implemented by local organisations from China and Republic of Korea (ROK) were supported:

- “The Public Propaganda and Education for Ecosystem Protection around the Northern Yellow Sea”, Liaoning Ocean and Fishery Department, Liaoning Province, China.
- “Welcome to the Green Olympics and Protect the Yellow Sea surrounding Us; Coastal Community Education and Public Participation”, Global Village, Beijing, China.
- “Community-Based Conservation of Coastal Ecology in Dalian, China”. Environmental Science and Engineer College, Environmental Protection Association of Dalian Maritime University, China.
- “Programme for exchanging information and experience about reclamation work among local communities in west coast of Korea - For a sustainable Yellow Sea”. Citizens’ Institute for Environmental Studies (CIES), Korea.

- “A Training Project Report Liyashan Oyster Reef Ecosystem Protection, Nantong China”, Haimen Ocean and Fisheries Bureau (OFB) in Nantong, Jiangsu Province, China.
- “Education Programs for Strengthening the Local Capability of Lake Sihwa Watershed”, Sihwa Lake Savers, Korea.

This publication is a collection of final reports prepared by individual grant holder groups, local NGOs and institutions, responsible for the implementation of the small grant projects.

The Small Grant holders made a huge effort to publicise the importance of protection of marine environment and sustainable use of coastal and marine resources in the Yellow Sea. A diverse activities were carried out by the programme, including educational trips along the coast and competitions for school children, seminars on environmental laws and regulations, workshops with local and volunteer organisations, beach clean ups, development of local stakeholder committees, dialogues and information exchange with local officials, and a large production of educational materials. This document summarises the grant holder’s approaches, results and solutions to address environmental issues within their communities.

The achievements of the Small Grant Programme in 2006 demonstrated effectiveness of the Programme in upgrading knowledge of protection of marine environment and sustainable use of marine resources in the Yellow Sea. Wide participation by different organisations and institutions encouraged the YSLME project to continue the Small Grant Programme in later years.

We would like to express our sincere appreciation to all partners who participated in and supported to the Small Grants Programme for their contribution to a better Yellow Sea ecosystem.

Project Management Office



The public propaganda and education for ecosystem protection around the northern Yellow Sea

**Liaoning Ocean and Fishery Department, China**

## **1. Summary**

From 24th July 2006 to 31st January 2007, Liaoning Ocean and Fishery Department carries out a project entitled “the Public Propaganda and Education for Ecosystem Protection around the Northern Yellow Sea”. A series of activities are organized, including school publicity, community propaganda, popular science propaganda week and seminar on environmental laws and regulations, media propaganda. This programme is implemented with grant support from UNDP/GEF Yellow Sea Large Marine Ecosystem (YSLME) Project.

So far, all the public awareness activities have been implemented successfully. Colourful school publicity has made young students recognise the importance of marine protection. The popular science propaganda week, community propaganda and media propaganda have enlarged the positive impact on public people in Dandong City. The related information and knowledge about ocean usage and ocean environment has been transferred to the enterprises involving in sea and seawater-culturists, and tourists, etc. By implementing these activities, especially the education to the youth, the public consciousness and enthusiasm for protection ocean environment have been promoted and encouraged.

## **2. Background of activities**

The Yellow Sea is an important part of the world ocean and the basis of the residents' survival in the Yellow Sea coastal area. But because of little aware of the marine ecosystem and lacking effective management in this area, the biology resource and biology diversity is decreasing, and environment and ecosystem is degenerating, which is threatening the continuable development of the Yellow Sea large marine ecosystem. The UNDP/GEF Yellow Sea Large Marine Ecosystem (YSLME) Project aims to protect, conserve and manage the Yellow Sea.

The water and sand from rivers in north Yellow Sea Area play an important role in shaping coast, continental sediment, hydrology and the marine ecosystem. The estuary area is an important marsh, biologic habitat and field for the valuable hydrophilic organisms as spawning and feeding ground, and the naissance area of marine ecosystem. Therefore the estuary area is a very important component of large marine ecosystem. The Yalujiang river estuary is the biggest river in North Yellow Sea, and its contribution to Yellow Sea marine ecosystem is the largest. As the increase of population and economy in recent decades, the environmental problem is becoming more and more serious. Some anthropogenic activities such as discharge of pollutants, over fishing and coastal engineering are continuously breaking the marine ecosystem; moreover some natural changes are making ecological cycle and continuable using face huge threats.

People have done much to exploit marine resources for many years, but done less to protect the marine environment and resources, and knew less about the

change of the ecosystem in this area. Therefore it is very important to strengthen the publicity to the publics and to improve their awareness for joining in the protection of the marine environment.

### **3. Objectives of activities**

The objectives of the project are: to promote the public awareness in schools, communities and factories and/or fishing area, involving thousands of pupils and citizens.

### **4. Target audiences**

Target audiences were public people (young students were the majority), local community, local government and local enterprises in Dandong City.

### **5. Activities implemented**

#### **5.1. School publicity**

The lecturing activities in the theme of the marine and coastal environment in the Dandong City/Yalujian River estuary were organized at Experiment School on 12 September 2006 and at Jintang School on 18 September 2006. The lectures were followed by 187 teachers and 3833 pupils of two elementary schools in Dandong city. Three thousand booklets on marine protection and management were distributed in two elementary schools and used as reference book.

A drawing competition with the theme of “taking the ocean protection to heart” was conducted in Dandong city on 18 September 2006. The competition was followed by 500 school children of two elementary schools in Dandong city. Ten winners were chosen and received a trophy, gift and certificate.

“How much you know about the ocean?” aiming at this, the knowledge contests were held by five classes on 19 September 2006 at Experiment school and five classes on 27 September 2006 at Jintang school. There were 622 students participating. From the contests we know that a small number of students in elementary schools think the ocean is so big that it can't be polluted.

At Experiment school and Jintang school, class meetings whose theme were “protect the ocean environment, cherish our blue home” were conducted. There were 684 students joining in. A composition exercise and photo showing were also introduced during the class meeting. These activities aroused great enthusiasm in the students.

These activities mentioned above were organised in co-operation with Dandong Education Committee and Dandong Newspaper Press.

## 5.2. Popular science propaganda week

The activity was organised in co-operation with Dandong science and technology association. Once activity with the theme of ocean knowledge was organised in Dandong Business walking street, and it was lasting from 17 to 24 September 2006. The target audience included five thousand persons from pupils, workmen, peasants and businessmen, etc. Thirteen awareness boards and twelve awareness banners were installed in the street. Two thousand booklets on marine protection and management were distributed. Besides, the questions about ocean were explained by 2 staff of Dandong Marine and Fishery Bureau on the scene.

## 5.3. Seminar on environmental laws and regulations

This activity was conducted on 20 September 2006 and took place at Donggang Port, Donggang city. The theme of the seminar was “protecting the ocean environment, cherishing our blue home”. At this seminar, 4 lectures were given: (1) 'An introduction to fishery ecological environment and protection of the Yalujiang river estuary' presented by Wang Nianbin; (2)'Laws and regulations about the protection of marine and coastal environment and the management of the ocean project' presented by Wen Quan; (3)'Marine environment protection regulation of Liaoning province' presented by Meng Dexin and Zou Xiaochun; (4)'Marine environment management and protection of Dandong city' presented by Sun Yaquan. 2 lectures in electronic edition had been transferred to Donggang port for reference materials. The target audience included 55 persons from aquaculture, coastal industries and local government, etc.. Sixty booklets on marine protection and management were distributed. After the presentations, participants had a discussion and showed a high level of interesting ocean protection and management. The activity had strengthened compliance with the laws and regulations and promoted active participation of the enterprises in environmental protection.

Table1. Participants in seminar on environmental laws and regulations

Organization	Name	Position	Speaker or audience
Liaoning Marine and Fishery Institute	Meng Dexin	Officer	Speaker
	Zou Xiaochun	Officer	Speaker
National Marine Environmental Monitoring Centre	Wen Quan	Research Professor	Speaker
Liaoning Provincial Marine and Fishery Administration	Wang Nianbin	Research Professor	Speaker
	Li Ai	Assistant Professor	Audience
Dandong Marine and Fishery Bureau	Sun Yaquan	Officer	Speaker
	Han Zaiqi	Officer	Audience
Donggang Port	38 participants	Employee	Audience
Other organizations	10 participants	Culturist and tourist	Audience

#### **5.4. Community propaganda**

As one of public awareness activities, the community propaganda was organized in Dandong city, from 22nd September to 30th October 2006. The objective of this community propaganda activity was for local publics to learn the protection of marine environment in the Yellow Sea and the sustainable use of its natural resources. An exhibition was an excellent opportunity for reaching out to a wider audience. There were thirteen awareness boards and twelve awareness banners installed in Qinghuayuan Community, Dongshengliyuan Community, Linjiang Street and Jinxiuhuayuan Community. The staff from Liaoning Provincial Marine and Fishery Administration and Dandong Marine and Fishery Bureau explained the related information and knowledge about ocean to audience on the scene. Two thousand booklets on marine protection and management were distributed. Then, the knowledge contest was held by four communities with the theme of “How much you know about the ocean”. During this activity, the main problem was that most of the residents did not realize the current environmental status.

#### **5.5. Media propaganda**

In order to promote the public awareness, Dandong Newspaper pressed reports of “Protecting our ocean” and “Organizing the public propaganda for the management of sea area uses in our city (Dandong city)” on 20th October and 6th December 2006. The reports focused on encouraging and educating local residents of Dandong City to conserve the marine environment and scientifically use the ocean.

#### **5.6. Booklet**

A booklet was pressed and provided to the publics through the related activities. Booklets were distributed in School, Public Place (street and communities) and Corporation.

#### **5.7. Data and information collection**

The existing data and information about the environment in the Yalujian River Estuary were collected to identify and analyse the status and problems of the environment. The collected data and information were used as a basis for the above proposed activities.

#### **5.8. Interim report**

Submit the results-to-date as an interim report to the Yellow Sea Project Management Office (PMO) by 31<sup>st</sup> October, 2006.

#### **5.9. Final report**

Submit the final report, incorporating all the comments and recommendations on the report from the PMO by 31<sup>st</sup> December, 2006.

## **5.10. Financial statement**

Submit the both interim and final financial report to the PMO by 31st December, 2006.

## **6. Produced outputs and outcomes**

The main produced outputs and outcomes of this project are as follows:

- Publicity materials including: 8000 booklets on marine protection and management were pressed and provided to the publics through the related activities; 13 awareness boards and 12 awareness banners were constructed and installed in Dandong Business walking street, Qinghuayuan Community, Dongshengliyuan Community, Linjiang Street and Jinxiuhuayuan Community; 2 reports named "Protecting our ocean" and "Organizing the public propaganda for the management of sea area uses in our city (Dandong city)" were published on Dandong Newspaper.

- Collected works include 148 drawings, 146 essays and 118 photos from the pupils of Experiment School and Jintang School. A total of 187 teachers and 3833 pupils participated in school publicity.

- Imagery products include 6 digital videos and 902 digital photos recording the finest details of the activities named "the school publicity, popular science propaganda week, community propaganda and seminar on environmental laws and regulations". Nearly 10,000 people participated in these activities.

- Reports "An introduction to fishery ecological environment and protection of the Yalujiang river estuary" (in Chinese) and "Laws and regulations about the protection of marine and coastal environment and the management of the ocean project" (in Chinese) were presented at the seminar on ocean environmental laws and regulations, 2006-09-20, Donggang, Dandong city. In total there were 55 participants from local government, aquaculture and coastal industries.

- A collection of selected photos from all the public awareness activities was compiled.

## **7. Evaluation: Effectiveness of implemented activities**

In general, the public awareness activities were successfully held. The lectures introduced the ocean knowledge to the youth and other colourful activities of school publicity encouraged their enthusiasm for ocean protection. The popular science propaganda week, community propaganda and media propaganda enlarged the positive impact on public people in Dandong City. Seminar on environmental laws and regulations provided an important chance for enterprises involving in sea and seawater-culturists to learn about the laws and regulations of marine, and to exchange and discuss protection and development measures of ocean.

But a long-term propaganda and education programme for the Yalujiang river estuary is still urgently needed and it seems possible with more effort from various stakeholders.

## 8. Conclusions and recommendations for future work

By the public awareness activities, we can conclude that the activities encourage public enthusiasm for protection of ocean environment, and make them joining in of one's own accord.

The recommendations for future work of this project are as follows:

- The Yalujiang river estuary has an important significance in ecology, including important spawning and breeding grounds for fishes, shrimps and shellfishes in the past as well as at present, so it should be given more attention of protection and management than before.

- It is very important to build up the partnership among stakeholders, including local coastal industries, aquaculture, local government and related research institutes, for the Yalujiang river estuary protection.

- Take some concrete measures for the Yalujiang river estuary protection, such as enforcement monitoring capacity, organizing more public education to the persons whose activities are often involved in the sea.

### Annex 1. Contact information of implementing institutions

Implementing institutions	Address	E-mail, telephone and fax
Liaoning Ocean and Fishery Department	2, Taiyuan Street, Shenyang Liaoning Province, China, 110001	lnhyhbc@vip.163.com Tel. 82- 24-23448518 Fax. 86- 24-23448519
Dandong Ocean and Fishery Bureau	Dandong, Liaoning 180000, China	ddhyglk@126.com
Liaoning Ocean and Fishery Science Research Institute	50, Heishijiao Street, Dalian, China, 116023	wang_nb0415@yahoo.com.cn lmfem@mail.dlppt.ln.cn

## Annex 2. References

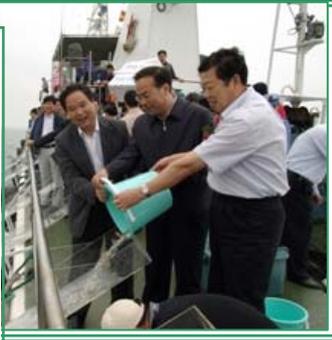
Wang Nianbin (2003). Distribution of Inorganic nitrogen contents and environmental quality assessment in north Yellow Sea Estuary Area, Journal of Dalian Fisheries University, 2003, 18(4):282-286.

Wang Nianbin (2004). Distribution of active phosphate contents and environmental quality assessment in north Yellow Sea Estuary Area, Journal of Fishery Sciences of China, 2004, 11(3)

UNDP/GEF Yellow Sea Project (2006). Report of the First Training Workshop for Local Government Officers Coastal Development vs. Protection of Marine Environment: How to make a decision?

## Annex 3. Materials produced

Materials produced		Number
Publicity materials	Booklets	8000
	Awareness boards	13
	Awareness banners	12
	Newspapers	2
Collected works	Drawings	148
	Essays	146
	Photos	118
Imagery products	Digital videos	6
	Digital photos	902
Reports	“An introduction to fishery ecological environment and protection of the Yalujiang river estuary” (in Chinese)	1
	“Laws and regulations about the protection of marine and coastal environment and the management of the ocean project”(in Chinese)	1
A collection of selected photos		1



Welcome to the green Olympics  
and protect the Yellow Sea  
surrounding us--Coastal  
community education and public  
participation

**Global Village, Beijing, China**

## 1. Summary

Global Village of Beijing and Greenera jointly organized an activity for the locals in the Qingdao Tiantai Olympic Garden. The aim of the activity was to build an environment council and improve the environmental awareness of local residents. The main activities were lectures about oceans, screening of environmental education films, outdoor activities, aquarium visits and more.

## 2. Background of activities

The 2008 Olympic Sailing Competition will be launched in Qingdao. Consequently, environmental protection has recently become a significant issue for the local government in Qingdao. Water quality in the Yellow Sea is extremely important to both the Olympic Sailing Competition and the whole ecological environment in China. Qingdao has been honored with the title of “Oriental Switzerland”. In 2005, 600,000 foreign tourists and 23,000,000 domestic visitors went to Qingdao. Overall, tourism has placed a severe ecological pressure on the Yellow Sea in China. Local residents in Qingdao have a strong responsibility to protect the Yellow Sea surrounding them.

## 3. Objectives of activities

- To organize an environment council in Qingdao;
- To educate local communities in the Yellow Sea region about environmental problems in the Yellow Sea;
- To provide the coastal communities with opportunities to observe the biodiversity and ecosystems in the Yellow Sea; and
- To build the capacity of the local communities to manage the marine and coastal environments.

## 4. Target audiences

- (1) Local Residents in Tiantai Olympic Garden Community, Qingdao

*Description* - the Tiantai Olympic Garden Community is located in Chengyang District, Qingdao.

- (2) Tourists and Visitors in Qingdao

*Description* - Qingdao, dubbed “Oriental Switzerland”, is located in the Southeast of Shandong Province. In 2005, up to 600,000 foreign tourists and 23,000,000 domestic visitors came to Qingdao.

## 5. Activity implemented

### 5.1. Community networking:

A network of Tiantai Olympic Garden community members working toward marine environmental protection was established on December 22, 2007. The members, local residents of the Tiantai Olympic Garden community concerned about local environmental issues, were eager to initiate environmental conservation activities, and were willing to encourage their fellow community residents to participate in these activities. These members named their network the “Local Environmental Council.” As a volunteer group, the environment council is composed of community residents and staff of the property management company. They have concerns about community issues and the environment surrounding the community. The members of the environment council have a close relationship, and communicate with each other 3 times per month. Thus, they are able to organize and motivate local residents to actively participate in environmental activities and contact local NGOs.

### 5.2. Training workshop for environmental monitoring:

We organized workshops every month, a total of 12 times, training the local residents to conduct simple monitoring activities and analyses. The trainees/residents observed and recorded ecological changes and the pollutants released along the coast. The following graph illustrates the concentrations of various pollutants recorded over one year, from September 2006 to August 2007. The water sample extractions were sent to the Institute of Oceanology, Chinese Academy of Sciences. Once analyzed and tested by scientists, the results were published to residents.

Generally speaking, the process of water sample extraction was comparatively difficult for local residents, especially those without technical education background. It also took a long time to do research, which resulted in complicated statistics which were hard for the locals to understand.

