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Presentation materials were revised in accordance with the adopted meeting reports of the 5<sup>th</sup> CEARAC Focal Points Meeting.

## Report on implementation and expenditure of CEARAC activities for the 2006-2007 biennium

### NOWPAP CEARAC

18-19 Sep. 2007

## Outline of CEARAC Activities for the 2006-2007 biennium

- Organization of CEARAC 4<sup>th</sup>FPM and 3<sup>rd</sup>WG3 and WG4 Meetings
- CEARAC Projects
  - WG3
    - Booklet of "Countermeasures against HABs"
    - Pamphlet of *Cochlodinium*
  - WG4
    - Eutrophication Monitoring Guidelines by RS for the NOWPAP Region
    - RS Training
    - Development of RS information network
- CEARAC Activities on Marine Litter
- Other Intersessional Activity; RS
- Cooperation and Coordination
- Publication of CEARAC Newsletter

## Main Achievements of the 4<sup>th</sup> FPM

(8-9 March 2006, Toyama, Japan)

- Reported implementation of CEARAC activities in 2005 and expenditure for the 2004-2005 biennium
- Reported intersessional activities of NOWPAP WG3(HAB) and WG4(RS)
- Approved the detailed workplan and budget of CEARAC for the 2006-2007 biennium
- Adopted the revised TORs for WG3 and WG4
- Discussed the revised TOR of CEARAC FPM and agreed to submit to 11th IGM for approval
- Decided to discuss long-term objectives of CEARAC in WG meetings and the next FPM.



## Main Achievements of the 3rd Meeting of WG3 and WG4 (Toyama, 6-7 July 2006)

- Agreed on publishing *Cochlodinium* pamphlets in four languages; Chinese, Japanese, Korean and Russian
- Agreed on publishing an Eutrophication Monitoring Guidelines by RS for the NOWPAP Region through refining NPEC Eutrophication Monitoring Guideline by the NOWPAP Members in 2006.
- Changed the title of the booklet to "Countermeasures against HABs", and a new chapter about toxic producing algal blooms was added.
- Agreed on conducting a RS training program on data analysis in 2007.
- Discussed the mid and long term strategies of CEARAC and mid and long term objectives of WG3 and WG4, and confirmed to continue discussing these issues.

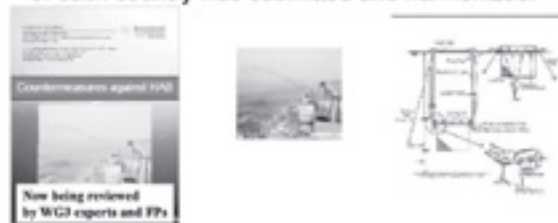


### Activities of WG3

- ◆ Booklet of "Countermeasures against HABs"
- ◆ Pamphlet of *Cochlodinium*

### Booklet of "Countermeasures against HABs"

Information on countermeasures against HABs of each country was submitted and harmonized.



After approval by FPs and WG experts, this booklet will be published and circulated to related organizations in book form and a CD format

### *Cochlodinium* Pamphlet in each language

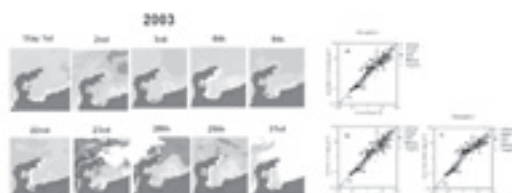
English *Cochlodinium* Pamphlet was translated into four languages by WG3 experts voluntarily.



### Activities of WG4

- ◆ Eutrophication Monitoring Guidelines by RS for the NOWPAP Region
- ◆ RS Training
- ◆ Development of RS information network

### Eutrophication Monitoring Guidelines by RS for the NOWPAP Region



The guidelines have been approved by CEARAC FPs and WGs experts, and being reviewed by a native English speaker. The guidelines will be published by the 12th NOWPAP IGM.

### RS training on data analysis

3-7 Sep. 2007 at Nagasaki University  
23 trainees from 8 countries  
10 lecturers from 5 countries



- Main topics -  
RS data analysis for eutrophication, red tide and oil spill

### Development of RS information network system

- North Sea area in Shandong Peninsula, China
- Ariake Bay, Japan
- South Sea, Korea
- Peter the Great Bay, Russia



•The Marine Environmental Watch website has been registered as one of databases of NEAR-GOOS



NEAR-GOOS  
Regional Global Ocean Observing System (RGOOS)

### Activities of MALITA

- ◆ Guidelines for Monitoring Marine Litter on the Beaches and Shorelines of the Northwest Pacific Region
- ◆ Tourism Guidelines
- ◆ The 2<sup>nd</sup> NOWPAP Workshop on Marine Litter
- ◆ Pamphlet for reduction of marine litter
- ◆ Booklet on recycling of plastic marine litter
- ◆ Monitoring survey to raise public awareness

### Monitoring Guidelines and Tourism Guidelines



### The 2<sup>nd</sup> NOWPAP Workshop on Marine Litter



### Pamphlet for reduction of marine litter and Booklet on recycling of plastic marine litter



Booklet on recycling of plastic marine litter

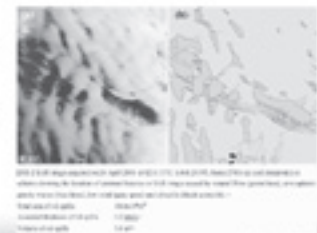
Now being reviewed by MALITA FPs and RCU

### Intersessional Activity

#### Website on Oil spill monitoring by remote sensing

Added many SAR images with annotations.

