1. Background

The National Reports on Ocean Remote Sensing in the NOWPAP Region and the Integrated Report on Ocean Remote Sensing for the NOWPAP Region were published in 2005 and they provided comprehensive understanding on the status of remote sensing of the Northwest Pacific Region.

Based on suggested activities and recommendation made in these reports, remote sensing information network such as Ocean Remote Sensing Portal Site, Web Site on Oil spill Monitoring were further developed to provide useful information on remote sensing for the NOWPAP Region. In 2007, Eutrophication Monitoring Guidelines by Remote Sensing for the NOWPAP Region were made targeting coastal managers in local governments and professional researchers and aiming to translate satellite remote sensing techniques into information and tools that are useful for monitoring of eutrophication. Furthermore, an intensive training course on remote sensing data analysis in the Northwest Pacific Region was conducted at Nagasaki University as a joint activity with IOC/WESTPAC.

Recognizing these milestones and considering mid- and long-term strategies of CEARAC and goals of WG3/WG4, development of educational materials for utilization of remote sensing data for marine environment conservation was proposed at the 5th CEARAC FPM and approved at the 12th NOWPAP IGM as an activity for the 2008-2009 biennium.

2. Objective

Objective of this activity is to develop educational materials for utilization of remote sensing data for marine environment conservation, targeting at students, young researchers and coastal managers in the NOWPAP Region

3. Main tasks

The educational materials consist of guidance on acquisition, analysis and validation of remote sensing data for the monitoring and assessment of marine environment depending on the purpose of data use. Contents of the materials will be developed based on the training texts and materials of the first NEARGOOS-NOWPAP Training Course on Remote Sensing Data Analysis and other existing educational materials.

CEARAC prepared this workplan for development of the educational. Upon approval of the workplan at the CEARAC FPM, CEARAC will conclude MoU with national experts recommended by WG4 experts or WG4 experts themselves to develop the educational materials.

Developed educational materials will be disclosed on the Internet and widely disseminated by CEARAC and national experts.

4. Expected outcomes

Developed educational materials will contribute to wide use of remote sensing data among students, young researchers and coastal managers in the NOWPAP Member States. In addition, the materials will be adequately polished through feedbacks of users or experts, given from the second NOWPAP training course on remote sensing data analysis and other possible opportunities.

5. Schedule

Proposed schedule will be as follows.

Time		Actions	Main body
2008	Q1	• Preparation of workplan for development of educational materials	CEARAC / consultant
	Q1	• Review of prepared workplan by WG4 experts	WG4 experts
	Mar (6th CEARAC FPM)	• Approval of workplan and budget for development of educational materials	CEARAC / CEARAC FPs
	Q2	• Conclusion of MoU with national experts	CEARAC / National experts
	Q2 to Q3	• Development of the educational materials	National experts
	Q3 (4th WG3/WG4 Meetings)	• Review of interim progress on the development of educational materials	WG3/WG4 experts
	Q4	• Development of the educational materials (continue)	National experts
2009	Q1	• Development of website contents	CEARAC consultant

6. Budget

Contract	Timing	Output	To be completed	Couterpart	Budget (US$)
MoU for the development of educational materials	2008 Q2	Educationa materials	2008 end of Q4	Expert in China	2,000
				Consultant in Japan	2,000
				Expert in Korea	2,000
				Expert in Russia	2,000
MoU for the development of website contents for the educationa materials	2009 Q1	Website contents for the educational materials	2009 Q1	Consultant	2,000
Total					10,000

Annex 1

Draft contents of the educational materials

Draft contents of the educational materials

1. Introduction
   - Eutrophication
   - Auatic ecosystem
   - Harmful algal bloom (HAB) and red tide
   - Common Procedure for the Identification of the Eutrophication Status of the Maritime Area
   - National Estuarine Eutrophication Assessment (NEEA)
   - Eutrophication Monitoring Strategy for the Mediterranean Sea
   - Tools for assessment of eutrophication in the Baltic Sea
   - Satellite remote sensing
2. Satellite Data
   2.1 Parameters
   - Ocean color
   - Chl-a concentration
   - SST
   - Turbidity (K490)

   2.2 Sensors
   - Chl-a concentration
     - CZCS
     - OCTS
     - SeaWiFS
     - MODIS
     - GLI
     - MERIS
   - SST
     - AVHRR
     - MODIS
   - Turbidity (K490)
     - SeaWiFS
     - MODIS