Venue	Time	PO <sub>4</sub> -P	SiO <sub>3</sub> -Si	NO <sub>3</sub> -N	NO <sub>2</sub> -N	NH <sub>4</sub> -N
		(μmol/L)	(μmol/L)	(μmol/L)	(μmol/L)	(μmol/L)
	Nov 2006	0.42	1.22	2.32	0.28	4.42
	Dec 2006	0.46	6.24	1.67	0.40	4.68
	Dec 2006	0.5	10.32	1.42	0.45	4.92
	Jan 2007	0.98	4.42	3.62	0.72	5.12
	Feb 2007	0.59	2.32	2.92	0.83	1.32

Mar 2007	0.44	11.92	3.72	0.63	5.32
Apr 2007	0.22	2.0	3.42	0.88	2.12
May 2007	0.48	7.42	3.42	1.52	17.82
Jun 2007	0.26	4.6	0.52	1.62	0.78
Jun 2007	0.29	4.03	0.94	1.57	0.99
Jul 2007	0.35	3.82	1.82	1.52	1.12
Aug 2007	0.54	4.2	3.8	0.30	2.82

### 5.3. Environmental campaign:

We organized six education campaigns for local residents to disseminate to visitors and tourists about the marine environment and how to protect it. The local residents distributed printed materials and participated in a beach cleanup activity.

#### *Campaign (1)*

- Date: 2007.03.10
- Venue: May Wind Square
- Target volunteers: The residents, members of the environmental council, and volunteers
- Objective: to recruit new volunteers and promote our activity
- Activity: Our first Environmental campaign at Qingdao Wusi Square, where we handed out bimonthly newsletters and manuals to the passengers

#### *Campaign (2)*

- Date: 2007.04.08
- Venue: Stone Elder bathing beach
- Target volunteers: The residents, members of the environmental council, and volunteers
- Objective: to improve the environmental awareness of visitors
- Activities: pick up rubbish and conduct a seminar on the beach, aiming to alert tourists to consciously protect the beach environment.

#### *Campaign (3)*

- Date: 2007.04.21
- Venue: Lao Mountain
- Target volunteers: The residents, members of the environmental council, volunteers, and visitors.
- Objective: to improve the environmental awareness of visitors
- Activities: Residents from Tiantai Olympic Garden Community and many volunteers participated in the million people mountaineering activities organized by the Qingdao Olympic Sailing Committee

#### *Campaign (4)*

- Date: 2007.05.27
- Venue: Top Bathing Beach
- Target volunteers: The residents, members of the environmental council, volunteers, and visitors.
- Objective: to improve the environmental awareness of visitors
- Activities: Led by the Qingdao Youth Association of Environmental Protection, residents from the Tiantai Olympic Garden Community and many volunteers went to the Top Bathing Beach to explain the importance of the protection of the Yellow Sea to the local people and tourists, and distribute relevant printed materials.

#### *Campaign (5)*

- Date: 2007.06.16
- Venue: Huang Island
- Target volunteers: The residents, members of environmental council
- Objective: to clean the island's bathing beach
- Activities: Qingdao Youth Association of Environment Protection organized a "protecting the Yellow Sea, loving the Golden Sands" activity involving many volunteers and members of the environmental council. They picked up garbage, handed out bimonthly newsletters and questionnaires. Through various activities, they promoted knowledge of environmental protection and the importance of protecting the Yellow sea to the tourists.

#### *Campaign (6)*

- Date: 2007.07.8
- Venue: Top Bathing Beach
- Target volunteers: The residents, members of the environmental council
- Objective: to improve the environmental awareness of visitors
- Activities: On the afternoon of July 8, a volunteer team from the residents of Taoyuan Community went to the Top Bathing Beach, where they promoted the importance of the protection of the Yellow Sea to tourists and handed out publicity materials. Influenced by their behavior, over 400 local people joined in their activity.

### **5.4. Forum for marine environmental protection:**

We organized six forums for the local residents to learn about the status and problems of the marine and coastal environment in the Yellow Sea. Regional experts from universities and research institutions attended the forums and delivered presentations.

#### *Forum (1)*

- Date: 2006.11.02

- Venue: Institute of Oceanology, Chinese Academy of Sciences
- Target volunteers: The residents and members of the environmental council
- Trainer: Xu Jun
- Objective: To provide the residents with opportunities to observe the biodiversity and ecosystems in the Yellow Sea
- Topics: Ocean biodiversity conservation, the variety of specimens, information of Antarctic Pole investigations, historical cases and information on red tide, the impact of marine pollution, etc
- Result of the Forum: The activity aroused the enthusiasm of residents in protecting the Yellow Sea. More and more people are willing to join in the activity of protecting the Yellow Sea which helps them have a better understanding of the ocean.

#### *Forum (2)*

- Date: 2006.12.22
- Venue: Tiantai Olympic Garden
- Target volunteers: The local residents
- Trainer: Chen Yang and Cheng Fangping
- Objective: To educate local residents of the Yellow Sea region about environmental problems in the Yellow Sea and to introduce information regarding the environmental council to the residents of Tiantai Olympic Garden.
- Topics: red tide and marine pollution; a water sample extraction and detection methods
- Result of the Forum: residents had a good discussion about the marine pollution, especially in relation to their own lives. Through games and water sample extraction, they all have a better understanding of the issue.

#### *Forum (3)*

- Date: 2007.01.25
- Venue: Tiantai Olympic Garden
- Target volunteers: The residents and members of the environmental council
- Trainer: Zhang Zongmin
- Objective: To educate local residents of the Yellow Sea region about environmental problems in the Yellow Sea through a training session and a marine environmental education film.
- Topics: Conducted discussion on the ecological marine environmental and showed films on marine science.
- Result of the Forum: residents exchanged their viewpoints after seeing the films.

#### *Forum (4)*

- Date: 2007.04.08
- Venue: Stone Elder Bathing Beach

- Target volunteers: The residents, members of the environmental council, and volunteers
- Trainer: Jing Yan
- Objective: To educate local residents of the Yellow Sea region about environmental problems in the Yellow Sea
- Topics: participants put forward their ideas on marine environmental protection, meanwhile listening to experts.
- Result of the Forum: Participants understood the ocean better. This activity attracted passersby and other visitors as well. After the forum, they cleaned the beach.

#### *Forum (5)*

- Date: 2007.05.20
- Venue: Chinese Marine Academy of Science
- Target volunteers: The residents and members of the environmental council
- Trainer: Chen Yang and Cheng Fangping
- Objective: To provide the residents with opportunities to observe the biodiversity and ecosystems in the Yellow Sea
- Topics: spread knowledge and history about marine life through pictures and a biological samples exhibition.
- Result of the Forum: the visit to Tong Dizhou and Zeng Chengkui Memorial Room, and other exhibitions related to the marine environment, helped local people obtain knowledge about the marine environment and awaken their love for the ocean.

#### *Forum (6)*

- Date: 2007.05.27
- Venue: Top bathing beach
- Target volunteers: The residents, members of the environmental council, and the volunteers
- Trainer: Jing Yan
- Objective: to educate local residents and volunteers of the Yellow Sea region about environmental problems
- Topics: case study on environmental marine protection, both domestic and international.
- Result of the Forum: due to the case study, residents had a broader vision of the marine environmental protection. After the training, they had more useful and meaningful information to reach more people.

### *Forum (7)*

➤ Date: 2007.05.31

➤ Venue: The playing field of the 2008 Olympic sailing competition

Target volunteers: The residents and members of the environmental council

➤ Objective: To provide the residents with opportunities to help the Yellow Sea renew the quantity of shoal

### **5.5. Publicity activities:**

Implementing publicity activities, as detailed below, to reach out to and raise awareness amongst local residents about the status and problems of the marine environment in the Yellow Sea. We conducted the following activities:

(a) Poster exhibitions;

Download from the following link

<http://www.yellowsea.ngo.cn/download/poster.rar>

<http://www.yellowsea.ngo.cn/zyxz.html>

(b) Bulletin board;

Download from the following link

[http://www.yellowsea.ngo.cn/download/display\\_boards](http://www.yellowsea.ngo.cn/download/display_boards)

(c) Website with an online discussion board

[www.yellowsea.ngo.cn](http://www.yellowsea.ngo.cn)

(d) Shop-window

We rented a shop-window from November 2006 to August 2008

The shop window will be updated once per month, for a period of one year, with details on training information, upcoming activities, hot issues about the Yellow Sea, as well as the information about the character of the Yellow Sea's environment and its biodiversity. The long-term increase in marine knowledge and education aims to target community residents and other citizens as well.

(e) Outdoor publicity activities (the members of the local Environmental Council exhibited the bulletin board, distributed printed materials to the residents, and organized actives to promote the program.).

We organized six outdoor publicity activities in Tiantai Olympic Garden.

### *Outdoor Activity (1)*

➤ Date: 2006.10.30

- Venue: Tiantai Olympic Garden
- Target volunteers: The residents and members of the environmental council
- Objective: to let more residents know our activity
- Activities: the residents' environmental council organized publicity and conducted education on marine issues in front of the entrance of the Tiantai Olympic Garden Community.

#### *Outdoor Activity (2)*

- Date: 2007.02.28
- Venue: Tiantai Olympic Garden
- Target volunteers: The residents and members of the environmental council
- Objective: to inform more residents about our program
- Activities: the residents' environmental council came to the recreational center to publicize the marine environmental protection. They handed out posters and paper fans to residents.

#### *Outdoor Activity (3)*

- Date: 2007.05.26
- Venue: Tiantai Olympic Garden
- Target volunteers: The residents and members of the environmental council
- Objective: to inform more residents about our program
- Activities: The staff of Qingdao Youth Association of Environment Protection and volunteers from Qingdao University worked together to carry out education and publicity on marine environmental protection to the local residents in the recreational center. To show their support and determination to the marine environmental protection, all the residents signed their name on the posters.

#### *Outdoor Activity (4)*

- Date: 2007.07.08
- Venue: Tiantai Olympic Garden
- Target volunteers: The residents and members of the environmental council
- Objective: to inform more residents about our program
- Activities: a speech to the residents. Residents then hung a poster on the shop window and signed their name on it, in order to pledge to marine environmental protection.

#### *Outdoor Activity (5)*

- Date: 2007.07.14
- Venue: Tiantai Olympic Garden
- Target volunteers: the primary school students who live in Tiantai Olympic Garden
- Objective: To inform more residents about our program
- Activities: with the help of American volunteer Kate Szewczyk ,and young

volunteers from the community, Qingdao Youth Association of Environment Protection came to TainTai Community again. They handed out bimonthly newsletters and other publicity materials and promoted knowledge of environmental protection to the residents.

#### *Outdoor Activity (6)*

- Date: 2007.07.26
- Venue: Tiantai Olympic Garden
- Target volunteers: The residents and members of the environmental council
- Objective: To inform more residents about our program
- Activities: The volunteers, consisting of residents from Tiantai Community, went to Huangdao to conduct publicity activities and help do some cleaning there. Additionally, they performed a drama, named "Ocean Guard", which they created themselves.

### **5.6. Publications**

We published and distributed newsletters to the local residents six times. The newsletter, issued bimonthly, provided information about pollution in the Yellow Sea. Those publicity materials were popular.

Results (including materials produced)

Helping the residents gain knowledge about the ecological marine environment and understand the importance of protecting it.

Advocating the spirit of "Green Century, Olympics, Qingdao and Home", highlighting the task of Yellow Sea protection and leading the local residents to get involved in protection of their environment.

Expanding local residents' knowledge about marine ecology.

## **6. Evaluation: Effectiveness of implemented activities**

6.1. Founding the environmental council of local residents in the Olympic Garden Community

As a volunteer group, the environmental council is composed of community residents and staff of the local property management company. These members are all concerned about community issues and the environment surrounding the community. The members of the environmental council maintain a close relationship, communicating with each other at least twice a month. Thus, they are able to organize and motivate local residents to actively participate in environmental activities and to contact local NGOs.

## 6.2. Effectiveness of implemented activities between August 2006 - August 2007.

Activity	Number of Events
Forums for marine environmental protection	6
Environmental campaigns	7
Training workshops for environmental monitoring	12
Outdoor publicity activities	6

## 6.3. Effectiveness of implemented promotional material

Promotional material	State
Posters	Completed
Brochures	Completed
Display boards	Completed
Banner	Completed
T-Shirts	Completed
Souvenirs (CD-ROM)	Completed
Caps	Completed
Bimonthly Newsletters	6

## 7. Conclusions and recommendations for future work

### 7.1. Conclusions

- The action of local residents' environmental council is aimed at encouraging the local residents to pay more attention to the environmental issues in the Yellow Sea.
- With support from the environmental council and project team, the residents in Tiantai Olympic Garden have had increased opportunities to learn about the Yellow Sea and observe its biodiversity and ecosystems. This knowledge and awareness about the urgency of protecting the Yellow Sea has spread to the surrounding communities.

### 7.2. Recommendations for future work

We will invest more time and resources to encourage and support the outstanding members of the local residents' environmental council. Our hope is that

eventually, the local environmental council will be able to organize the activities independently.

### **Annex 1. Contact information**

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## Community-based conservation of coastal ecology in Dalian, China

**Environmental Science and Engineer College, Dalian**

**Maritime University and Environmental Protection**

**Association of Dalian Maritime University.**

## 1. Summary

This project is university-level, community-based program to offer educational and training activities which raise community awareness, knowledge or skills on coastal and marine conservation issues. The program assists local communities to form partnerships with local managers by encouraging them to join in the protection, management and rehabilitation of Dalian's coastal and marine environments.

The mainly education contents:

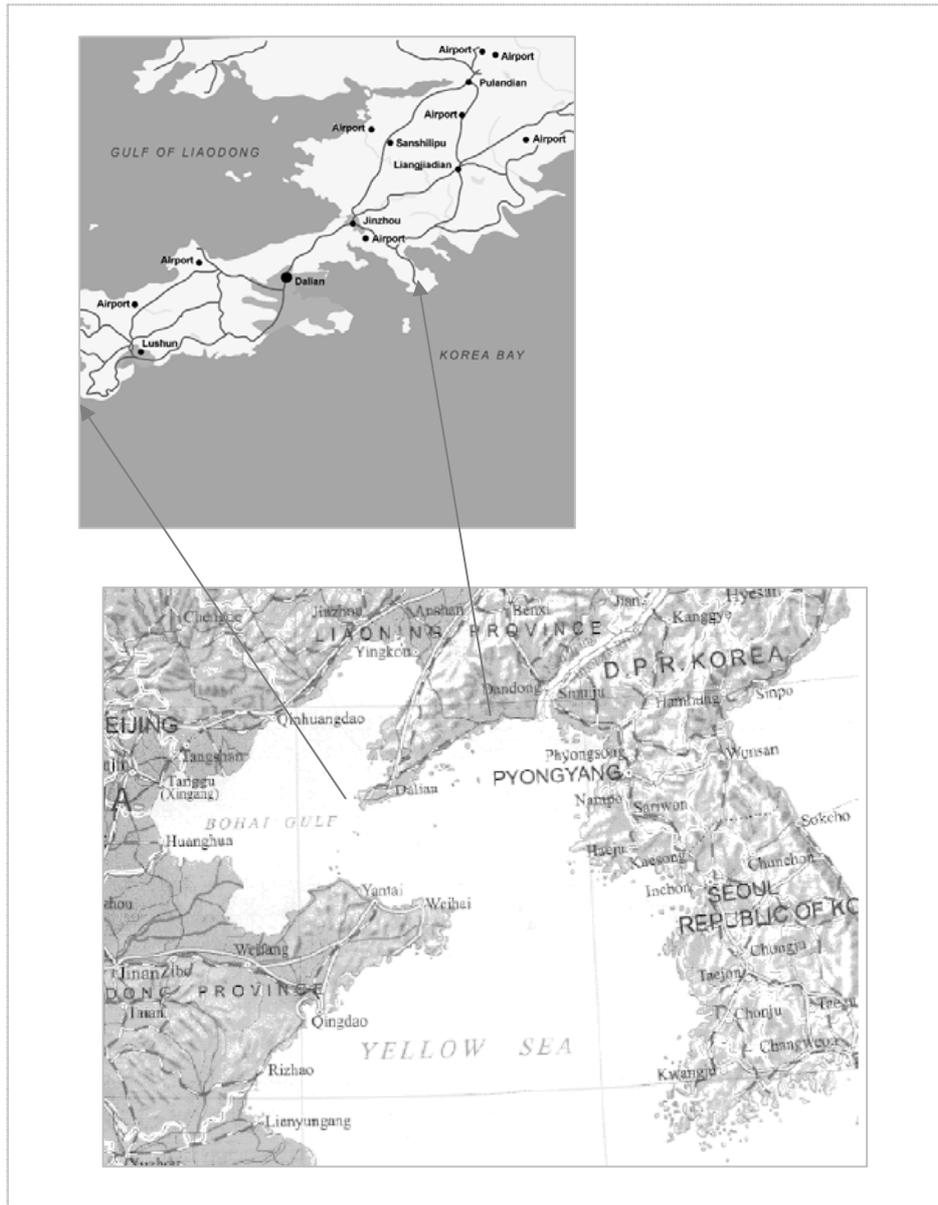
- 1) The importance of marine environment,
- 2) The basic knowledge of marine ecology,
- 3) The impacts of human activities on the environment,
- 4) The ways to restore and recovery the damaged marine ecosystems.
- 5) The way of marine environment management and planning.

## 2. Background of activities

Dalian is located in the south part of Liaodong peninsula, surrounded by the ocean on three sides, with the Yellow sea to its east and the Bohai sea to the west, facing southward Shandong peninsula across the ocean, has a coastline of 1900 kilometers, along which there are more than two hundred islands. Dalian people depend heavily on the seas for the improvement of their economies and standard of living, so they really care about the marine environment, but some of them lack of professional and systemic knowledge. This project will promote the conservation of coastal zone by providing the education for local communities.

- Project duration: 14 months
- Project member
- Project leader: Professor Lin Jianguo.
- Project assistant: Guo Ping and Qu Heng
- Project volunteers (around 40 person): teachers of Dalian maritime university; members of a student association : Environmental Protection Association of Dalian Maritime University, and anybody who were willing to participate in the community education activities
- Project area

Figure 1. The project area focus on the yellow sea's coastal zone in Dalian



### **3. Objectives of activities**

The project aims to encourage and educate local communities of the Yellow Sea's coastal area in Dalian to facilitate marine conservation efforts. The overall objective is to maintain the biological diversity and ecological functions of coastal ecosystems in Dalian coastal zone of Yellow Sea, while supporting the livelihood and economic opportunities of the communities living in these areas.