Added list of new literature related to oil spill monitoring by RS.



### Cooperation and Coordination(1/2)

#### Participation in NOWPAP IGM, Workshop and other RACs FPM

- the 1st NOWPAP Workshop on Marine Litter and the 1st NOWPAP Regional Meeting on Marine Litter. (Incheon, Korea, 8-9 June, 2006)
- PICES 15th Annual Meeting (Yokohama, Japan, 13-22 October, 2006)
- 4th Korean-Japan Workshop on Ocean Color Remote Sensing (Cheju, Korea, 19-20 December 2006)
- 1st COBSEA Marine Litter Workshop (Jakarta, Indonesia, 8-9 May 2007)
- NOWPAP International Coastal Cleanup (ICC) held in Sakata, Japan (29-30 September 2006) and in Rizhao, China (27-28 June 2007)

### Cooperation and Coordination(2/2)

#### Cooperation with other RACs and Organizations

- The 4th International Workshop on Remote Sensing of the Marine Environment in the Northwest Pacific Region
- The State of Marine Environment Report in the NOWPAP Region
- Assistance to POMRAC for organizing ICARM

### Publication of Newsletter



### The use of CEARAC budget for the 2006-2007 biennium(1/3)

Activity	Date & Venue	Expenditure (expected) in US\$
Organization of CEARAC 4 <sup>th</sup> FPM -organizing the meeting -publishing the meeting report	Mar. 2006; Toyama, Japan	17,660 1,908
Organization of 5 <sup>th</sup> FPM -organizing the meeting -publishing the meeting report	Sep. 2007; Toyama, Japan	(21,000) (2,000)
Organization of 3 <sup>rd</sup> Meeting of NOWPAP WG3 and WG4 -organizing the meeting -publishing the meeting report	November 2006	27,679 4,000
WG3 (HAB) -Making a Booklet of "Countermeasures against HABs" -Publication of Cochlodinium pamphlet in four languages	Throughout 2006 and 2007	21,345 4,755

### The use of CEARAC budget for the 2006-2007 biennium(2/3)

Activity	Date & Venue	Expenditure (expected) in US\$
Publication of RS Guidelines -Eutrophication Monitoring Guideline -RS Training	Throughout 2006 and 2007	16,000 (16,000)
CEARAC Activities on Marine Litter -Monitoring Guideline -Tourism Guideline -Pamphlet for the reduction on marine litter -Booklet on recycling of plastic marine litter	Throughout 2006 and 2007	3,594 (6,000) (3,000) (6,906)

### The use of CEARAC budget for the 2006-2007 biennium (3/3)

Activity	Date & Venue	Expenditure (expected) in US\$
Interseasonal work -Website on Oil spill monitoring by remote sensing -TBD	Throughout 2006 and 2007	3,000 3,000
Cooperation and Coordination of CEARAC activities -2006 -2007	Throughout 2006 and 2007	4,400 (4,548)
Publication of CEARAC Newsletter -Third issue -Fourth issue	Autumn 2006 and 2007	1,908 (2,000)
<b>TOTAL</b>		<b>169,500</b>

**Draft workplan and budget of  
CEARAC activities  
for the 2008-2009 biennium  
and recommendation  
to the 12th NOWPAP IGM**

**NOWPAP CEARAC**

18-19 Sep. 2007

**Outline of CEARAC Activities  
for the 2007-2008 biennium**

- Organization of CEARAC 6<sup>th</sup> & 7<sup>th</sup> FPM and 4<sup>th</sup> WG3 and WG4 Meetings
- CEARAC Projects
- Cooperation and Coordination
- Publication of CEARAC Newsletter

**Organization of CEARAC 6<sup>th</sup> &  
7<sup>th</sup> FPM and 4<sup>th</sup> WG3 and WG4  
Meetings**

- CEARAC 6<sup>th</sup> FPM, Mar. 2008
- 4<sup>th</sup> WG3 and WG4 Meetings, Summer 2008
- CEARAC 7<sup>th</sup> FPM, Sep. 2009

**CEARAC Projects**

- WG3 -HAB Case Studies  
-HAB Integrated Website
- WG4 -educational materials for utilization of remote sensing data for coastal environment conservation  
-2nd training course on remote sensing data analysis
- joint activity of WG3 and WG4  
-procedures for assessment of eutrophication status for the NOWPAP Region