   2.3 Obtaining data
   - Chl-a concentration
     - Ocean Color Web
     - Marine Environment Watch Homepage
     - EOLI-WEB
   - SST
     - Marine Environment Watch Homepage
     - Marine Remote Sensing Laboratory, NFRDI
     - Ocean Color Web
   - Turbidity (K490)
     - Ocean Color Web

   2.4 Data processing method
   - SeaDAS
   - WIM
   - TeraScan
   - ERDAS Imagine
   - ENVI
   - BEAM

2.5 Region-specific issues
- CMODIS
- COCTS
- CCD
- MVIRS
- NSOAS Web
- OCM

3. In situ Data
- Calibration
- Validation

3.1 Parameters and measurement method
- Chl-a concentration
- Nutrients
- Temperature and Salinity
- Transparency
- COD
- SS
- CDOM
- Water-leaving radiance
- Phytoplankton species and pigments
- Primary productivity
- Weather conditions

3.2 Sampling plan
- Sampling points
- Monitoring site
- Monitoring frequency and timing

3.3 Requisites for monitoring and analysis
- Vessels
- Positioning system
- Navigation system

4. Monitoring and Assessment of Eutrophication
- Analysis correlation between in situ data and satellite data
- Evaluation of underwater algorithm
- Understanding spatio-temporal variation eutrophication
- Evaluation of eutrophication