### **4. Target audiences**

We have conducted a number of activities and each activity may have different target audience. The target audiences of "training for trainers" are the "trainers" who is willing to participate in the community education activities. The local residents are the most important target audiences in our activities. For example, the local fishermen are the target audiences in the activity "site visits to fishery village"; the local people are the target audiences in the activity "the Environmental campaign in residential community". Some activities are organized in the water-front parks, so the visitors are the audiences in these activities. Undergraduate students of Dalian Maritime University are also our important audiences, such as in the activity "the Environmental campaign in campus". The staffs of some administration branches are another special audiences.

On the other side, all members of our program are audiences as well, we learn a lot from our target audiences.

### **5. Activities implemented**

Six kinds of activities were carried out during the past year:

- Training for Trainers
- Site visits to beach area
- Site visits to aquaculture area
- Beach Cleanup
- Oily-water treatment
- Environmental campaign

#### **5.1. Training for Trainers**

"Training for trainers" is the activity that provides project volunteers some lessons. 20 lectures have been conducted, and the topic was marine ecosystem conservation. The teachers are the people who are professional on marine ecology. The trainers could be anybody who is willing to participate in the community

education activities. Actually, most of our trainers are undergraduate students. We arranged three kind of teaching styles: formal class, competition and stage play

#### *5.1.1 Formal class*

Fourteen lessons are arranged as formal class. From these professional courses, we could learn the systematic knowledge of marine ecology. The topics of these lessons are the following:

- The basic knowledge of marine ecology
- Management and planning for marine environment
- marine life zones
- the ecology of rocky shore
- the ecology of sandy beach
- ecological invasion
- aquaculture pollution
- oil pollution in the sea
- over fishing
- marine biodiversity conservation
- Red tide
- Restoration and recovery of the damaged marine ecosystems
- Marine pollution
- Typical marine ecosystem

#### *5.1.2 Stage play*

The organisms in the ocean are so magic for us, from the microplankton to big whale. So we learn this part knowledge in an attractive way: stage play! The topic of each stage play should belong to conservation of marine organisms. 60 volunteers attend this activity, 15 volunteers are in one group, and responds to one stage play. So all of us are "actors", we design the contents and actions under the guidance from our teacher.

#### *5.1.3 Competition*

After the above teaching actives, we learned lots of useful knowledge on marine ecosystem conservation. Now, it's time to check our result! For this reason, two activities were carried out at the end of the "Training for trainers". The first activity was just like normal examination: we prepared some examination paper with the questions and let our "trainers" answer these questions. The second activity was competition: we have five groups and each group select four trainers to join the competition. The competition has two parts: 1<sup>st</sup> questions must be answered, 2<sup>nd</sup> quick fire question, and the group that get more points is winner.

### **5.2. Site visits to beach area**

Local communities, accompanied by staffs of this project, walk along the beach to familiar with different coastal ecosystems. Educate local communities how an

ecosystem works and the interaction between organisms and their environment. Educate them about the importance of these marine ecosystems. The task for each of us: 1 Observe the coastal ecosystem; 2 promote the knowledge to the person whom we meet there; 3 Try to find the most important environmental issue and discuss how to restore the ecosystem;

#### *5.2.1 The first activity: "natural observation"*

The first outdoor activity was arranged on 2006/09/23, 2 groups (about 25 person) attended. We walked along the coast together from Ling Shui bathing spot to Xinghai Park. The education emphasis is let people familiar with different coastal ecosystems and how human activities affect the marine ecology.

The first site we visited was Ling Shui Bay, which is a very small bay but has sandy beach, rocky coast and a very beautiful cliff. Actually, this is a less-artificial bay. But the seawater here looks not very clean, due to the *Undaria pinnatifida* aquaculture and land-wastewater input.

The next site was Heishi reef, there is a very beautiful waterfront residence community, and people who live here even can smell the sea in their room and walk to the coast in two minutes. Of course, they care about this coastal zone more than others, so we can have a nice interact with them. The coast line is very dirty here due to the man-made waste, such as waste-papers and plastic bags.

The final destination was Xinghai Park, which is a typical in city coastal park. The park consists of a 0.15 million-square-meter garden and an 800-meter-long bow-shaped man-made beach. Lots people come to here for relax every day.

#### *5.2.2 Second activity: "Teaching and Cleaning"*

Time: 2006/10/11

Site: Dalian (Tiger plaza; Xinghai plaza; Heishi reef)

Lvshun (Laotieshan, CoastalGuard park)

Subject: Teaching and Cleaning

Participator: 30 volunteers, they work in 5 groups, and each group go to one site. The role of this activity is let more people care about our coast! Each staff has 5 query forms, which mean one staff should contact at least 5 local communities and spread the knowledge of yellow sea ecosystem to them. After this teaching work, our volunteers should clean up the site they visited.

#### *5.2.3 Third activity: "observation on coastal species"*

Time: 2006/11/26

Site: Qixianling

Participants: 11 volunteers.

Subject: Observation on coastal species

The main task of this activity is to observe coastal species, and learn how these species interact with their environment. We arrived to there around 3:00p.m, because that time is the lowest tidal time, so we can find more organisms in inertial zone. There were many local people, and they came to here to collect some marine organisms to cook, e.g: crabs and oysters. We had a very nice time with these people, actually we learning from each other. They teach us the capture skill, and we teach them how those coastal organisms interact with their environment.

### **5.3. Site visits to aquaculture area**

Organize site visits to aquiculture area to educate local people about how human activities affect the ecosystem, how to recover the damaged ecosystem, and how important the sustainable use of natural resources in the marine environment is. So the role for this activity is to educate local people how to utilize the limited natural marine resource and develop sustainable fishery and aquaculture.

#### *5.3.1 Pre-work*

Three volunteers did some pre-work. They went to some fishery villages to investigate the current situation of coastal ecosystems there. On the other side, they went to some administration branches to study the related policy of marine environment protection, and familiar with how the government branches work on marine management. From this practice, we may have a better understanding on marine management policy and process. These pre-works are very necessary for our following work.

#### *5.3.2 First activity: "One day study trip"*

Time: 2007/04/06

Site: Longwangtang, Baoyudu village, Bolanzi village, Laotieshan, qixianling aquaculture factory

Participants: About 10 volunteers.

Subject: Contact with local people, try to familiar with their life, discuss how to protect marine ecosystem with them.

#### *5.3.3 Second activity:Ffishery village*

Time: 2007/04/26

Site: Longwangtang

Participants: 12 volunteers.

Subject: Contact with local fishery men, discuss how to protect marine ecosystem with them. The emphasis of this activity is "sustainable fishery". From this activity, we found that some fishery men think that the fish in the ocean is infinite, and

even some fishery men know the terrible impact of over fishing, they still think that was not their business.

#### *5.3.4 Third activity: Aquaculture village*

Time: 2007/05/26

Site: Baoyudu village,

Participants: 14 volunteers.

Subject: Contact with local men, discuss the impact of aquaculture and how to reduce the aquaculture pollution.

### **5.4. Beach Cleanup:**

This is a great way for families, students, service groups, and neighbors to join together and take care of our fragile marine environment: Clean up the rubbish and remove seaweeds and other undesirable plants from beach. The problems of marine debris and pollution are just as unsightly as they are damaging; affecting the smallest ocean organisms to the largest marine mammals.

We arranged the specialized beach cleanup activity four times. Some volunteers suggest that we should pick up the rubbish whenever we walk along the beach, so we also cleanup the beach during other activities.

#### *5.4.1 The first site: Xinghai Park*

Time: 2006/11/04

Site: Xinghai Park

Participants: About 10 volunteers.

Subject: Cleaning the beach

Xinghai Park is a public in-city park, and lots people come to here for relax. There are many specialized cleaning-workers in this park, but the place is not so clean.

#### *5.4.2 The second site: Lijiao Bay*

Time: 2007/05/26

Site: Lijiao Bay

Participants: 30 volunteers.

Subject: Cleaning the sandy beach

Lijiao Bay is a very nice bathing spot, has long sandy beach.

#### *5.4.3 The third site: Heishi resident community*

Time: 2007/04/07

Site: Heishi resident community

Participants: About 10 volunteers.

Subject: Cleaning the resident community

Heishi resident community is a very beautiful waterfront residence community, and people who live here even can smell the sea in their room and walk to the coast in two minutes.

#### *5.4.4 The fourth site: Longwangtang*

Time: 2007/06/03

Site: Longwangtang

Participants: about 50 volunteers.

Subject: cleaning the coast

There is no specialized cleaning-worker in this area, so the coast is very dirty.

### **5.5. Hand-on experiment**

DaLian is a harbor city, so the oil pollution from ship is one of the major pollutants. As our initial plan, we should organize lab experiments to show people the impacts of oil spills and the ways to treat the oily water. But we are lucky, the factory director of the oily- water treatment plant of Dalian port allowed us to visit their factory. So we could learn oily water treatment in the real way instead of in the lab.

Time: 2006/12/02

Site: Oily- water treatment plant of Dalian port

Participants: About 40 people.

Subject: Oily- water treatment

Firstly, the technician of this factory explained to us the impacts of oil spills and the general ways to treat the oily water. Then we visited factory following with him, he showed us how the oil was removed step by step and how these large equipments work. After this activity we have a sense of the real oily-water treatment technology.

### **5.6. Environmental campaign**

#### *5.6.1. Environmental campaign in campus*

A five-day campaign was held in the second week (from 13th to 17th) of November at Dalian Maritime University to disseminate the knowledge and information of marine conservation through the exhibit and distribution of educational materials. We prepared some blackboards and banners in a teaching building to

show the marine ecology knowledge to the students who are passing by here. Every morning our volunteers made some speeches to explain the knowledge to the pass-by people, and distribute educational materials to them and invite them to join our project if they are interested in. At night, we also displayed some environmental protection movies in the classroom for students who are interested in.

#### *5.6.2 Environmental campaign in residential community*

After the campaigns in campus, we arranged four campaigns in residential community in Apr.2007. We prepare lots blackboards to show the residents the knowledge of marine environmental protection. Because the education levels of those residents are so difference, we think out some ways to make the knowledge more easily to understand and more attractive to learn, such as we draw more pictures and cartoons on the blackboard, prepare some small presents to the people, make a music show...

The first activity:

- This activity was arranged at Heishijiao residential area on 2007/04/14, and around 30 volunteers joined it. Heishijiao residential area is a big community and near to the shore, so people who live here are more care about the marine environment. That's why we select here.

The second activity

- This activity was arranged at Dayou residential area on 2007/04/15, and around 30 volunteers joined it. Dayou residential area is a new community and most residents are the teachers of University, so the emphasis of this activity is to collect the suggestions on management and planning of marine environment from those people.

The third activity

- This activity was arranged at Shuzhou residential area on 2007/04/21, and around 20 volunteers joined it. Shuzhou area located in business central, and has high population.

The fourth activity

- This activity was arranged at Ligong residential area on 2007/04/19, and around 10 volunteers joined it. ligong area located near to Dalian university of technology, lots students pass by here everyday.

#### *5.6.3 Environmental campaign in park*

This activity was arranged at Eastsea park on 2007/04/21, and around 40 volunteers joined it. Eastsea Park is a very beautiful and famous park in Dalian, and lots visitors come to here everyday. The emphasis of this activity is to collect the suggestions on marine protection from the visitors.

## **6. Produced outputs and outcomes**

- 1) Well-trained volunteers

- 2) Started a Beachcare group
- 3) To further galvanise the volunteer spirit and enthusiasm in the community, and to harness it to help implement the Program.
- 4) Better understanding of the local communities on the importance of the ecosystem of the Yellow Sea
- 5) Materials produced: T-shirt and cap with the CoastCare logo; brochures and CDs with the knowledge of marine ecology; posters, banners and blackboards for display; query forms. Bookmarks, feedback informations.
- 6) Building good relationship with some government branches, such as Dalian Environmental Protection Bureau, Dalian Oceanic and fishery Administration, Dalian Aquaculture Administration.
- 7) Two undergraduate thesis and one master thesis (on-going)

## **7. Evaluation: Effectiveness of implemented activities**

Passive points:

- Most of activities were held not on timetable exactly.

At the beginning, we didn't consider that the August is the holiday for students, so lots group members were not available in that month. And for each activity, we need to do some pre-work and need to consider lots things: such as weather condition, so it's impossible to follow the initial timetable. But we did all the activities that we mentioned in contract.

- Most of activities were held not in five subgroups exactly.

According to the inception report, we will have one group leader, 10 group members and 40 group volunteers. They are working in 5 independent subgroups. But we found this is not reasonable after we started the work. For example, some volunteers only want join the activities which they are interested in, and some volunteers maybe want visit the sites which they like. Finally, we decide that we still have 5 subgroups, but the members of each group are exchangeable. Volunteers could attend the same activity more times if they like and not attend even once if they are not available. The five subgroups could work together for some activities depending on real conditions. And we accepted more volunteers to join our work.

Positive points:

- We are a very unitive group now, and enjoy the environmental education actions.
- More than 800 local people that we had teach via our activities, which raise community awareness, knowledge or skills on coastal and marine conservation issues.
- We design all the propaganda materials by ourselves, e.g. CDs, posters...
- We try to contact with some government branch and get lots help from them.

- More volunteers joined our work.

## **8. Conclusions and recommendations for future work**

What we did has encouraged and educated lots local communities of the Yellow Sea's coastal area in Dalian to facilitate marine conservation efforts, which helps increase awareness about environmental sustainability.

### *Training for trainer*

The Training work was hold in tree styles: formal class, competition and stage play. We found that the best way was stage play. By this way, the trainers joined this activity more actively.

### *Site visits to beach area*

Most of the sites what we have visited are in the Dalian city, normally these sites are man-made costal line, so the ecosystems are not so "natural". For further work, people should visit some small places to found more natural marine ecosystem.

### *Site visits to aquaculture area*

It's most difficult work in all the activities. Actually, we are not so welcome, because most local people only care current income, and sometimes this high income also brings passive impact to marine ecosystem.

### *Environmental campaign*

We held this activity in our campus, in community and in park. The most successful activity was in resident community.

### *Educational materials*

We prepared some kinds of educational materials to give to local people, and we found lots people prefer we give them CD instead of just a piece of paper.

## **Annex 1. Contact Information**

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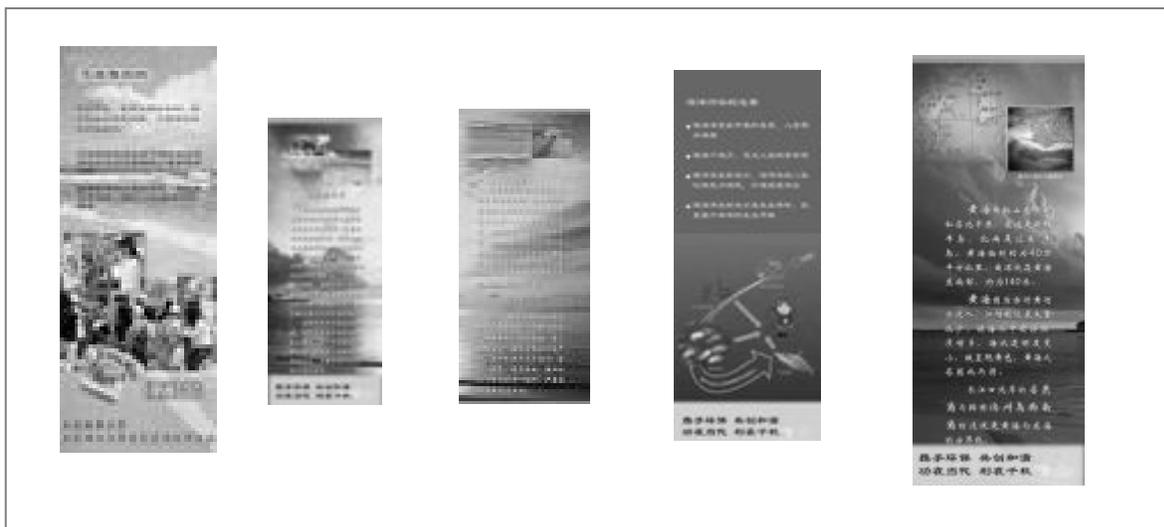
Tel: 0086-0-13795147092 and 0086-0411-88314929

E-mail: guoping214@126.com

## Annex 2. Materials produced

Materials produced : T-shirt and cap with the CoastCare logo; brochures and CDs with the knowledge of marine ecology; posters, banners and blackboards for display; query forms.

We designed and made lots bookmark, give them to local people as small gift. The knowledge of marine ecology was printed on these bookmarks. It's a good way to promote knowledge.



Query forms and feedback information: Get suggestions from local people. There are some different kinds of forms we designed: query form of aquaculture, query form of fishery, query form of resident community.



Program for exchanging information and experience about reclamation work among local communities in west coast of Korea - For a sustainable Yellow Sea

**Citizens institute for environmental Studies (CIES)**

## **1. Summary**

Although tidal flat is very important for ecology and fishery in west coast of Korea, It has been highly threatened by human activities, such as reclamation works and pollution. Public work, such as reclamation, gave a huge damage to life of local people as well as natural environment.

This program was planned to help local community to find strategies for conserving ecosystems of tidal flat and sustaining human life in the west coast of Korea (Yellow Sea). Three local regions were selected from coastal area of western Korea based on the stage of reclamation work: Seocheon (planned), Buan (ongoing) and Hwaseong (completed). We also have several cooperative organizations in three regions to make us contact local people easily.

We suggested three objectives in this program: 1) Establishing sustainable strategy for ecosystem and local community in Yellow Sea area, 2) Preparing educational and interactive programs for local people in Yellow Sea area, 3) Providing information and news to locals.

