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**UNDP/GEF PROJECT ENTITLED “REDUCING ENVIRONMENTAL STRESS IN THE  
YELLOW SEA LARGE MARINE ECOSYSTEM”**

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**Third Meeting of the Regional Scientific and Technical Panel  
for the UNDP/GEF Yellow Sea Project**  
Jeju Island, Republic of Korea, 20-22 November 2006

**REPORT FROM CHAIRPERSON OF  
THE ECOSYSTEM REGIONAL WORKING GROUP (RWGE)**

**1. Introduction**

Various activities have been implemented by RWGE in 2006. The most important achievement from this group is the “Data and information collection” which has been conducted in both countries. Certainly there are gaps and limitations in the output of this activity but the data and information gathered from this activity will form the underpinning of TDA. Based on the results of “Data and information collection” activity from both countries, a regional consultant was hired to do a synthesis of the data and information on a regional basis. This synthesis is in turn being passed to TDA process and used accordingly. During the 3<sup>rd</sup> RWGE meeting, these activities were reported. There also were discussion during the meeting on the past activities, pending issues, and future plans. In this report I will summarize the activities implemented by RWGE in 2006.

**2. Activities**

**2.1. Data and Information Synthesis**

**2.1.1. Data coverage**

To identify any long-term trend in the Yellow Sea ecosystem is a prerequisite of identifying the current problems on the ecosystem and establishing a future plan to conserve the ecosystem. The Data and Information Collection activity aims to reveal any long-term change in the Yellow Sea ecosystem on a basin-scale. To this end, data were collected in both countries for the following categories:

- Phytoplankton
- zooplankton
- Benthos
- HAB
- Primary productivity
- Physical variables

The data from both countries are confined to certain period and some basic variables are totally missing. Even the collected data from both countries do not match in time in many

cases. Therefore, major problem in this activity is that data coverage may not be adequate enough to identify basin scale trends.

### **2.1.2. Gaps**

In addition to the gaps in data coverage, there are other limitations:

- Overview of physical oceanography is lacking. Presently, Korea presented CTD data of 1992. However, interpretation of the data is not sufficient to provide a overall picture of physical oceanography. The results of circulation modeling from China which were presented during RWGE meeting should be incorporated into the report.
- More Interpretation is needed. The draft reports from each country contain mostly numbers and figures and descriptions. Efforts to extract information from the collected data are necessary.
- Some values should be analyzed to give statistical confidence to make interpretation more robust and meaningful.
- Definition of HAB species is dubious. Some species reported as HAB are in fact not harmful. As Smayda (1997) pointed out, if only abundance is the criterion, about half of the existing phytoplankton species belong to HAB species. We have to apply more rigorous definition and interpretation before we make a warning that HAB is increasing in the Yellow Sea as a whole.

## **2.2. Regional Synthesis**

### **2.2.1. Overall remarks**

The consultants for regional synthesis and TDA expressed the opinions that there are now enough data and information gathered for TDA report. However, as chair of the group, I have some reservation on this observation. One of the purposes of data synthesis would be to identify the trends in the ecosystem status. The trends identified should be supported by scientific evidences and the trends should be consistent basin-wise. Careful re-examination on the interpretations based on the data sets is desirable.

### **2.2.2. Gaps and improvements**

Professor Kang Dae Suk, the consultant for Data and Information Synthesis work identified gaps in a similar vein: a severe lack of basin-scale ecosystem information and difficulties in intercomparison. He suggested some recommendations to fill the gaps, including:

- i) systematic data and information collection (more qualitative data are necessary and useful for comparison);
- ii) establishment of a basin-scale joint survey program (two research activities, scanning (general) survey and target (specific) survey, were suggested);
- iii) utilization of remote sensing technology to have a long-term picture of the ecosystem in the Yellow Sea (a workshop on remote sensing might be helpful); and
- iv) collection of data and information on the coastal water of DPRK

## **2.3. Planning for co-operative cruises**

Since last December, the group have been preparing for co-operative cruises, which were supposed to conduct in May/June 2006 and then July/August 2006. Agreements were made on the variables and budgets. There were also discussions on the stations and sample/data sharing. Some expendables and equipments were purchased. However, as the co-operative cruises were postponed, these efforts have been suspended.

## **2.4. Other topics discussed during the 3<sup>rd</sup> Regional Working Group Meeting**

Item 2.1 and 2.2 were discussed during the 3<sup>rd</sup> RWGE meeting. There were other topics discussed during the meeting. Below are brief summaries of those discussions.

### **2.4.1. Workshop on Sustainability of LMEs**

There was a brief introduction to the socioeconomic and governance analysis workshop in March 2006, in Rhode Island, USA. Yoo Sinjae and Zhu Mingyuan attended the workshop. The workshop dealt with issues to improve the socioeconomic and governance analysis ability of participants from LME projects. Some of the important concepts were such as environmental valuation, compliance, and sustainable financing. The information could be utilized by RWG-I in SAP development.

### **2.4.2. Ecosystem Monitoring Guidelines**

There was no applicant for the consultant position to write the guidelines of ecosystem monitoring. The meeting felt that one reason might be that the TOR was too vague and targets were not specific enough. Also, the meeting felt that the monitoring activities from ecosystem and pollution should be combined or coordinated. Recommendations are made in the section 2.5.1.