5. Challenges and Prospects

5.1 Algorithm development
- Region-specific algorithm
- Positive-reverse retrieval model
- NN models
- Genetic algorithm

5.2 Application of high-resolution satellite data
- ALOS
- Landsat
- SPOT

5.3 New sensor
- MERSI
- GOCI

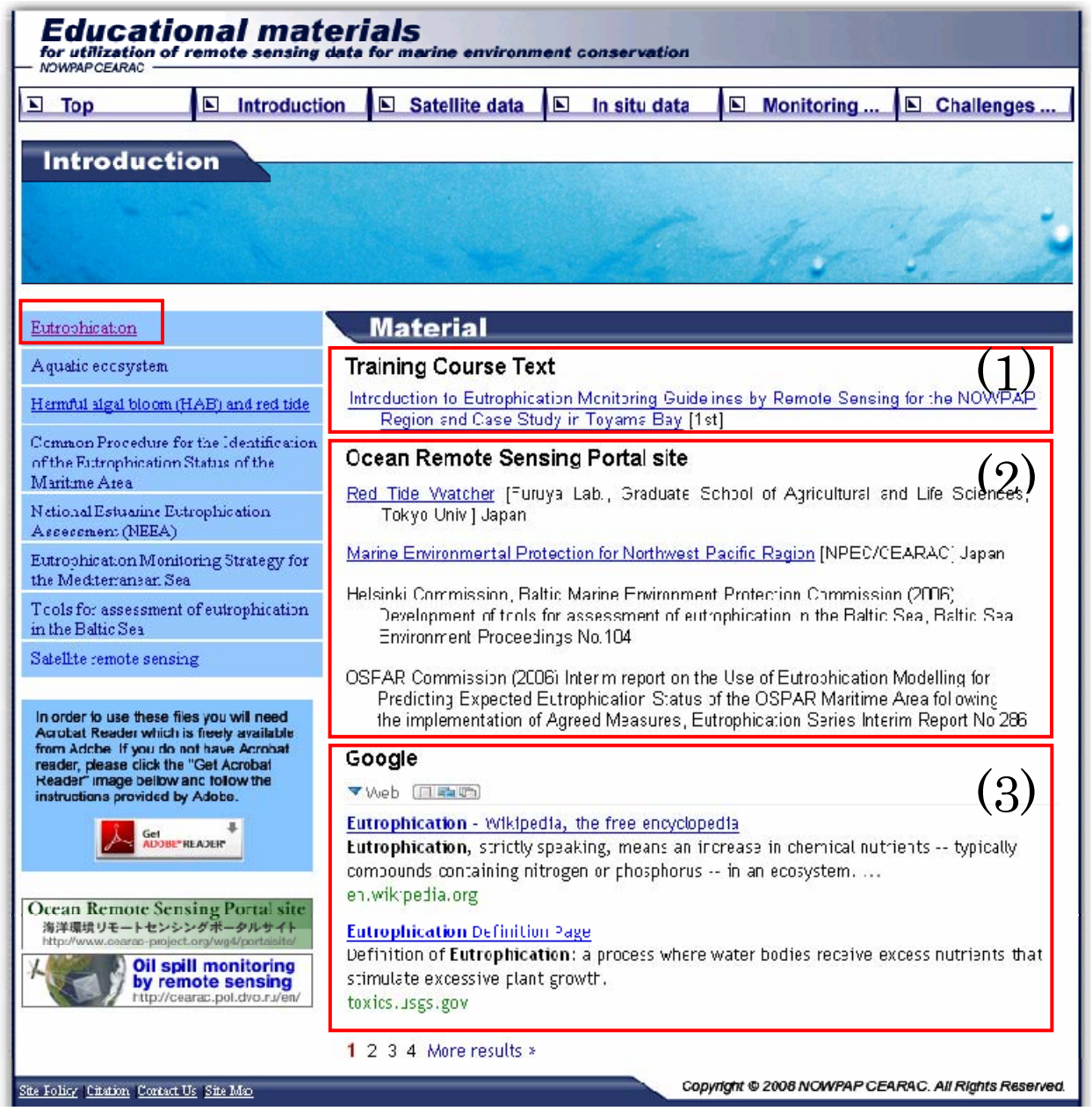
Annex 2

Draft contents of the educational materials and the training materials

Draft contents of the educational materials		1st NEAR-GOOS – NOWPAP Training Course on Remote Sensing Data Analysis Training Materials
Introduction		1. Introduction - Remote Sensing for the Northeast Asian Seas
Satellite Data		
	Parameters	1. Introduction - Remote Sensing for the Northeast Asian Seas
	Sensors	1. Introduction - Remote Sensing for the Northeast Asian Seas
	Obtaining data	3. Introduction of Satellite Data Distribution System 15. Hands-on Practice on WIM/WAM ii. Familiarizing with satellite data distribution system
	Data processing method	6. Introduction to software for satellite data analysis - with a emphasis on SeaWiFS Data Analysis System 15. Hands-on Practice on WIM/WAM i. Basic exercise on WIM/WAM iii. Visualizing and projecting satellite data images
In situ Data		4. Operational Oceanographic Data Exchange and NEAR-GOOS Regional Real Time Data Base 5. Introduction of RDMDB (NEAR-GOOS) & Data Management at JODC
	Parameters and measurement method	7. The Optic Properties and Regional Ocean Color Algorithms for the Case-II Waters in China Seas 8. Validation of Ocean Color Remote Sensing Data in Korea 12. Measurements of Ocean Optical Properties for Sea Truth
	Sampling plan	
	Requisites for monitoring and analysis	
Monitoring and Assessment of Eutrophication		
	Accuracy evaluation	2. Atmospheric Correction and Bio-optical Algorithm for Ocean Color Remote Sensing 7. The Optic Properties and Regional Ocean Color Algorithms for the Case-II Waters in China Seas 8. Validation of Ocean Color Remote Sensing Data in Korea 15. Hands-on Practice on WIM/WAM v. Match up analysis with sea truth measurement data
	Integration with the existing monitoring system	10. Introduction to Eutrophication Monitoring Guidelines by Remote Sensing for the NOWPAP Region and Case Study in Toyama Bay 15. Hands-on Practice on WIM/WAM iv. Command line programs for time series analysis
Challenges and Prospects		7. The Optic Properties and Regional Ocean Color Algorithms for the Case-II Waters in China Seas 8. Validation of Ocean Color Remote Sensing Data in Korea 9. Satellite-based Red-Tide Detection/Monitoring 11. Case Studies of Red Tide 13. Monitoring of Oil Pollution with the Use of Satellite Imagery 14. Introduction to NGSST and SST Application for Monitoring of Ocean Environment 15. Hands-on Practice on WIM/WAM vi. Time series analysis of NGSST data

Annex 3

Tentative design of the website for the educational materials



Tentative design of the website for the educational materials

Note: The above image shows an example of information to be displayed when keywords "eutrophication" is selected. From above, (1) link to the training text at the 1st NOWPAP RS training course, (2) links to list of information in Ocean Remote Sensing Portal site, (3) search results by Google, are displayed.