This Program gave a chance for local people to see themselves situations in the diverse views. It could play a role to help them find out what lacks in their activities based on the experience of former experienced locals. The news-letter contained the diverse local information that was collected by referencing and interviewing. Through interviewing local people, we could document and introduce the activity and philosophy of them, showing the current situation practically. Our news-letter appears to help local peoples have a hope to get over the challenging situation in the cooperation of each other.

Visiting to Lake Sihwa by Saemangeum folks is to provide a chance to compare the past and the present of both folks. Saemangeum folks appeared to confirm that the government could not keep the commitment in Lake Sihwa, the economical development by reclamation of tidal flat. Visiting to Julpo Bay and Hajeon village in Gochang could help Saemangeum folks figure out how to make a strategy for sustainable development of tidal flat and their own community. They recognized themselves the example that both preserving tidal flat and increasing the economical income could be done at the same time.

Local people seemed to be able to understand their own situation objectively by the workshop with experts. Examples of sustainable development introduced during the workshop were to realize the importance of work protecting ecosystem and culture.

Sharing information and experience are to provide the useful tools to understand the situation regardless of the scale. Similar experience has very important implication to the person concerned. Thus, the program of sharing information and exchange should be conducted more extensively.

## **2. Background of activities**

Tidal flat has a very peculiar origin, which makes its distribution limited. It can be formed mainly in estuaries and inlets under macrotide, gentle bottom slope and enough sediment. Lots of indigenous marine lives inhabit in the intertidal soft bottom. Fishes and invertebrates use this place as a spawning and nursery grounds. Nutrient recycling

function of tidal flat is very famous for the best economic value among all kinds of ecosystems.

Yellow Sea has, fortunately, the best condition for tidal flat formation and is well known to have the second largest tidal flat in the world next to North Sea in Europe. Total about 5,900 km<sup>2</sup> size of tidal flat develops well in the west coast of South and North Korea. Such a huge ecosystem of tidal flat in Yellow Sea has been highly threatened by reclamation as well as pollution. For example, 40 % of tidal flat in South Korea has been already reclaimed and changed into land (Table 1). Therefore, conservation of tidal flat in Yellow Sea is urgently needed for conservation of marine ecosystem.

Table 1. Details for reclamation works in coastal zone of Korea after 1970

Name	Location	Total size (ha)	Lake size (ha)	Dike length (km)	Work period
Saemangeum	Buan etc. Jeollabukdo	40,100	11,800	33.0	1991~2004 (2011)
Sihwa	Siheung, Hwaseong	17,300	6,100	12.7	1987~1996
Seosan	Seosan, Chungnam	15,600	4,000	7.7	1980~1995
Gunjang Nat'l. Complex	Gunsan, Janhang	15,000			Ongoing work on stages
Yeongsan River III-1	Yeongam, Jeonnam	12,800	4,300	2.2	1988~1993
Yeongsan River II	Yeongam, Jeonnam	10,800	3,460	8.6	1978~1982
Daeho	Seosan, Chungnam	7,650	2,200	7.8	1981~1985
Yeongsan Rriver III-2	Haenam, Jeonnam	7,400	2,300	2.1	1989~2005
Hwaong (Namyang Bay)	Hwaseong, Gyeonggi	6,220		13.8	1991~2001
Yeongjong Int'l Airport	Yeongjong island	4,650			
Dongjin- Gyehwa	Buan, Jeonbuk	3,970		12.8	1963~1967
Gimpo	Gimpo, Seoul	3,800		9.2	1980~1989
Seokmun	Dangjin, Chungnam	3,740	1,000	10.6	1987~1998
Namyang	Hwaseong,	3,600	800	2.1	1971~1973

Gyeonggi					
Asan	Hwaseong, Gyeonggi	3,200	2,800	2.6	1970~1973
Goheung	Goheung, Jeonnam	3,100	750	2.8	1991~1996
Haenam	Haenam, Jeonnam	3,000	830	1.9	1985~1988
Haechang Bay	Goheung, Jeonnam	2,700		3.4	1978~1992
Sapgyo	Asan, Chungnam	2,600	2,000	3.4	1976~1979
Songdo New Town	Songdo, Incheon	1,770			
Donga	Gimpo, Gyeonggi	1,725			
Hongbo	Boryeong, Chungnam	1,646		2.9	1991~2004
Daebul Ind. Complex	Yeongsan River	1,500			
Iweon	Taeon, Chungnam	1,350		2.9	1990~1998
Busa	Boryeong, Chungnam	1,240	430	3.5	1986~1997
Gunnae	Jingo, Jeonnam	900		3.2	1991~1996
Sanae	Gangjin, Jeonnam	820		3.2	1989~1997
Nampo	Boryeong, Chungnam	666		7.7	1985~1997
Jinchon	Baekryeong island	504		0.8	1991~1997
Wando	Wan island, Jeonnam	370		1.1	1989~1996
Mandeok	Gangjin, Jeonnam	315		3.0	1989~1996
Bojeon	Jingo, Jeonnam	290		0.9	1987~1995
Yaksan	Wan island, Jeonnam	257		1.3	1987~1996
Gogeum	Wan island, Jeonnam	243		1.7	1992~1996
Gangsan	Goheung, Jeonnam	209		1.3	1988~1994
Reference:: 『Tidal fiat in Korea』 (Koh, Cheol-hwan, 2001); KARICO, 1996.					

Most of people, going through a big development project where they live, suffer from it and get commonly confused at first. They often dispute and have different opinions among themselves resulting from scanty of specific information on the current situation. Therefore,

the exchange of the past and present experiences makes people understand their own situations better. The exchange can be achieved by the visit to share experiences, the comparative analysis of local situations, and the regularly published newsletters. Supporting local people to communicate and discuss with each other can be the best solution for looking for strategy for sustainable ecosystem in local community.

### **3. Objectives of the activities**

We suggested three objectives in this program:

- Establishing sustainable strategy for ecosystem and local community in Yellow Sea area,
- Preparing educational and interactive programs for local people in Yellow Sea area,
- Providing information and news to locals.

Six activities were proposed as follows:

- To prepare dialogues of local people in three regions respectively
- To prepare visiting program of local people to each other region
- To prepare workshop for local people
- To review and summarize existing data and information on Saemangeum case
- To publish news letters to share information
- To document the whole procedure

### **4. Target audiences**

Fishermen usually show weaker unity power and interaction than that of another social group because of lack of local union. Limited communication and isolation from information are also characteristic of local fishery village.

We tried to have local fishermen share their own experience and information, focusing on the reclamation project of tidal flat in Yellow Sea, the west coast of Korea. For instance, Sihwa that suffered from the completed reclamation work, Saemangeum that is running through the ongoing the reclamation, and Seocheon that is planned to have reclamation work in the near future, were selected.

### **5. Activities implemented**

#### **5.1. Preliminary fieldwork**

We carried out two field trips for the preparation of this project.

1) To Saemangeum and Secheon area on the purposes of investigating the current situation on local communities in July 5-7, 2006.

2) to Sihwa area to understand the development of inner lands and seek the possible contacts for discussing with Saemangeum fishermen in September 5th, 2006.

## 5.2. Review and summary of existing data

We collected data and information on the reclamation projects of Sihwa, Saemangeum, and Seocheon, from mainly referencing of relevant local organizations, and partly seeking Internet and newspaper.

Three projects in Saemangeum, Sihwa, and Seocheon were summarized and compared in Table 2.

Table 2. Comparison of three reclamation projects

Content	Sihwa	Saemangeum	Seocheon
<b>Location</b>	Siheung-si, Ansan-si, and Whaseong-gun, Gyeonggi-do	Gunsan-si, Gimje-si and Buan-gun, Jeollabuk-do	Gunsan-si, Jeollabuk-do and Janghang-eup, Chungcheongnam-do
<b>Size</b>	Total: 17,300ha -land: 11,200ha -lake: 6,100ha -dike: 12.7km	Total: 40,100ha -land: 28,300ha -lake: 11,800ha -dike: 33km	Total: 9000 ha
<b>Purpose</b>	Distributing population and company in Seoul Metropolitan Enlargement of land, rice production, and water resource	Enlargement of land, rice production, and water resource	Industrial complex
<b>Period</b>	1987~1994	1991~2001 (extended by 2011)	1989~2006 (extended by 2015)
<b>Expense</b>	USD 400 million (construction) USD 745 million (water quality)	USD 3 billion (estimated)	-
<b>Managing</b>	KWRC <sup>a</sup> (KAC <sup>b</sup> , Gyeonggi-do, MOCT <sup>c</sup> )	MAF <sup>d</sup> (KAC, Jeollabuk-do)	KLC <sup>e</sup>
<b>Remarks</b>	- water pollution in 1996 - discussion on the inner land use in progress	- completion of dike in 2006 - enforcement of dike in progress -plan for the inner land use in progress	- completion of entering road and compensation for fishermen - change of plan

<sup>a</sup>Korea Water Resources Corporation; <sup>b</sup>Korea Agriculture Corporation ; <sup>c</sup>Ministry of Construction and Transportation; <sup>d</sup>Ministry of Agriculture and Forestry ; <sup>e</sup>Korea Land Corporation

### **5.3. Exchanging information among local people**

Saemangeum fishermen visited to Sihwa area in Oct. 11-12, 2006 to meet Sihwa local people and share experiences. In Jan. 04, 2007, they also made a visit to Julpo and Hajeon village which are famous for good examples of sustainable wetland area. Mutual visiting programs by fishermen at Saemangeum and Seocheon area suggested by project proposal were not performed due to the conflict situation in Seocheon.

#### *5.3.1. Sihwa artificial wetland and the Museum of Ecology in Sihwa*

Ms. Lee, Gye-suk (member of People for Lake Sihwa) was guiding kindly and giving the introduction of the present situation in Sihwa to Saemangeum folks. They discussed about ongoing construction of tidal power plant in Sihwa. Saemangeum fishermen doubted the construction whether it considered the folks' profit or not. She answered that the government could not find other plan but the ongoing one as a compromising plan due to the extremely deteriorated water quality. Also it seemed not even to include local people in the process of discussing development plan, she said. An alternative plan was composed in the partnership with civilians and NGOs, but never gained attention of the government and the public.

The big issues in Sihwa area are the development of MTV (Multi Techno Valley), the disposal of sediment dredged from Sihwa Lake, and the development of Tan Island. She expected that the dispute in Saemangeum area would begin in environmental problem and turn the direction to inner development issues.

#### *5.3.2. Daebu Island*

Mr. Kim, Jong-seon (executive officer in Daebu island folks group) gave a comment on difficulties for the last decade in Daebu island community. He pointed out the most difficult work was to unite diverse opinions of folks because of the compensation money issue. If they came together into one opinion, it would be different in present situation, he said.

Gyehwa island of Saemangeum and Daebu island of Sihwa have a completely different geographical location. After completion of reclamation work, the former will be completely circled by land, but the latter is still surrounded half by land and half by sea. Even if Daebu Island has suffered from the reclamation work, it is fast recovering from the damage, changing industry structure from fisheries to tourism.

#### *5.3.3. Oi Island*

An officer of Oi Island fishery committee and Ms. Lee, Gyeong-jin, elderly resident in Oi Island, welcomed our visiting and introduced the past history of Oi Island in developmental process. As the compensation, one resident received about USD 5000 cash and a right to purchase the reclaimed land for the original price. They have required more compensation to government for last 10 years, but finally it came into nothing. The compensation issue seemed to be the most difficult problem to get over during the developmental process.

Saemangeum folks visited to Julpo on Jan. 4th, 2007, meeting with Mr. Gi, U-hun, chief of Julpo village, and walking around the Julpo Bay tidal flat designated as WPA. They

showed a great interest in what prompted Julpo folks to accept and enhance the designation of WPA. And it was also noted whether dispute occurred during the implementing procedure.

According to saying of Mr. Gi, it was 3.5 km<sup>2</sup> size of tidal flat to be designated as WPA, which is a tiny fraction of the whole Julpo Bay tidal flat. Most part of Julpo tidal flat has been owned privately since the early 20th century because the right of property possession transferred from public to private sectors during that period by Japanese conquerors. Private-owned tidal flats are excluded from the designation as WPA. Gochang-gun has a large part of Julpo Bay tidal flat which also has yet to be designated. Gochang folks, however, began to discuss on the designation of their tidal flat as WPA, said Mr. Gi.

### 5.3.5. Hajeon village

Hajeon village is widely known as the spectacular scenery of coast and the highest production of short-necked clam (local name: bajirak) in Korea. It is located in Hajeon-ri, Simweon-myeon, Gochang-gun, Jeollabuk-do. Recently, eco-touring to tidal flat became popular to visitors who planned originally their family vacation to come by the nearby famous temple, Seonun-Sa.

Saemangeum folks visited to Hajeon village on Jan. 4th 2007, seeking the way to invigorate their own villages suffering from the reclamation project. They stopped by visitor center of Hajeon and met with Mr. Lee, Su-yong, one of the leaders in visitor center of Hajeon. We summarized the conversation (Q & A) among them as following:

Q: Hajeon village is known as a good example of both protecting tidal flat and facilitating local economy. What is the strong point of this village?

*A: Our tidal flat had been called of 'gray-colored sea' due to the huge amount of short-necked clams long before even if the production reduced recently. In addition, eel, tiger shrimp, oyster, gray mullet, laver and raspberry are famous.*

*We are conducting ourselves several eco-touring programs, such as riding taxi in tidal flat, self-catch of clams. Our village was selected as one of 100 beautiful fisheries town in Korea. We demonstrated that fisheries and eco-touring could enhance substantially local economy.*

Q: How much can you earn out of fisheries and eco-touring program?

*A: We have 220 families in our village. 169 members among 600 people are in our fisheries community, who cultivate short-necked clam and venus clams. 70 % of short-necked clams production, whose annual sum is 4,000 ton, is being exported to Japan. Tiger shrimp and oyster are also cultivated. We did not produce laver any more after the compensation money was given by a nearby nuclear power plant. We are cultivating ourselves 99 Ha which is less 10 % of total fishery area in Gomso Bay. More than 90 % of Gomso fishery area is owned privately. In average, our members earn thirty to forty million won (\$ 300,000 - 400,000) in annual basis.*

*Tidal flat eco-touring makes lower profits yet in comparison of its popularity. During last two years, 5-10 % of total revenue came from eco-touring that more than 30 thousands visitors are enjoying annually from March to October.*

Q: What kind of difficulties did you run into while planning and implementing eco-touring program?

*A: Surely, we had a kind of difficulties but finally got over them. At beginning stage, we tried home-staying for visitors should stay at village so as to increase profits. However, it is impossible to carry out the home staying system because most of members start to work at dawn in their own fisheries area. We worked out this problem as conducting eco-touring program to bring visitors to our working place at dawn and let them to enjoy outdoor activities in tidal flat. Currently we are extending accommodating facilities by building new houses and renting village center.*

*Our initial worrying about tidal flat eco-touring disappeared as we recognized its possibility to succeed and thus we could reach to the consensus of all members on the program. Saemangeum folks would be welcomed at any time. We hope our story help encourage them to sustain the community.*

#### **5.4. Workshop with local people and experts**

##### **5.4.1. 1st. Workshop**

- Title: Role of local people in the sustainable development of reclaimed tidal flat area
- Date: Thursday, November 9th 2006, 5 pm
- Location: GeuRae (tidal flat educational center), Gyehwa-myeon, Buan-gun, Jeollabuk-do
- Lecturer: Mr. Choi, Jong-in from Sihwa and Mr. Park, Hui-jun from Nami island

The first workshop was held in GeuRae, tidal flat educational center in Gyehwa Island, on Nov. 19th 2006. Mr. Choi, Jong-in, well-known conservationist of Lake Sihwa, and Mr. Park, Hui-jun, director of Nami Island, gave lectures and discussed with participants. The contents are summarized as follows.

*Choi: When I visited to Saemangeum in 2000, I did not think that local people could work in companies and factories which would be established on the reclaimed land. In case of Lake Sihwa, even though the geographical and economical background is far better than Saemangeum. I cannot, however, be still sure of the economical success in local people of Lake Sihwa. When industrial complex comes in, the existing system can collapse. There is no authority to be in charge to solve this problem, and thus the deprived were left alone.*

*Saemangeum folks will get hopeless soon. We, Sihwa folks, did not know the value of tidal flat either. When we lost money in gambling then, we just went out to get some money by catching clams from tidal flat. What will Fishermen who depend wholly on tidal flat do for a living?*

*I am suggesting that changes in tidal flat observed and recorded by local people will be necessary. We have been monitoring in Lake Sihwa and regret that there is no data right after completing Sihwa dike. Local people can monitor changes in tidal flat. Fishermen know better than experts in some cases. We discovered the dinosaur fossil area over 4 million pyeong in Lake Sihwa. We should have a faith on kindling charcoal to make a fire. Once animal cannot live, human cannot live either. Even a bird's footprint can give an opportunity to survive our hope. You should prove it.*

*Park: Nami Island has begun to obtain public attention recently. It was known as a picnic place for college students in the 1980s and an amusing park for families in the 1990s. When Mr. Gang, U-hyeon took a charge of management, everything started to change.*

*We were to change our philosophy as to change totally the island. First, we adopted 'hungry spirit.' If no money, we should earn. If no material, we should recycle. If no skill, we should learn. We change our perspective of nature. As you believe that human is unable to make tidal flat, we had the nature of island remain untouched. We determined to stop using pesticide.*

*It was a self-discipline management philosophy that contributed largely in the success. We regarded the courage to get over ourselves as the real courage. Finding-fault man could not survive in our community. We started our career as a janitor for first three months with no exception. Also I started my career to work cleaning job and finally became a director in 18 months.*

#### 5.4.2. 2nd. Workshop

- Title : Changes in local community due to reclamation project
- Date : January 3rd, 2007
- Location: Village center, Ha-ri, Gyehwa-myeon, Buan-gun, Jeollabuk-do
- Lecturer: Dr. Kim, Jun (Mokpo National University),  
Mr. Yeo, Gil-uk (chief executive officer of KFEM in Seocheon).

Dr. Kim, working at the center of islands culture in Mokpo National University, has been studying on the culture of western islands in Korea as well as Saemangeum area for 10 years. Recently, he began to monitor the business district in Gunsan, Gimje and Buan. Based on Saemangeum anti-reclamation movement, he divided three stages of period in changes of economical aspects in the business district.