### **2.4.3. CPR –related activity**

Zhu Mingyuan informed the meeting that the continuous plankton recorder had been delivered to FIO, but he was unsure about available Project funds for non-cruise activities using the CPR. It was agreed that FIO would submit a proposal containing activities using the CPR, and the budget for the activities, including insurance costs. FIO agreed to submit a proposal to the PMO before 8th October 2006.

### **2.4.4. Proposal to improve the estimation of Ecosystem Carrying Capacity**

As a new activity under “Demonstration of New and Innovative Technologies for Monitoring Ecosystem”, Yoo Sinjae made a proposal to purchase FRRF-2 and an optic profiler. The former equipment is used to measure in-situ photosynthesis, while the latter equipment is used to measure

downwelling and upwelling irradiance. The data from the latter can be used in part to develop and verify ocean color algorithms, and interpreting in-situ photosynthesis rate. Yoo further stated that, with respect to the Project, data obtained from the activities using the equipments would be used in a Remote Sensing Workshop to develop maps of primary production in the Yellow Sea, and ultimately used for assessing carrying capacity.

### **2.4.5. Remote sensing workshop**

One of the methods to fill the data gaps is using remote sensing technology. However, there are certain technical difficulties to be solved for the remote sensing data to be utilized fully. A remote sensing workshop was planned to remedy some technical problems inherent in the Yellow Sea. Two topics are currently planned to be discussed in the workshop: Case 2 chlorophyll algorithms and HAB detection algorithms. Co-sponsorship of the workshop with other organization has been discussed. Among the potential organizations are KJWOC (Korea-Japan workshop on Ocean Color) group. KJWOC has also connection with WESTPAC and NOWPAP. Sinjae Yoo will bring this matter to the annual KJWOC Meeting this December, and he would further develop this activity, and keep the PMO updated on the developments of when and where the workshop should be held.

#### **2.4.6. Ecosystem Regional Targets and Strategic Action Programme**

There was an extensive discussion on how to identify the regional “targets” for the Ecosystem Component, and associated activities necessary for developing the SAP. It was suggested that “targets” should be something that can be monitored or measured, possibly predicted, and could be translated to management targets which has direct human implication. The meeting engaged in a long deliberation on how to define the ecosystem targets to fit the definition and to be measurable and concluded in three targets:

- i. Diagnosis of spatial and temporal change in lower trophic level productivity;
- ii. Diagnosis of spatial and temporal change in lower trophic level community structure; and
- iii. Diagnosis of spatial and temporal change in benthic community structure.

#### **2.4.7. Causal chain analysis**

The meeting spent a good deal of time to revise the causal chain analysis table. Consensus was made that the Ecosystem group should focus on the lower trophic level. Logical consistency and overlapping with other components in the causal chain analysis were re-examined. The causal chain analysis table was revised accordingly.

### **2.5. Cross component issues on which the RSTP should make a decision**

#### **2.5.1. Recommendation on Ecosystem Monitoring Guidelines**

Recommendation was made that the 3rd RSTP Meeting should consider the strategic implementation of this activity. The scope of work including the pollution monitoring should be examined. If PSC approval is obtained for the RSTP’s recommendation, the SAP Consultation Meeting to be held in early 2007 will discuss and refine the scope of work. Following the SAP Consultation Meeting, the PMO will rewrite the TOR, and re-advertise this consultancy.

#### **2.5.2. Carrying Capacity**

Carrying capacity can be defined in many ways depending on the context. As a result, there seems some confusion on the operational definition of carrying capacity. Fisheries scientists might want to define the concept on species or community level. Geographical scope could vary as well. However, in the Productivity Module (another LME term for Ecosystem studies) carrying capacity can be defined in a more practical way. Consider the function of the Productivity Module. The Productivity Module is described as: “Focuses on oceanic variability and its effect on the production of phytoplankton and zoo-plankton that are at the base of the ocean food chain; it is concerned with the carrying capacity of ecosystems and their ability to sustain fishery and other living resources.” (Olsen et al., 2006). Therefore, major purpose of the Module is to estimate and monitor the ecosystem ability to sustain fishery and other living resources. Among the abilities of ecosystem, bottom-up energy flow could be the fundamental property of the ecosystem. I would like to propose an operational definition of ‘carrying capacity’ from the ecosystem group as annual primary and secondary production, and if possible, allochthonous production in basin-scale. These estimates and their change (and causing factors) will be the basis of further analysis. I hope Fisheries Group could use these estimates to calculate the potential production at higher trophic levels.

### **3. Future workplan**

#### **3.1. Co-operative cruises**

If co-operative cruises will happen, they will provide new data and information on the current status of the Yellow Sea ecosystem. The new data and information will fill some gaps in the

current data base and will aid in enhancing the assessment of the ecosystem status.

### **3.2. Remote sensing workshop**

The workshop will be held in 2007 in conjunction with KJWOC and NOWPAP activities. The date has not been determined yet. The workshop could be held back-to-back with a training course on remote sensing sponsored by NOWPAP. Major outputs will be better chlorophyll-a algorithms and HAB detection algorithms.

### **3.3. Carrying capacity**

The outputs of the remote sensing and new in-situ instruments could be utilized to provide a basin-scale estimation of primary production. The analysis could also quantify the effects of physical/meteorological factors that influence primary productivity in the Yellow Sea. Depending on the decision by Fisheries component, the carrying capacity activity of Ecosystem component can be coordinated with that of Fisheries component.