As a consequence of his study, Buan declined substantially its income. Economy of Gunsan increased due to golf course, but seafood restaurants had a significant loss in

profit. In case of Bieung-do, although the land for tourist complex was already sold out, the local people left separately, remaining ships abandoned inside of dike. Fishermen in Seonyu-do strived to transfer to tourism with their fishing boat and house. Fisheries community near Gunsan area could be incorporated in Gunsan city or transferred to tourism. However, those in Gimje and Buan are losing vitality without any proper measure, pointed out Dr. Kim.

Moreover, what is urgently needed is to prepare plans of the professional training and the counseling program for fishermen. We should not let the fishermen deprived but make them work out the problem themselves for the future, emphasized Dr. Kim in his conclusion.

Mr. Yeo, chief executive officer in Seocheon branch of KFEM, doing a movement against reclamation of Janghang tidal flat commented the problem of Saemangeum and Lake Sihwa in perspective of the problem of Seocheon.

Janghang tidal flat in Seocheon is located in the north of Saemangeum. Its reclamation process was similar to Saemangeum. Lack of financial budget due to no economical and environmental merits brought the extended construction period. During the process, local people disputed on the compensation money and misunderstood the situation by the work of politicians who wanted to get rid of the public opinion against the reclamation.

Seocheon folks have fully studied the background of Saemangeum reclamation project in order to work out their problem in Janghang tidal flat. They tried to make logics in the scope of ecology, culture and economy, and research to demonstrate the value of the tidal flat. Saemangeum folks had to monitor and document their tidal flat, said Mr. Yeo.

Most fishermen participated in the workshop expected that it would be difficult for local people to take the lead of anti-movement because they had been exhausted and discouraged by loss of income. What the system of community collapsed and traditional fishery rules, such as no catch of juvenile fish, no use of illegal fishing gears and proper working time, was not observed were worried as well.

### *5.5. Newsletter publication*

We have published the newsletter 'sustainable Saemangeum' in Korean. It was issued as online to inform readers of abruptly changing situation in Saemangeum as fast as possible. The corresponding paper newsletter was also released to local people in reclaimed area.

Online newsletter designed in the form of Webzine was distributed to NGOs, professional society, mass media etc. More than 1000 copies of paper newsletter were printed and released to local people through active organizations and persons in Buan, Gimje and Gunsan (Saemangeum area).

# 6. Produced outputs and outcomes

## 지속가능한 새만금 '9.10'

### 갯벌매립사업의 새 형제 잘못된 방향도 답습

갯벌매립 사업은 2007년 7월 27일 개항한 새만금의 유일한 환경영향평가 대상 사업이다. 새만금개발공사(사장 김기현)가 주관하고 있다.

새만금 갯벌 매립 사업은 새만금의 유일한 환경영향평가 대상 사업이다. 새만금개발공사(사장 김기현)가 주관하고 있다.



새만금개발공사(사장 김기현)가 주관하고 있다. 새만금개발공사(사장 김기현)가 주관하고 있다.

## 지속가능한 새만금 '9.10'

### 시화호, 남이섬에서 새만금의 길을 찾다

시화호, 남이섬에서 새만금의 길을 찾다. 새만금개발공사(사장 김기현)가 주관하고 있다.



새만금개발공사(사장 김기현)가 주관하고 있다. 새만금개발공사(사장 김기현)가 주관하고 있다.

## 지속가능한 새만금 '9.10'

### 시화호의 실패에서 아무것도 배우지 못했다

시화호의 실패에서 아무것도 배우지 못했다. 새만금개발공사(사장 김기현)가 주관하고 있다.



새만금개발공사(사장 김기현)가 주관하고 있다. 새만금개발공사(사장 김기현)가 주관하고 있다.

## 지속가능한 새만금 '10.10'

### 지속가능한 발전을 위한 지역주민의 역할

지속가능한 발전을 위한 지역주민의 역할. 새만금개발공사(사장 김기현)가 주관하고 있다.



새만금개발공사(사장 김기현)가 주관하고 있다. 새만금개발공사(사장 김기현)가 주관하고 있다.

## 지속가능한 새만금 '10.10'

### 시화호, 남이섬에서 새만금의 길을 찾다

시화호, 남이섬에서 새만금의 길을 찾다. 새만금개발공사(사장 김기현)가 주관하고 있다.



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## 지속가능한 새만금 '10.10'

### 간척사업이 지역공동체에 미친 영향

간척사업이 지역공동체에 미친 영향. 새만금개발공사(사장 김기현)가 주관하고 있다.



새만금개발공사(사장 김기현)가 주관하고 있다. 새만금개발공사(사장 김기현)가 주관하고 있다.

## 지속가능한 새만금 '10.10'

### 새만금 백항조개 배자와 냉장고 자식

새만금 백항조개 배자와 냉장고 자식. 새만금개발공사(사장 김기현)가 주관하고 있다.



새만금개발공사(사장 김기현)가 주관하고 있다. 새만금개발공사(사장 김기현)가 주관하고 있다.

## 지속가능한 새만금 '10.10'

### 2006년 하반기부터 시민환경연구소와 새만금지역 어민들이 함께 작업하여 만든 <새만금 백항조개 배자와 냉장고자식>에 많은 분들께서 따뜻한 호응을 해 주셨습니다.



새만금개발공사(사장 김기현)가 주관하고 있다. 새만금개발공사(사장 김기현)가 주관하고 있다.

## 지속가능한 새만금 '10.10'

### 새만금 백항조개 배자와 냉장고 자식

새만금 백항조개 배자와 냉장고 자식. 새만금개발공사(사장 김기현)가 주관하고 있다.



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## **7. Evaluation: Effectiveness of implemented activities**

As Saemangeum and Sihwa reclamation works are perceived as completed, the public showed less concern than before. In case of Seocheon, the dispute has greatly grown in local community, but other civilians exhausted by the repetitive and fruitless social debate are unlikely to pay attention to these affairs.

Suffice to say that there has been no chance to share experience with local communities. Most local press has supported absolutely the development project. They usually address the effect of the development work on the economy, culture and ecology in local scale with the warped scope favoring the development.

In light of this situation, what shares the information that is collected by referencing and interviewing has the important meaning. It can give a chance for local people to see themselves situations in the diverse views. It can play a role to help them find out what lacks in their activities based on the experience of former experienced locals.

We published the news-letter two times during our project as planned. The news-letter contained the diverse local information that was collected by referencing and interviewing. Through interviewing local people, we could document and introduce the activity and philosophy of them, showing the current situation practically. Our news-letter appears to help local peoples have a hope to get over the challenging situation in the cooperation of each other.

Visiting to Lake Sihwa by Saemangeum folks is to provide a chance to compare the past and the present of both folks. Saemangeum folks appeared to confirm that the government could not keep the commitment in Lake Sihwa, the economical development by reclamation of tidal flat.

Visiting to Julpo Bay and Hajeon village in Gochang would help Saemangeum folks figure out how to make a strategy for sustainable development of tidal flat and their own community. They recognized themselves the example that both preserving tidal flat and increasing the economical income could be done at the same time. However, late timing and limited participation in visiting could be the deficit of our implementation.

Local people seemed to be able to understand their own situation objectively by the workshop with experts. Examples of sustainable development introduced during the workshop were to realize the importance of work protecting ecosystem and culture. Saemangeum folks would like to visit to Hajeon village again, and also have a chance to visit to Nami Island. Therefore, our two activities, visiting to other tidal flat area and workshop with experts, can be evaluated to accomplish the planned objectives.

## **8. Conclusions and recommendations for future work**

Sharing information and experience are to provide the useful tools to understand the situation regardless of the scale. Similar experience has very important implication to the person concerned. Thus, the program of sharing information and exchange should be conducted more extensively.

Lake Sihwa, Saemangeum and Seocheon have partly the same and partly the different situation. Lake Sihwa is standing on the stage of discussing development after

reclamation and Saemangeum is on the stage of completing dike. Seocheon has yet to decide the start of construction. Many remain to be done for conserving integral ecology, including nature and human beings in the corresponding scale.

As commented by several experts, monitoring and documenting ecosystem including nature and human beings by local people should be carried out continuously. These data can be excellent references to be used on the time to make the solution of new challenge. They can be helpful for the research of experts critically.

Furthermore, we suggest that visiting to a developed country by local people bring a significant advance in working out the controversy of development versus conservation. For instance, Germany designated the tidal flat as national park to protect it. It is necessary to understand what caused the switching of German policy from reclamation to conservation of tidal flat, how it affected residents and tidal flat, how residents participated into the process and worked, how they satisfied on the present management, and what can be adapted into our situation. Such a visiting program can bear a significant implication that local people have a chance to seek the application to their own cases from examples observed and learned in the developed country.

## **Annex 1. Contact information**

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# A Training project report Liyashan oyster reef ecosystem protection

**Haimen Ocean and Fisheries Bureau**

**Nantong, China**

## 1. Summary

This project is carried out from July, 2006 to June, 2007. This project is carried out according to the protection plans, to enhance the local government and inhabitants sense of ocean environment protection, to make the local social institutes concerned pay more attention to the tendency of the environment deterioration. The support institutes include assisting the competent administrative departments Marine Management, environmental supervision and law enforcement personnel management, coastal primary and secondary school teachers and student representatives, grass-roots management cadres, township enterprises in the relevant staffs. All of them make up the marine and environmental activists. They adopt diversified flexible manners to do a series of activities, including environmental training, alternative skills training, summer schools, management of cadres training, Fishermen Culture Festival, seminars, field studies and communion with wetland protection project in Yancheng, Jiangsu Province, etc.

## 2. Background of activities

Liyashan Oyster Reef is located in northern Jiangsu Province with an area of 3.5km<sup>2</sup> (Fig1. 2). The natural background of the reef is unique. The reef is surrounded by tidal lands, underwater sand and islands with diversified animals taking it as their habitat such as fish, birds and mollusks bottom animals. Liyashan Oyster Reef is one of the rare live oyster reefs in China. It is the typical Oyster reef ecosystem which idiosyncrasy is in evidence and is surrounded with diversified animals.

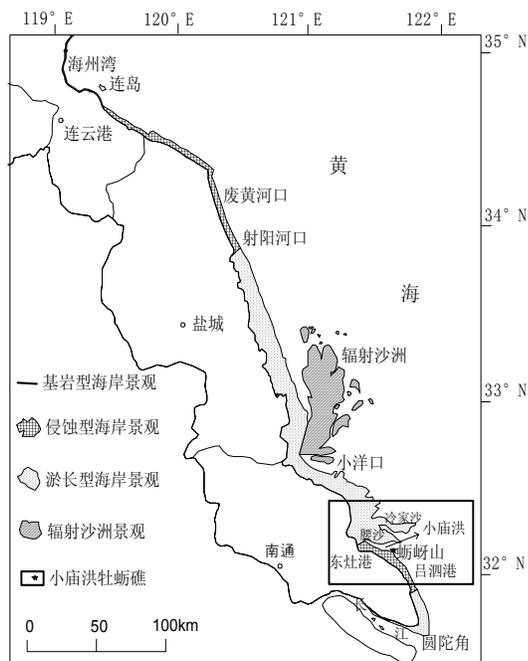
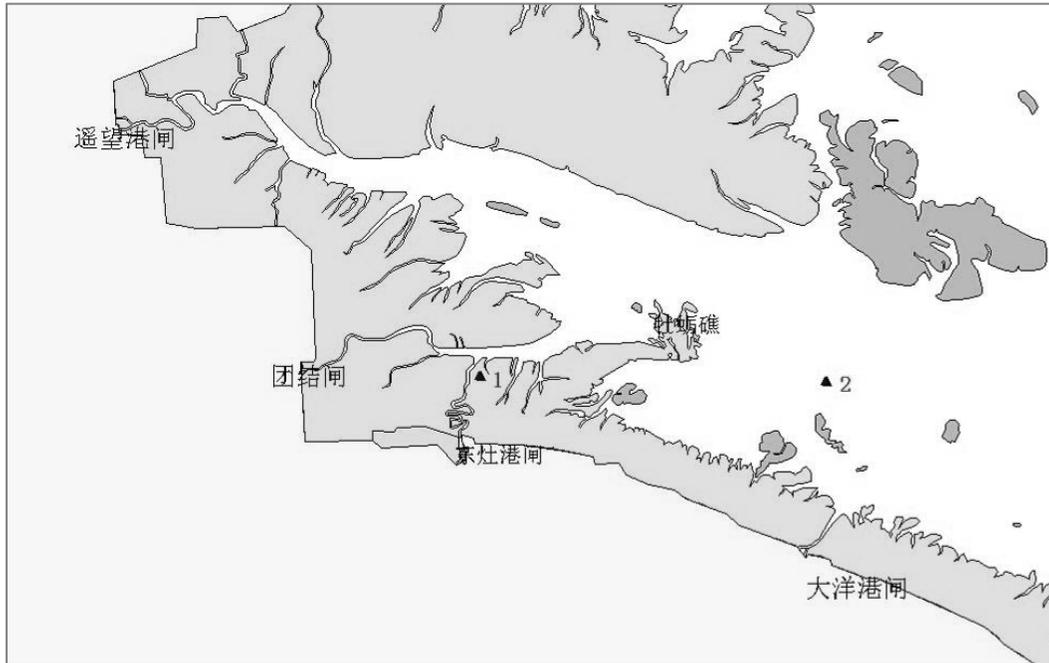


Fig1 Situation I of Oyster reef in Dongzao Harbor, Xiaomiaohong of

Fig2 Situation II of Oyster reef in Dongzao Harbor, Xiaomiaohong of Haimen, Jiangsu



Inhabitants nearby, reinforced by fishermen quitted from fishing boats, make a living by the main means of collecting oysters. Longtime and unrestrained picking up of oysters has seriously damaged reef surface where oysters grow. And contamination thus drained by the coastal enterprises as well as fertilizers and chemicals thus applied not only make the ocean be rich in nutrition, but also make the red tide easily emerge. Both of them damage the environment and the resources further.

Because of environment vicissitude and human development activities enhanced, Liyashan Oyster Reef ecosystem is gradually degenerating. This phenomenon arouses the government's attention. Then the government appropriates funds to researching it and prepares to construct the ocean special reserve around Liyashan Oyster Reef. On Dec. 30th, 2005, a report of *Argumentation of selecting Haimen Liyashan Oyster Reef as Oceanic Specially Protected Areas* has passed the judgment of the experts organized by National Ocean & Fisheries Bureau.

### 3. Objectives of activities

This project is carried out according to the protection plans, to enhance the local government and inhabitants sense of ocean environment protection, to make the local social institutes concerned pay more attention to the tendency of the environment deterioration, then to make no effects to renew the Oyster Reef Ecosystem, in order to make the coastal fishermen nearby gain the substituting skills.

This project has cooperated with the plan of the construction of Oceanic Specially Protected Areas, and has taken remarkable effect through ameliorating oyster

environment and strictly forbidding overwhelming collection. In November, 2006, Liyashan Oyster Reef has been permitted as Special National Marine Protected Areas by People's Republic of China SOA. With the growth of oyster resources and the growth of unit body, the recession of Liyashan Oyster Ecosystem has been ceased effectively, and the Oyster Reef Ecosystem is recovering.

#### **4. Target audiences**

This project is carried out from July, 2006 to June, 2007. The support institutes include assisting the competent administrative departments Marine Management, environmental supervision and law enforcement personnel management, coastal primary and secondary school teachers and student representatives, grass-roots management cadres, township enterprises in the relevant staffs. All of them make up the marine and environmental activists.

#### **5. Activities implemented**

According to the plan of this project, during Sep, 2006 to Jun, 2007, there has been one summer school, five marine environmental protection and marine environmental protection volunteers training courses, five terms of oyster artificial breeding technology, Harmless Green Farming Technique, ecotourism service training and four seminars, with United Nations Development Programme (UNDP) and the higher-level departments in charge of support and guidance.

##### **5.1. Grouped summer camp in student summer vocation for once.**

(in class training and scene inspection included)

In Aug, 2006, during 3rd to 7th, a five-day summer camp was held, in class training and scene inspection included.

In Aug, 2006, during 3rd to 7th, at Haimen Dongzaoxiang primary school and Liyashan, a summer camp of 33 students and teachers from Dongzao Central Primary school was held, in which training teacher introduced information about oyster and the origin of oyster reef and promoted ocean knowledge to students and teachers of the camp. There was a outdoor inspection, a site tour to the oyster reef, which gave students the chance to experience the spectacular of the oyster reef. The students were lead to take a tour to the oyster museum where exhibited oyster samples from around the world, and students' perceptual understand and knowledge were greatly fulfilled. Through the introductions that explain the profound things in a simple way, the outdoor inspections, students knowledge was greatly fulfilled, their interests to sense and explore the nature and improved students' awareness of ocean protection.

##### **5.2. Five marine environmental protection and marine environmental protection volunteers training courses**

From Sep-Dec, 2006 to Jan, 2007, five terms of marine environmental protection and marine environmental protection volunteers training courses were to foster marine environmental protection laws and regulations, pollution monitoring and control methods, train volunteer duties, to investigate the township enterprises in marine pollution.

*1. From Sep 14th to 15th, 2006,*

The Agricultural Cadres Training School in Haimen gives marine laws, regulations, and environmental monitoring and pollution control knowledge training courses to 28 township ocean management cadres at present. The trainer Chen Liping gives the training courses.

*2. From Dec, 22th to 23th, 2006,*

The Agricultural Cadres Training School in Haimen gives a training to 58 people including teachers and students from the central primary school in Dongzao Harbor, ocean management cadres, interested in marine environmental protection volunteers.

The main contents of the training are environmental protection and marine ecosystems, as well as basic knowledge of the local marine resources and the environment Overview.

*3. From Jan, 26th to 27<sup>th</sup>, 2007,*

The Agricultural Cadres Training School in Haimen gives a training to 52 people including teachers and students from the central primary school in Dongshe Harbors and interested in marine environmental protection volunteers. The main contents of the training are environmental protection and marine ecosystems, which are to guide the volunteers to publicize marine environmental protection.

*4. From Mar, 16th to 17th, 2007,*

The Agriculture Cadres Training School in Haimen gives a training to association cadres engaging the work relative with ocean environment protection and the inhabitants cherishing with the sense of ocean environment protection. The main contents are on ocean laws, environment monitoring and pollution controlling.

*5. On Apr, 12th, 2007,*

The Agriculture Cadres Training School in Haimen give a training to 18 cadres of supervising the reserve areas. The main contents are on laws and rules of ocean environment protection and the provision of supervising the reserve.

Through the training, the trainees can realize the local ocean resources all-around characteristics, the main problems of the ocean environment and the relationship between ocean exploitation and protection. The trainers coach the volunteers in many forms to publicize the knowledge of ocean environment protection to the local people and help them set the sense of ocean environment protection, enhance their senses of laws and rules, in order to improve their skills on environment monitoring and pollution controlling.

### **5.3. Five terms of oyster artificial breeding technology**

Between October-December in 2006 to March-April in 2007, the training school organize the substituting skills trainees to investigate practically, and is in the form of protection to foster the skills on oyster manual and green un polluted breeding aquatics, and services on ecotourism, etc.

*5.3.1 From Oct,19th to 20th ,2006,*

The school give a training on Harmless Green Farming Techniques (The training materials are in the in closure 5—1、 5—2).

*From Oct, 19th to 20th , 2006,*

The Agricultural Cadres Training School in Haimen gives a training course to 65 fishermen on Harmless Green Farming Technique.

*5.3.2. On Apr,18th, 2007,*

The class of Harmless Green Farming Techniques.

*On Apr,18th,2007,*

The Agricultural Cadres Training School in Haimen gives a training course to 55 fishermen on Harmless Green Farming Techniques.

Through the training, it improves the fishermen's breeding techniques, makes them make a living by alternative skills. And it can make the fishermen rely less on the wild oyster's resources, reduce the fertilizers and chemicals to pollute the ocean environment, then to protect the ocean environment efficiently.

*5.3.3. From Nov,17th to 18th ,2006, A training on ecotourism service training.*

From Nov,17th to 18th ,2006, the Agricultural Cadres Training School in Haimen gives a training course to 55 fishermen on ecotourism service training , including Hotel services and cicerone services.

*5.3.4. From Mar,8th to 9th,2007, the class of ecotourism service training.*

From Mar,8th to 9th,2007, the Agricultural Cadres Training School in Haimen gives a training course to 48 fishermen on ecotourism service training . And the main content is on tourism skills development.

Through the training, it improves the fishermen's tourism skills, increases their opportunities of employment and promotes the development of the local tourism. It props up the local fishermen to utilize the unique scene of oyster reef, to explore the ecotourism products, then to achieve the two-win of ocean ecosystem protection and resources exploitation.

*5.3.5. From Dec,14th to 15th, 2006, a training on oyster manual breeding.*

From Dec,14th to 15th, 2006, the Agricultural cadres training schools in Haimen gives a training course to 52fishermen on skills of oyster manual breeding.

Through the training, it improves the fishermen's oyster artificial breeding technology, enhance their skills of protecting the environment. It fosters the local inhabitants to breed the oyster and extends oyster artificial breeding technology as an alternative way of making a living. And it can make the fishermen rely less on the wild oyster resources, then to protect the oyster reef ecosystem efficiently.

#### *5.3.4. Ecotourism service training and four seminars*

On Oct, 2006 and Apr, 2007, it has held 3 seminars on forming reasons of Liyashan oyster reef, special topic on ecosystem protection and management of marine protected areas .

5.3.4.1. On Oct, 15th, 2006, it was held a seminar on forming reasons of Liyashan oyster reef and special topic on ecosystem protection in the meeting room of Haimen Ocean & Fisheries Bureau. The 15 participants include EP from Nanjing Normal University, leaders from ocean administrative department and EP from Ocean Aquaculture Institute. The EPs discuss the forming mechanism, characteristics and the value of the local oyster reef and propose the thought and measures on environment protection and continuant utilization, aiming at the present ecosystem crisis.

5.3.4.2. On Oct, 27th, it invited EPs, scholars and leaders from Nanjing Normal University, provincial Ocean & Fisheries Bureau, provincial Halobios Institute and Nantong Ocean & Fisheries Bureau to attend the seminar on forming reasons of Liyashan oyster reef and special topic on ecosystem protection in Haimen. The participants discuss the forming reason of the Liyashan and propose many valuable advices on protecting the Liyashan oyster reef.

5.3.4.3. On Apr, 27th, 2007, it organized EPs, scholars and leaders from Jiangsu Province Ocean & Fisheries Bureau, Geography Science College of Nanjing Normal University, Nantong Ocean & Fisheries Bureau, Haimen Ocean & Fisheries Bureau, Halobios Institute, Haimen Halobios Instructing Institute and Dongzao Harbor Town government in Haimen to attend the seminar on Ocean Special Reserve around Liyashan oyster reef. Through the discussion, it was explored some effective supervising measures on reserve area.

## **6. Produced outputs and outcomes**

6.1. Through the training and educating, coastal people in all walks of life, students and the administrators all improve to realize the significance of its protection, master the basic skills of environment monitoring and pollution controlling, publicize the knowledge of environment protection. And it formed a good tendency of public environment protection.

6.2. Through a series of training such as teaching the Environmental knowledge, environmental protection skills, Harmless aquaculture technology, oyster farming technology, tourism services, we have enhanced coastal fishermen's awareness of environmental protection, the skills of environmental resources protection, in the original collection oyster fishermen have switched engaged in aquaculture and pollution-free service. And 53 of them were breeding razor clam, 38 of who were breeding clam, 12 ones in Hotel services and 5 ones in tourism services. Original Oyster protect both the mountain oyster resources and the surrounding marine environment, and mitigation of the Original Oyster Mountain oyster reef capturing pressure, the Mountain Oyster Original Oyster individual increasing, the number has been increasing.

6.3. Through the whole year's publicizing, training, educating and managing, it stops the inhabitants to pick oysters from Liyashan, and regulate the industry pollution around, Quality status of the water have greatly improved, and Ecological Environment of Liyashan Oyster Reef is getting better and better gradually .

6.4. In Nov, Liyashan Oyster Reef is authorized as Special national marine protected areas by the People's Republic of China SOA .

6.5. General Science Book: Approaching Oyster Reef.

## **7. Evaluation of implemented activities**

Through the activities of students summer camp, ocean environment protection training and ocean environment protection volunteers training, substitution technique training and specific seminar, know ledges about ocean ecology, environment and related laws have been promoted, which served as good promotion and draw the attention of local government and the public to the ecology pressure encounters the oyster reef eco-system. Trained seashore communities and related workers, improved their sense of value resources and environment protection, and give them the knowledge and skills for ocean environment protection. Provided with substitutive industry and other incoming ways to shore fish men and improved the sense and ability of resources on going utility.

## **8. Conclusions and recommendations for future work**

Since one year ago when this project began, the society's sense of environment protection has been greatly enhanced, surrounding waste discharge has been dealt with, the Liyashan oyster reef eco-system has been handled and Liyashan oyster reef has been permitted as national ocean special reserve successfully, through efficient activities like training programs, seminars and summer camp. Ocean Department director general Sun Zhihui and vice nomarch Hang Lixin came Haimen for the open ceremony of "National Jiangsu Haimen Liyashan Oyster Reef Ocean special Reserve". Now, Haimen Ocean & Fisheries Bureau is applied to the local government for the specific management entity for the ocean special reserve, and this project has succeeded just as expected.

In following work, we shall take one further step to cooperate with technique institution and universities, keep in touch with other implementation unit of environment project, learn from their advanced experiences, do better to protect ocean resources and ocean ecology environment and facilitate the on-going development of ocean related economy.

## **Annex 1. Contact information**

Contact information of implementing institution(s): 海门市海洋与渔业局

## **Annex 2. List of references**

- 1、海门市蛎岬山牡蛎礁海洋特别保护区选划论证报告，南京师范大学、海门市海洋与渔业局,2006
- 2、江苏小庙洪牡蛎礁的抢救性保护对策，张磊、包健，污染防治技术，vol.18.No.5.2005.10.
- 3、江苏小庙洪牡蛎礁生态评价与保护区建设，顾勇等，海洋科学，vol.29.No.3.2005

### **Annex 3. Materials produced**

走进牡蛎礁（Approaching Oyster Reef）



## Education programs for strengthening the local capability of Lake Sihwa watershed

**Sihwalakesaver, Korea**

## **1. Summary**

The purpose of this project was to help the youth and general citizens have correct understanding of Lake Sihwa, to enable them to make right decisions and actions about Lake Sihwa problems, and further to strengthen the watershed management capability of the region by utilizing and reprocessing the database about Lake Sihwa that has been accumulated as a result of Lake Sihwa marine improvement projects

This project consisted largely of Marine Environmental Education for Teachers, Support for the Trained Teachers' Field Study on Lake Sihwa, Operation of Teachers' Study Group on Lake Sihwa, Teachers' Workshop for Evaluating the Environmental Education at Schools, and Production and Distribution of Teaching Materials, among which the Support for the Trained Teachers' Field Study on Lake Sihwa and the Operation of Teachers' Study Group on Lake Sihwa were financially supported by YSLME.

### **1.1. Operation of the Teachers' Study Group on Lake Sihwa**

Sihwalakesavers prepared "A Plan for Environmental Education on Lake Sihwa" in 2004 and then performed the teachers' training during the summer vacation in July 2006 using this plan.

The reason why we adopted the method of training the teachers, not the youth themselves, and then making the teachers train the youth was because we believed that it would make sustainable education possible for the youth to understand the historical background and the current situations and problems.

We organized a study group on Lake Sihwa with teachers from the Sihwa coastal area and educated them so that sustainable education can be provided at the place of education (10 teachers including Keumjae Park, a teacher from Sung-an High School and the lecturer on Lake Sihwa from Sihwalakesavers). The Teachers' Study Group on Lake Sihwa served as the opinion leader for Lake Sihwa, evaluated and corrected the previous education programs about the Lake Sihwa marine environment, and produced a new education plan and a tool (The Destiny of Lake Sihwa: Game Title).

### **1.2. Support for Education on Lake Sihwa for the Youth**

Sihwa Lake Lifekeepers intended to support the teachers, who completed the environmental education course on Lake Sihwa for teachers, to lead the environmental education course on Lake Sihwa for the youth at their schools. As it was almost impossible for them to educate all their students about Lake Sihwa through one-time course, we arranged the instructors from Sihwalakesavers to educate the youth.

We provided the in-class lectures and the tour to Lake Sihwa to the students from total 4 schools including Dongsan High School, and distributed "Workbook for the Youth: 7 Years of Mystery" to each of those schools.

We are planning to solidify the environmental education for the youth through the educational support for the teachers and the financial support, and to support the teachers to think of new subjects about Lake Sihwa together with the youth.

## **2. Background of Activities**

### *2.1. Lake Sihwa*

The Gyeonggi Bay, where Lake Sihwa was constructed by reclamation in the early 1990' s, was a lively and prosperous area full of sea-based activities and interaction with different cultures since the Neolithic Age. But as a dike was built to create a freshwater lake and blocked interchange of seawater, it caused serious water quality degradation and tidal flat destruction within only a few years. While these problems remain unresolved, there are even a number of additional development projects being planned around Lake Sihwa watershed and they are threatening marine environment of the region.

### *2.2. Who owns Lake Sihwa?*

Local residents have had more drastic changes in the course of Lake Sihwa construction than any others. It is obvious that they have the most stakes than any other stakeholders. Yet, even after 12 years of its construction, they are being excluded and alienated from decision-making processes that would transform the environment of the Lake Sihwa Watershed and could make an impact on their own lives. We believe that this is mainly because the information we get is so overflowing, complicated and technical that instead of being helpful, it is rather hampering sensible decision-making by ordinary people. The status of local residents is still guest not host.

### *2.3. Marine environmental education for bringing up the future host*

Education is the key to bring up the local youths who will take care of Lake Sihwa and its watershed in the near future. The local youth should have rights and opportunities to have accurate understanding and make rational decisions, and ultimately should be the host who decide the sustainable future of their living environment on their own.

### *2.4. How do we educate them?*

The environmental education programs targeting youth groups have been generally made as extracurricular activities outside the school and inevitably there were difficulties to perform them in continuous and systematic ways. Instead, we designed an education program to be implemented as an official school curriculum, to inform about it and persuade its necessity to teachers, and to train the teachers who want to join the program.

For the past few years, we have collaborated with several researchers in the Korea Ocean Research and Development Institute (KORDI) as a partner of the Lake Sihwa Marine Environmental Project. Now we have our own know-how and experience and also a wide network of experts to transform the scientific, technical data and information into understandable, adequate ones for the youth.

We also have accumulated knowledge and experience from previous extracurricular education activities. Designing the "Proposal for Lake Sihwa Environmental Education," we developed teaching plans for trainee teachers and education materials for students. With the developments we have made so far, we now want to initiate this project and contribute to promote the environmental capability of the region.

### 3. Objectives of Activities

The objectives of environmental activities concerning Lake Sihwa are to help the youth and general citizens have correct understanding of Lake Sihwa, to enable them to make right decisions and actions about Lake Sihwa problems, and further to strengthen the marine environmental capability of the region by utilizing and reprocessing the database about Lake Sihwa that has been accumulated as a result of Lake Sihwa marine improvement projects

To make the marine environmental education to be continued systematically within the public education system and thus educate the youth to take the initiative for sustainable development of Lake Sihwa, by providing the teachers in charge of educating the youth with the marine environmental education about Lake Sihwa.

### 4. Target Audiences

Teachers and the Youth in the Lake Sihwa Watershed

### 5. Activities Implemented

#### 5.1. Teachers' Training for Marine Environmental Education for the Youth

##### 5.1.1. Contents of Teachers' Training Workshop

Environmental education about Lake Sihwa for the middle- and high-school teachers in the Sihwa Watershed (Shiheung, Ansan and Hwaseong).

As intended for trainees to apply what they learn directly to the field of environmental protection activities after training, this program shall be provided for teachers who are already working in the field of education, and the staff in charge of ecology, culture, and environmental projection in the cities of Shiheung, Ansan and Hwaseong.

The environmental education workshop for Lake Sihwa consists of 7 lectures and 1 day field trip over 4 days.

Teaching materials and curriculum for the Teachers' Workshop were those developed with the support of the Ministry of and Maritime Affairs and Fisheries in 2004 and 2005.

##### 5.1.2. Timetable of the Teachers' Training Workshop

Date and Time	Lecturer	Subject	Content
July 24 (Mon) 10:00 - 12:00	Bonjoo Koo (Korea Ocean Research & Development Institute)	Benthos in Lake Sihwa	Types of Benthos Changes in the Tidal Flat after the Construction of Lake Sihwa Life on Tidal Flat of the Sihwa Watershed
July 24 (Mon) 12:00 - 1:00	Lunch		

July 24 (Mon)	1:00 - 3:00	Joon Kim (Institute of Island Culture, Mokpo Univ.)	Oceanic Culture and Fishery	<ul style="list-style-type: none"> <li>● Oceanic Culture</li> <li>● Types of Fisheries in Sihwa Watershed</li> <li>● Historical Significance of Gyeonggi Coast</li> <li>● Traditional Fishing Culture in Gyeonggi Coast</li> <li>● Traditional Life Economy in Gyeonggi Coast</li> </ul>
July 24 (Mon)	3:00 - 5:00	Gapgon, Kim (Korean Network for Coastal Preservation)	Reclamation and History of Lake Sihwa	<ul style="list-style-type: none"> <li>● History of Reclamation</li> <li>● History of Lake Sihwa</li> </ul>
July 25 (Tue)	10:00 - 12:00	Byeongkwon Park (Kyunghee Univ.)	Halophytes in Lake Sihwa	<ul style="list-style-type: none"> <li>● Halophytes in the Sihwa Watershed</li> <li>● Halophytes in Dinosaur Egg Fossil Site</li> </ul>
July 25 (Tue)	12:00 - 1:00	unch		
July 25 (Tue)	1:00 - 3:00	Euichan Jeon (Sejong Univ.)	Atmosphere of Lake Sihwa	<ul style="list-style-type: none"> <li>● Atmospheric Standard</li> <li>● Current Conditions of the Atmosphere of Sihwa-Banwol Industrial Complex</li> </ul>
July 25 (Tue)	5:00 - 6:00	Sihwalakesaver	Presentation of Related Activities	<ul style="list-style-type: none"> <li>● Creating a Pollution Map for in Each Area</li> </ul>
July 26 (Wed)	10:00 - 12:00	Shiwan Lee (Korean Institute of Environmental Ecology)	Water Birds at Lake Sihwa	<ul style="list-style-type: none"> <li>● Plans to Preserve Water Birds in Lake Sihwa</li> </ul>
July 26 (Wed)	12:00 - 1:00		Lunch	
July 26 (Wed)	1:00 - 3:00	Eunsoo Kim (Korea Ocean Research and Development Institute)	Water Quality of Lake Sihwa	<ul style="list-style-type: none"> <li>● Current Condition of Water Quality of Lake Sihwa</li> <li>● Change in Water Quality after the Construction of Lake Sihwa</li> <li>● Change in Water Quality after the Construction of Tidal Power Plant</li> </ul>
July 26 (Wed)	3:00 - 4:00	Sihwalakesavers	Presentation of Related Activities	<ul style="list-style-type: none"> <li>● Quiz on Lake Sihwa</li> </ul>

July 27 (Thur)	10:00	Sihwalakesaver	Departure from City Hall	● Field Trip to the Sihwa Watershed
July 27 (Thur)	10:30	Sihwalakesaver	Observatory in the North Side of Reclaimed Land in Lake Sihwa	View of the Sihwa Watershed
July 27 (Thur)	11:30	Sihwalakesaver	Lake Sihwa Ecology and Culture Center	History of Lake Sihwa Reclamation Culture of the Sihwa Watershed
July 27 (Thur)	12:00 - 1:00	Lunch		
July 27 (Thur)	2:00	Sihwalakesaver	Tando Island	Natural Coast Line and Stratum
July 27 (Thur)	4:00	Keejin Cho (Head of Uhdo Fishers' Union)	Wooeumdo Island	People of Lake Sihwa
July 27 (Thur)	5:00		Return to City Hall	

### 5.1.3. Participants in the Teachers' Training Workshop

No.	Name	School	TEL No.	E-Mail
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3	D. E. Hong	Bono Middle School	011-9703-1690	hde21@hanmail.net
4	G. J. Park	Chogi High School	019-9027-5393	pansori4u@paran.com
5	J. I. Kwon	Bugog Middle School	011-9141-5248	kji1965@hanmail.net
6	I. S. Kim	Howon Primary School	016-210-7072	in8379@hanmail.net

7	J. O. Kim	Wongog High Schoo	011-723-5600	thwjtdn@hanmail.net
8	S. J. Chung	Bonwon Primary School	017-351-6164	jinsil6164@hanmail.net
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19	S. K. Lee	Sihwalakesaver	016-9355-8268	codemjkl@hanmail.net
20	K. H. Hwang	Sihwalakesaver	011-9684-4747	
21	K. S. Lee	Sihwalakesaver	017-347-4958	

## 5.2. Supports for Field Trips to Lake Sihwa led by Trained Teachers

### 5.2.1. Support for Field Trips to Lake Sihwa

When the teachers who have completed the Teachers' Workshop for the Environmental Education on Lake Sihwa give lessons to students, we provide them with education program on Lake Sihwa, and necessary teaching materials and aids.

As a means of supporting the education program on Lake Sihwa for the Youth designed for the size of one class (consisting of 45 students/teacher), we produce and

lend teaching materials and aids necessary for the field trip and provide information about Lake Sihwa.

5.2.2. In order to facilitate the environmental education at the field, we produce audiovisual aids (CD ROM in PPT format, for teachers) available at the field, teaching materials (materials made for teachers with the support of the Ministry of Maritime Affairs and Fisheries in 2004 and 2005, consisting of narrations, commentary on student's workbook, basic information on Lake Sihwa, and contributions from local residents) and game boards (games created with the support of YSLME in 2007), and lend them free of charge to the teachers for the environmental education on Lake Sihwa.

### **5.3. Teachers' Study Group on Lake Sihwa**

#### *5.3.1. Objectives and Results of Teachers' Study Group on Lake Sihwa*

The Teachers' Study Group, organized mainly with the teachers who completed the maritime environmental education on Lake Sihwa, aims at supporting the environmental education on Lake Sihwa in the regional schools, forming a foundation for sustained education at school, and collecting and providing data about Lake Sihwa or maritime environmental education for efficient operation of the study group.

The teachers who completed the maritime environmental education on Lake Sihwa (10 teachers including Mr. K. J. Park from Sungan High School) and Sihwalake instructors from Shiwhalakesavers organized the Teachers' Study Group, who ensured sustainable environmental education at school, revised and supplemented 'Workbook for the Youth' developed in 2005, and developed a Lake Sihwa related game.

### 5.3.2. Activity Plan for the Teachers' Study Group on Lake Sihwa

Schedule	Content	Remarks
June 8 (Thur), 2006	Discuss about the Workbook on Lake Sihwa Program for the Youth.	7 years of mystery
June 20 (Tue), 2006	Discuss about the Workbook on Lake Sihwa Program for the Youth.	7 mysterious things that save water quality
Sept. 19 (Tue), 2006	Evaluate Teachers' Workshop for Lake Sihwa, Workbook on Lake Sihwa for the Youth, and Hands-on Experience at Lake Sihwa.	Drawing the pollution map for each area
Nov. 10 (Wed), 2006	Execute the Workbook on Lake Sihwa Program for the Youth by example, and evaluate the result.	Drawing the food chain at the Lake Sihwa Watershed
Nov. 22 (Wed), 2006	Workshop to evaluate the youth education at Lake Sihwa, identify the problems, and suggest alternatives.	
Mar. 19 (Mon), 2007	Discuss about the Workbook on Lake Sihwa Program for the Youth. Project meeting for the development of instruction materials	Quiz on Lake Sihwa

### 5.4. Teachers' Workshop

*For Promoting the Environmental Education on Lake Sihwa: Debate for Evaluating the Courses for Environmental Education on Lake Sihwa*

Teachers who participated in the environmental education on Lake Sihwa, environmental advocacy experts, and environmental organization staffs in charge have a debate to share and evaluate the results of the environmental education on Lake Sihwa, and to propose more positive alternatives for future development.

The following is the summary of what was discussed at the debate:

#### *5.4.1. Results of the Debate*

Establish sustainable and systematic education programs about Lake Sihwa.

One- or two-day education programs are not enough to make people recognize all the problems concerning Lake Sihwa. Thus, it is necessary to educate the youth who have engaged in environmental advocacy clubs like Green Scouts through a year-long programs, in cooperation with the experts.

The programs should include both theoretical education about political, economical, social and historical significances of Lake Sihwa and hands-on education such as environmental experiments, field trips and debates.

#### *5.4.2. Arrange the field trip to be done in various forms without hurry.*

Field trips to Lake Sihwa had been arranged to look around the entire Sihwa Watershed in a day, so that students could not have enough time to think. As even the places to visit were selected without consideration to the students, their participation was mostly passive.

It was the limit of short-term program. So, if we could design a long-term program that can reflect students' voluntary decisions made through preliminary theoretical education and discussions, it would be possible to arouse more interests and have more educational effects.

Even if they were to visit only one place, it would be better for them to have more time to observe, investigate, and experiment on their own about a certain mission or task. A method of instruction, which encourages students to discuss about their observations or experiments and requires them to submit reports about the results, would make voluntary and active learning possible. In addition, the field trip should be arranged to be preceded by voluntary homework by the students.

#### *5.4.3. Require outcome that anybody can understand.*

A year-long education program should require a formal journal, observations and debate minutes to be recorded by the educatees, that is, by the youth. The youth would be political decision-makers in the future, so that the environmental education program about Lake Sihwa should also contribute to helping them to have a sound value on ecology.

The problems of Lake Sihwa are present problems but also an environmental issue that will affect our future. Therefore, the environmental education on Lake Sihwa should be designed to equip the youth with the ability to deal all environmental problems from the ecological point of view in relation to the impact on our future.

While past participants prepared their reports based on given materials and a few photos, future participants would be able to form their own opinions about Lake Sihwa or environmental problems through in-depth theoretical education and discussions. If they could become voluntary opinion leaders in the environmental advocacy movements, the environmental education on Lake Sihwa could be said true education for the future of Lake Sihwa and the future environment.

#### *5.4.4. Need sustainable follow-up programs after the education.*

All education programs are planned and made progress with good intentions while they are in progress. When they are over, however, they become forgotten. In order to prevent this from happening in the environmental education program for Lake Sihwa, sustainable follow-up meetings or activities concerning Lake Sihwa should be provided. Ongoing study group, monitoring newspaper articles on Lake Sihwa and other similar environmental issues, and online debate on green activities movements are some examples.

It is also necessary to link field education and classroom education so that the youth can grow being aware of environmental issues.

#### *5.4.5. Design the education program to be completed by participants' efforts, rather than to be crammed up to them.*

The past teaching method, which gives various benefits to participants simply because they participate, might give the youth a wrong sense of value. Though participation in the environmental education program for Lake Sihwa is meaningful in itself, participants' voluntary involvement and efforts are essential in the future environmental education program. The participants would be required to have minimum hours of volunteering for Lake Sihwa or its environment, or the equivalent efforts.

- i. Actions to Be Taken
- ii. Design the program to be preceded by preliminary investigation or discussion.
- iii. Organize a follow-up study group.
- iv. Include various hands-on experiments in the environmental education program such as water quality measurement or pollution level check.

#### Conditions

- v. The subject of environmental education program should be selected from those who have expressed their interest in it and those who have been members of environmental advocacy clubs.
- vi. Each education activity should be designed in a way that the program participant can produce his own outcome.
- vii. Homework activity should be arranged to be done autonomously and voluntarily.
- viii. Participants should be allowed during the education program to freely exchange their opinions through their own online community.

## **6. Produced Outputs and Outcomes**

### **6.1. Teacher's Training for Marine Environmental Education for the Youth**

Maritime environmental education was performed mainly by 10 teachers and other ecology instructors working in the region. These people organized the Teachers' Study

Group on Lake Sihwa, and they supported the environmental education on Lake Sihwa for the Youth.

Though limited within the area of Ansan, this Group established a 'network for the environmental education on Lake Sihwa in the region' through meeting of teachers and instructors in charge of first-hand environmental education on Lake Sihwa.

It focuses its energy on strengthening the personal and regional capabilities regarding the environment of Lake Sihwa through continuous meetings and data exchange, and support for environmental education programs.

## 6.2. Support for Field Trips to Lake Sihwa by the Trained Teachers

Originally it was planned to support the teachers who completed the teachers' training for environmental education on Lake Sihwa to give lessons on Lake Sihwa at school, However, the instructors specialized in the environmental education on Lake Sihwa took charge of the environmental education for the youth due to the lack of teachers' experience in that matter. Though the teachers were trained at the Teachers' Workshop for Promoting the Environmental Education on Lake Sihwa, it was beyond their ability to learn how to educate students about Lake Sihwa through one-time workshop even though they are teachers.

The following section describes the contents of each school's trip to Lake Sihwa.

The field trip will provide thematic descriptions during one day visit to the Lake.

The purpose is to just take a glance at the site, to enable visitors to guess what a background the Lake would have, to inform them of the past and the present of the Lake, and further to think of its future and some alternatives.

The details are summarized as follows and the sites to visit may vary depending on the nature or the site of field trip.

Location	Description
Reed marsh park at Lake Sihwa	<p>The location is at the junction of the streams of Banwol, Donghwa and Samhwa, where water flows from river and is purified and then flow into Lake Sihwa.</p> <p>The location is sometimes used for education for elementary school pupils that focuses on the development history of the Lake, water pollution and revival of the eco system, although it is presently not much frequented for the field trip to the Lake.</p> <p>The place is mainly available for observation of migratory birds, which would take about one and half to two hours, and yet it takes about 30 to 40 minutes only for the field trip to Lake Sihwa.</p>

<p>Industrial Complex observatory</p>	<p>The observatory overlooks Sihwa &amp; Banwol Industrial Complex, Ansan-Si and Hwaseong-Si. Here, the history of development and the past at and around Lake Sihwa is provided together with description of workers at the industrial complex. The roles as a military strategic point and the center of fishery in the western coast is discussed. It takes about 40 minutes to give a presentation.</p>
<p>Oedo Observatory</p>	<p>The location overlooks seas around Island Oedo, sandbanks and Lake Sihwa, surrounded by sea dikes. Here, descriptions are provided on past and present residents who engaged in fishery at the Lake. It takes about 15 to 20 minutes.</p>
<p>Sea dikes at Lake Sihwa</p>	<p>The sea dikes connect Oedo at Siheung with Daebudo at Ansan. The location overlooks seas around Oedo and sandbanks and Lake Sihwa. While in a vehicle, brief descriptions are provided, such as the length of sea dikes, comparisons to Saemangeum (the largest banking site in the western coast) and how to overlook the lake.</p>
<p>Tidal power generating plant</p>	<p>While in a vehicle, description is provided. It is difficult to make an on-site trip as construction is underway. Description is given on how the power plant, intended to improve water quality of the lake, is run and how huge it is.</p>
<p>Environment &amp; Culture Hall at Lake Sihwa</p>	<p>The location is used for promotional activities since Water Resources Corporation has constructed sea dikes at Lake Sihwa. The place overlooks transmission tower which passes over inland sea around Lake Sihwa. Visitors can get a glance of the history of development and the present and the past at Lake Sihwa.</p>
<p>Tando</p>	<p>The location, previously called Masan Waterway, is neighbored by both quarry at which footsteps were discovered, and some part of which are designated as cultural asset of Gyeonggido, and a fishers' village exhibition made by Ansan-Si. Located there is Port Jeongok at the entrance of travel to the western coast and Nuaeseom (Lighthouse museum). Descriptions are given on historical events of Masan Waterway while in a vehicle or waking on Tando dikes.</p>

Dinosaur's fossil  
egg site

The location overlooks Ansan-Si and its industrial complexes, and is designated as natural monument over large areas as the dinosaur's fossil egg site was discovered from the past sea.

Description is provided on its geology, fossils, dinosaurs and phenomena of natural shift. Visitors can have such feel as if they were on grassland.

The school which made field trips to Lake Sihwa in the way that was discussed above were as follows:

1) Bugok Middle School

The school made a field trip on 22 July, 2006 which teachers and students, totaling 35, participated in.

2) Wongok Middle School

The school made a field trip on 28 October, 2006 which teachers and students, totaling 33, participated in.

3) Bonwon Elementary School

The school made a field trip on 15 November, 2006 which teachers and pupils, totaling 45, participated in, focusing on the history and the ecological advantages of Lake Sihwa and observations of migratory birds, rather than its problematic issues.

4) Dongsan High School: Class Lecture

Description on development and future of Lake Sihwa was presented through PPT, which was developed by the Ministry of Maritime Affairs & Fisheries in 2004 and 2005) before making a field trip on 7 April, 2007 which teachers and students, totaling 30, led by a hobby club.

5) Dongsan High School: Field Trip to Lake Shihwa

The school makes a field trip on 2 May, 2007 which teachers and students, totaling 27, participated in.

### 6.3. Teachers' Study Group on Lake Sihwa

#### 6.3.1. "Destiny of Lake Shihwa"

The "Destiny of Lake Shihwa" : Who will be responsible for the destiny of Lake Shihwa? was developed by Teachers' Study Group on Lake Sihwa.

The purpose of the game is to give an opportunity for us to think of its future focusing on the coexistence and balance of development and preservation of the lake while playing the game.

The front side of the game board describes how to play the game and the complete view of the lake's basin area, while the back cover the photographic views of preserving (a draft of sustainable development by citizen) and developing (a plan by the Ministry of Construction) the lake.

There are also respective cards representing its development and preservation, which are available for expanding the land area while playing the game.

6.3.2. *Workbook for the Youth, '7 Year-long Mystery'* : What happened at Lake Sihwa?

The study group examined whether the workbook which was developed in 2005 is appropriate or not, targets to be reviewed, materials or resources fit for implementation of the program, and other better alternatives and proposed improvements. Some issues and measures to be taken are as follows:

Lesson	Correction and Evaluation
7 years of mystery	It was about paraphrasing difficult words in the section about the history of Lake Sihwa into those people can understand easily, rather than about evaluating the program. (The workbook should be written for the people, not for representing the view of the government)
Drawing the pollution map for each area	Difficult to identify correct spatial boundaries (ex. farms and orchards) Hard to identify pollutants from factories (because there are too many)
Water that mixes on its own	Can attract the youth's interest easily as it is related to the science curriculum. Can utilize various experiment tools.
7 mysterious things that save water quality	Can also be applicable to junior students.
Drawing the course of cargo boats	Can be linked to the history curriculum, though a bit difficult for middle school students.

Locating a port with its place name	Difficult to finish at one time. Interviews with local residents and researches on pictures and literature should be done attentively over several times. It would be better to make this course as one-year intensive course. Difficult to get old maps.
Food chain at Lake Sihwa	As data about marine life and ecology is insufficient, it is hard to draw an accurate food chain. Referred to "The World of Sea - where you can learn while playing" (2002) by the Ministry of Maritime Affairs and Fisheries."
Making newspaper	a It would be better if the students were instructed to make the newspaper through several planning and production meetings. Applicable to junior students too.
Quiz on Lake Sihwa	Let the youth make quiz questions on their own.
What can we do for Lake Sihwa?	It would be interesting if the students could talk about the future of Lake Sihwa through questionnaire or through pictures or stories for junior students.

#### 6.4. Teachers' Workshop

##### *For Promoting the Environmental Education on Lake Sihwa: Debate for Evaluating the Courses for Environmental Education on Lake Sihwa*

Teachers, professionals and staff working for environmental groups were convened to examine how environmental education should make progress and what programs will be prepared in relation to the lake.

In conclusion, the followings are presented as a result of the discussion.

First, long term and systematic education should be provided: For this, the prospective trainees should take interest in the lake or participate in environment clubs, mainly led by their teachers in charge.

Second, various field trip courses should be developed: the blueprints were proposed at onset of the development of the program;

- i. Historical and cultural course that includes Byeomang-seongji, shell mounds, General Nami's Tomb, Hyeongdo Bongsudai, Dangseong, and Jaenmeori Seonghwangdang
- ii. Course connecting Tando with dinosaurs' fossil egg site
- iii. Course that covers Masanpo, Doksal, salt fields, port joining natural coastline and fishing techniques
- iv. Course for inland sea of Lake Sihwa
- v. Course for open sea of Lake Sihwa

Third, prior study activities should be conducted voluntarily and considered in relation to later programs, resulting in outcomes that anybody can understand. It is possible when continued and systematic training is provided for the prospective trainee. Respective comments or opinions from one time field trip visitors are not of greater use in that they feature a little bit accounts of travel or essays. This workbook should be completed by using 'the Lake Sihwa Workbook for the youth.'

Fourth, the program should not be unilaterally beneficial one but combined with the service mind-set and efforts of the participants. Lake Sihwa could not be described without addressing maritime environment. It is therefore, advisable to motivate them to take interests in such issues as maritime wastes and pollution as well as to participate in maritime waste disposal campaigns.

## **7. Evaluation: Effectiveness of the Implemented Activities**

### **7.1. Teachers' Training for Marine Environmental Education for the Youth**

This training course was provided mainly for the teachers and the environmental advocacy leaders in the area, and serves as a foundation for education and public relations on Lake Sihwa.

In reality, most teachers recognized the area as a place of their work, not as a place of their living. Also, they had recognized Lake Sihwa only through mass media and vaguely as a polluted lake. This training provided an opportunity for the participating teachers to recognize the possibility to preserve Lake Sihwa in its natural condition and its importance.

An opportunity should be provided after training teachers in charge of Lake Sihwa related training so that they can become leaders who can properly educate the youth. If the training is provided as an one-time event like now, however, it would be difficult to expect them to act as leaders though it may have publicity effect. In one session, it was even difficult to identify the location and present conditions of Lake Sihwa. Therefore, the follow-up study should be provided to ensure continuous education and study.

### **7.2. Establishment of Sustainable Marine Environmental Education Program**

*For the Youth through Teachers' Training*

This training course paved the way for a condition to improve the quality that the youth leaders would have. Also, discussions were made with teachers in charge of training the youth, resulting in preparing a foundation on how the lake related training would have to go forward. As a result, it could be said that the environmental education program has helped the participants for the training have interest in what is going on in their area and take initiative for pending problems.

We tried to provide an opportunity so that young participants in the training course may understand and think about the problems concerning Lake Sihwa. Generally, until now, the environmental education on Lake Sihwa for the youth was focused on the trip to Lake Sihwa which was passive in its nature as it did not give them time to think on their own.

The main reason to organize the teachers' workshop on Lake Sihwa and the teachers' study group on Lake Sihwa was to make the education on Lake Sihwa done not only in the field but also in the classroom through discussion and thinking. It was limited for teachers to make their own teaching plans through one session of the teachers' workshop on Lake Sihwa, so that it was regrettably difficult for them to educate the youth to discuss and think about Lake Sihwa. Therefore, more specific pre- and post-sessions are needed for the workshop so that the training course may be well established.

### **7.3. Teachers' Study Group on Lake Sihwa**

The study group put more emphasis on teacher oriented education in order to strengthen the regional capability. It is important because they could provide the youth with better education in quality and quantity than that to be possibly provided by civil organizations when the same training was given for the same teachers in the region. The fact that the teachers organized a workshop on Lake Sihwa is expected to serve as a cornerstone for training the youth leaders.

The workbook on Lake Sihwa for the youth, written by teacher's study group in 2004, was made for the environmental advocacy leaders of Lake Sihwa through the program planning meeting without actually implementation. In this sense, the teachers' workshop provided an opportunity to evaluate and correct the program before the workbook is actually used for the youth, and to suggest alternatives.

Another product of this study group is the game that would help people understand Lake Sihwa more easily. Participants in the game, "Destiny of Lake Sihwa" get a chance to perceive the opposite concepts of development and preservation. It means to give an opportunity for the residents around the Lake Sihwa, including the youth, to think of the future of the Lake Sihwa watershed.

Though it is very meaningful that the study group organized the workshop at and around Lake Sihwa, it is a pity that the workshop was limited only to the schools in Ansan-shi, part of the lake area without covering the entire area of the lake. It was also regrettable that the teachers did not have a chance to actually teach the students. It will be our impending work to help the teachers who joined the teachers' workshop educate the future youth leaders. The workshop can also serve as an opportunity for the teachers to think of new subjects on Lake Sihwa and create a better future of Lake Sihwa and extend the scope of knowledge thereof, together with the youth

## **7.4. Teachers' Workshop**

*For Promoting the Environmental Education on Lake Sihwa: Debate for Evaluating the Courses for Environmental Education on Lake Sihwa*

This workshop presented a new direction of the education on Lake Sihwa and showed a possibility to develop new education program on Lake Sihwa. By letting the teachers think about the given conflicts concerning Lake Sihwa and giving them choices, they could make reasonable decisions rather than having vague expectation or necessity.

## **8. Conclusions and Recommendations for Future Work**

### **8.1. Education for the Youth on Lake Shihwa**

A prior in-class education is basically needed for an on-site trip to the lake; the participants should be given lectures on knowledge and backgrounds of the lake in terms of history, economy, culture and environment, by utilizing materials of ppt. It is also necessary to share comments or opinions with the participants or their teachers after the trip. Lake Sihwa related training covers in-class lectures, field trips and follow-ups, including preparing 'Workbook for the youth' and studying the results of the training. It was verified by teachers' study group that the teachers in charge rather than outsourcing lecturers are more qualified for better training for students or participants. Its success or failure depends on whether the teachers will choose to do so. It is mandatory that continued education be provided for the teachers, interests in the lake be shared, and supports be provided for their students.

### **8.2. Teachers' Study Group on Lake Shihwa**

It is difficult to educate the environmental advocacy leaders on Lake Shihwa through one-time teachers' workshop (12 class lectures and one trip to Lake Shihwa). Continuous education should be provided. For this, financial resources should be provided for the teachers to educate the youth.

There are difficulties in convening teachers for the study. Teachers are primarily responsible for teaching their students. They should have spare time to give them training on the lake and conduct it passionately.

And institutional supports are necessary, such as granting them merits when they take training courses on Lake Sihwa; for instance, good merit rating for the teachers would be adopted so that teachers are motivated to take interest in the lake and study it with their students.

### **8.3. Conclusions**

Programs that can encourage people's participation should be developed. : The environmental education programs have been limited to the teachers, excluding the participation of general citizens. Therefore, programs that include general citizens' participation should also be developed.

Theme tour to Lake Sihwa should be developed. : Environmental education programs should be developed for various target groups and with various themes.

For example, they can be a course on the natural coast line and the fishing industry in the west coast, a course for watching the migratory birds in the Lake Sihwa watershed, a course on the exploration of life in the Lake Sihwa watershed, a course centering on the northern reclaimed land, a course on the southern reclaimed land and the dinosaur egg fossil site, course for making known the past history of the lake area, and etc.

Leaflets for general citizen : Leaflets that brief the history, current conditions, and the future of Lake Sihwa should be made and used for education. The leaflet for each theme course is also needed.

The concept of the environmental education center for Lake Sihwa should be introduced. : A system to ensure the education on Lake Sihwa for each subject and theme should be provided. The content of education, qualified instructors, and necessary data should be accumulated. A web site that can be a foundation for the accumulating these data should be built first.

A system for the youth education should be provided. : As pointed out in the evaluation of the teachers' workshop, the education for the youth is focused on the short-term field trips. If possible, it would be better for the teachers, who participated in the teachers' workshop on Lake Sihwa, to educate the youth on Lake Sihwa once every year. If the trip to Lake Sihwa is accompanied with sufficient discussion and theoretical education before and after the trip, it would serve as a proper education program on Lake Sihwa for the youth.

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## **Annex 2. Comments or opinions by field participants**

### *1. Younghye Ryu (Grade 2, Dongsan High School)*

The fact that I am not a citizen of Ansan made the tour of Sihwa lake and the regions around it even more interesting. Thanks to the club activities that I signed up for, I was able to take part of a lecture concerning Sihwa Lake and the governmental policies

concerning it. I learned about the lake and the state at hand, the quality of the water, and the measures the government took to cleanse the water to how it was before. But because it was only a lecture, an indirect way of learning, I couldn't really understand how bad the current situation was.

But the day of the tour, I was able to not only learn many things that I didn't know of before but also understand deep inside what was really important. I have only heard about Sihwa Lake through my Social Studies textbook; that it was a failure of the government's policy, or so people say. The lake soon rotted because of the lack of circulation. I didn't actually have much interest in the lake, even though I got to go to a high school in the district. Eventually through this tour, I was able to get a new insight view on the environment, and get to know how crucial it is for us to be cautious when handling it.

Our tour group went to the top of an observatory. Before us outstretched the industrial complexes of Sihwa and Banwol. These two put together forms the greatest industrial complex in our country. The industrial sewage from all of these factories were sent to Sihwa Lake, but now is sent to the sea surrounding it. It's no wonder Sihwa Lake's waters turned almost black with unpleasing white foams. Though the government says they will work to enhance the environment by placing sanitizing facilities, I don't think that can actually put a stop to water pollution. Even though they can't solve the problem at hand, the government plans on setting up even more factories and golf courses on the land they will retain from drainage. In this situation, no matter what policies the government will set up, it's sure as fact that it will worsen the water pollution.

As I got to know the government's wish to develop even more, the more I felt that this type of development was none other than endless selfishness. Here we are, draining the shores to retain more land than that we are given, going against mother nature for the profits that come from the land. But if you take a careful look at what is going on, these measures are actually destroying what is valuable. The foreshore of our western sea has lots of marine products that are available as resources. But we are destroying the habitats of these resources for the profits that may seem great, but are actually temporary. We must consider the environment beforehand.

While riding the bus to transport to another point of the tour, we were lucky enough to see a small elk prancing away. We also saw some birds from far away. Not only that, we were able to see small saltworts close up. Looking at these creatures, beautiful creations, with my own eyes made me want to protect them even more. It also made me feel that us humans must be careful when we make decisions that will not only influence us, but also the small inhabitants around us.

The only positive effect that came from the tide embankment was probably the discovery of dinosaur fossil eggs. We were able to visit the site of the great discovery. The fact that I was looking at a fossilized egg that should of hatched hundreds of thousands of years ago was simply amazing. We had a great time roaming the salty grounds filled with halophytic plant communities. It was a great pity that not many people knew about this place. It would have been great if they got a chance to roam the grounds that dinosaurs once roamed before.

This tour of Sihwa Lake gave me many new experiences and new thoughts. It had a new impact on my life concerning my attitude towards the environment. I now have a new viewpoint of Sihwa Lake, and more knowledge about it than before. Thanks to the tour and

the teacher who provided our brains with very detailed explanations, I now sit in a new position facing the problems concerning our environment.

## *2. Jihye Park (Grade 2, Dongsan High School)*

A while back, we were able to take part in a lecture concerning the Sihwa Lake thanks to our club activities. Before listening to that lecture, I think I simply had positive thoughts about 'development'. I was also for land reclamation by drainage because I thought about the many ways that land could be used. But after I heard that lecture and actually went to Sihwa Lake, looking around and experiencing many things, I felt that a lot of data just got reorganized in my head.

Unfortunately, Sihwa lake, which was made by sudden decisions from above, isn't functioning correctly. As amendments to prevent further damage of the lake, the government planted a marsh of reeds, installed a tidal power plant and opened the floodgate, letting in seawater into the lake. But I really do wonder if these changes will be able to solve Sihwa Lake's water pollution. Even if we have sewage disposal facilities that sanitize the waste water coming from the endless industrial complexes, the chemical pollutants will remain in that water. That waste water will relentlessly defile not only Sihwa Lake, but also the ocean beyond. Expecting the waters of Sihwa Lake to purify without settling the matter at hand is probably just our selfishness.

Not only that, the land, estimating to about 9,256,198 meters squared (about 2287 acres), that will be retained by drainage will be used as the foundations of even more industrial complexes and golf courses which will worsen the current state. Ansan that we saw at the observatory was a place surrounded by smoking chimneys of factories. Even worse, a new city was built right next to factories. I can't believe that they set up even more factories here! Our teacher informed us that 10 years later, when we students become adults, the empty fields before us will change into another place. I can't imagine what he said. While we were riding on the tour bus, transporting to another site, we were lucky enough to see a small elk quickly hopping away in such a cute manner. Are we going to be able to see these cute elks, the blackfaced spoonbill, an international rare species, or the many other migratory birds after the new industrial complexes come in?

The way to the site where dinosaur egg fossils were discovered was so amazing, it made me exclaim, 'I can't believe there was a place like this in Ansan.' It has been a long time since I was able to feel free thanks to a spacious sight as this. Our teacher told us that the site containing dinosaur egg fossils was on a global scale, meaning that it is quite large. An object that was very familiar to that of a rock and looked worthless on the outside was actually a 130,000,000 year old fossil! It was so marvelous that we were able to actually see it.

I'm not implying that retaining land by draining our lakes has only bad sides. All I want to see is slow and steady development that cares and considers the environment, not relentless development with no carefully planned procedures. We should immediately stop polluting the environment that we must hand down to our descendants instead of being blinded by the instant profit we can gain.

My focused viewpoint was scattered into many various points through this experience. Through this tour, no matter what problems I face, I am now able to face it with a wider view. I also think that I now am able to think and care for the environment in a new way.

Though it was a short day, I was able to learn and feel many things through today. I am looking forward to keeping an eye on the future Sihwa Lake, dreaming about a clean future and the day we are able to get closer to nature.

### *3. Jooyoung Kang (Grade 1, Dongsan High School)*

Though I lived in Ansan for over 10 years, I never even visited the famous Sihwa Lake. I only knew for a fact that it was a dirty lake that the government policy failed to enhance. This tour was very interesting for me who didn't fully understand the exact existence and importance of Sihwa Lake. The 6 hour tour went over the observatory that looked over the industrial complex to the site where dinosaur egg fossils were discovered. The guide teacher's fully detailed explanations and the hands on experiences made the tour a lasting memory. Through the teacher's lecture a while ago, we were able to get to know a lot of information concerning the total expenditure concerning the developments of Sihwa Lake, the different opinions that came from each individual affiliated organizations of the government, the associations put up for the improvements of the quality of water forming Sihwa lake, the importance of the Oido region, and many other data regarding Ansan and the district neighboring it. Even though it is the place I had lived in since I was young, there were many new facts that I got to know for the first time. Especially the fact that the tide embankment of Sihwa was the longest in the world, before the Saemangum and also that the now building tidal power plant produces the largest scale of electricity in the world, but only satisfies about one third of Ansan's demand was very interesting. Not only that, I got to know for the first time that our country's foreshore is large enough to be ranked in the top five, and that the rare halophyte communities were widely distributed in this area's very foreshore.

Through this tour, I felt that though our effort to make Sihwa Lake clean again is necessary, but the most important thing is that we must take interest in where we live and understand it to make it an area we can all enjoy. It was a day that made me understand that the reclaimed land along the shore around Sihwa Lake isn't a total industrial complex built for development in a quantitative respect but a region we must protect and preserve.

### *4. Hyeyeon Yang (Grade 2, Dongsan High School)*

Even during the lecture about Sihwa lake, the fact that factories or industrial complexes were to be built on that land, or that parks or a golf course will be constructed, and all the other uses of the land that would be retained wasn't of interest to me. I just thought, 'I guess it's happening,' and shook my head in understanding. My heart wasn't moved. The reason of my lack of interest probably was because I didn't see it with my own eyes.

But through the Sihwa Lake tour, I was able to see the grounds filled with halophyte communities where the small elks inhabited and even visited the site where dinosaur eggs were discovered. I began to think that maybe if this place was used as an ecological park it would be educational and helpful to many people. I soon felt that Sihwa Lake was a place more useful and had many functions beyond my imagination.

The Sihwa Lake that I imagined in the past was a desolate place, filled with a foul smell, white foam floating around with no life able to be found. But, after I was able to actually see it, I came to think that I was not only disinterested about Sihwa Lake, but also

didn't know anything about it. If only I had a little bit of interest, then I could have known. On those terms, I think that this tour of Sihwa lake was a very valuable experience. A picture is worth a thousand words, they say.

People say that the major term for environmental pollution was Sihwa Lake, the place where turned into a dead lake within 3 years it was made because of the lake of water circulation and the inflow of industrial sewage and waste water from family homes. The lake got a lot better than before, but we still have a long way to go. Instead of raising more factories and golf courses that will add to the already overflowing pollution, I really want the government to consider using this place, this valuable land to create an ecological park that can be used as a tourist attraction.

### Annex 3. Content of Instruction Materials

(which was developed for teachers in 2004 and 2005)

Subject of Course	Target Group	Course Title	Content of Course
Current Condition of Lake Sihwa	Teachers	Past, present and future of Lake Sihwa	Current conditions of Lake Sihwa Development process of Lake Sihwa
Current Condition of Lake Sihwa	Students	7 years of mystery	Preparations for field trip Understanding the background of the construction of Lake Sihwa, and its development process
Water Quality of Lake Sihwa	Teachers	Is the water in Lake Sihwa clean?	Understanding of the water quality of Lake Sihwa and the basin
Water Quality of Lake Sihwa	Students	Water that mixes on its own	Preliminary activities Experiments to understand stratification
Water Quality of Lake Sihwa	Students	Drawing the pollution map for each area	Follow-up activities Understand the relationship between water quality and basin
Water Quality of Lake Sihwa	Students	7 mysterious things that save water quality	Identify things in daily use that are related to water quality
History of Lake Sihwa	Teachers	From Gunja Bay to Lake Sihwa	Historical background of Lake Sihwa area Historical relics of Lake Sihwa area

History of Lake Sihwa	Students	Drawing the course of cargo boats	Preliminary activities Find the course of cargo boats
History of Lake Sihwa	Students	Locating a port with its place name	Follow-up activities Locate ports with their place names on old maps
Life in Lake Sihwa	Teachers	Plants, insects and wild animals in Sihwa Watershed	Plants in Sihwa Watershed Insects in Sihwa Watershed Mammals in Sihwa Watershed
Tidal Flat of Lake Sihwa	Teachers	Is the tidal flat of Lake Sihwa safe?	Development of Lake Sihwa and the change in its tidal flat Current conditions of Benthos in Lake Sihwa
Tidal Flat of Lake Sihwa	Students	Food chain in Lake Sihwa	Understand the food chain in Lake Sihwa and its organization
Birds at Lake Sihwa	Teachers	Lake Sihwa and Water Birds	Current conditions of water birds in Sihwa Watershed Plan to preserve water birds in Sihwa Watershed
Birds at Lake Sihwa	Students	Making a newspaper	Inform the activities to protect birds at Lake Sihwa by making a newspaper
Field Trip to Lake Sihwa	Teachers	Guiding the course for hands-on experience at Lake Sihwa	Information about the course for hands-on experience at Lake Sihwa
Field Trip to Lake Sihwa	Students	Quiz on Lake Sihwa	Field application program Simple quiz available for the teachers during the field trip to Lake Sihwa
Field Trip to Lake Sihwa	Students	What can we do for Lake Sihwa?	Follow-up activities Let the students think of alternatives for Lake Sihwa problems.

Appendix - Culture and History of Lake Sihwa Basin	Teachers	Ecology and current conditions of Gyeonggi Coast	Current conditions of the ecology of tidal flat in Gyeonggi Coast Current conditions of the local coastal culture resources
Appendix - Culture and History of Lake Sihwa Basin	Teachers	History of tidal flat and Gyeonggi Bay	History of the tidal flat in Gyeonggi Bay from the prehistoric period to the present
Appendix - Culture and History of Lake Sihwa Basin	Teachers	Records about fishermen	Keejin Cho (Head of Uhdo Fishers' Union) Youngbae Yoon (Head of Woeumdo Fishers' Union)



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in the Yellow Sea Large Marine Ecosystem**

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