**HAB Case Studies**



Select 1-2 region(s)  
in each country

Collect information on HAB occurrence and environmental condition, and make report by experts contracted with CEARAC

Report of HAB Case Studies  
in each hot region

Updating report by  
adding latest information

Development  
HAB Hot Region  
Database

**HAB Integrated Website**

**Publication**

National reports on HAB



Integrated report on HAB

Booklet of  
"Countermeasures  
against HABs"

**Database**

HAB Reference Database



HAB Hot Region Database

Link to  
other International Database  
ex. PICES (HAE-DAT)

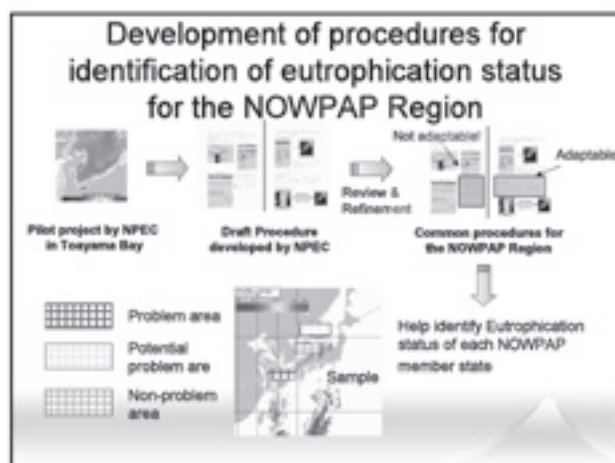
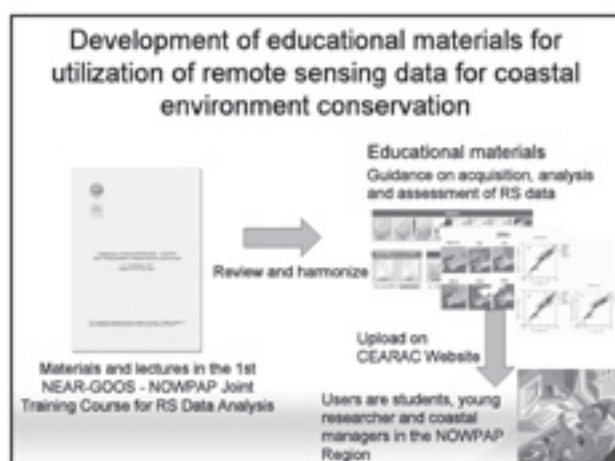
**Topics**



Cochlodinium Website

Link to Marine Environmental  
Watch Project





## Cooperation and Coordination

### Publication of CEARAC Newsletter

### Draft CEARAC Budget for the 2008-2009 biennium(1/2)

Activity	Planned Budget (US\$)			Tentative Time
	2008	2009	Total	
Organization of CEARAC FPM	23,000	23,000	46,000	Mar. 2008 Sept. 2009
Organization of 4 <sup>th</sup> Meeting of WG3 and WG4	36,000	-	36,000	Summer 2008
Specific Projects (tentative)				
WG3 (HAB)				
-HAB Case Studies				
-HAB Integrated Website				
WG4 (RS)				
-educational materials for utilization of RS data for coastal environment conservation		50,000	50,000	
-2nd training course on RS data analysis				
WG3 and WG4 (joint)				
-procedures for identification of eutrophication status for the NOWPAP Region				

### Draft CEARAC Budget for the 2008-2009 biennium(1/2)

Activity	Planned Budget (US\$)			Tentative Time
	2008	2009	Total	
Interseasonal Work	3,000	3,000	6,000	
Cooperation and Coordination of CEARAC activities	4,000	4,000	8,000	
Publication of CEARAC Newsletter	2,000	2,000	4,000	Autumn 2008 2009
<b>TOTAL</b>			<b>150,000</b>	

## HAB Case Studies

CEARAC  
18 September 2007

## Objective

Objectives of these case studies are

- (1) To establish the most effective and laborsaving ways for sharing various information on HAB (harmful red tide and toxin producing plankton) occurrence
- (2) To summarize common concerned items in the hot regions in case studies reports

## Main Tasks

- Selection of HAB hot region in each member state
- Implementation of case studies
- Sharing information on hot region
- Updating the information on hot region

## Image of the report of case studies

*In case of the north-west of Kyushu hot region*

### Contents

1. Monitoring system and items on HAB
2. HAB occurrence
3. Environmental condition
4. Adverse effect by HAB
5. Summary

Attachment (List of all HAB events)

## 1. Monitoring system and items on HABs

- 1.1 Outline of hot region
- 1.2 Monitoring system
- 1.3 Monitoring items
- 1.4 Standards for HAB occurrence

### 1.1 Outline of hot region

- Topographic position of this hot region
- Oceanographic condition around this region

### 1.2 Monitoring system

- Implementing agencies in this region
- Fukuoka Fisheries & Marine Technology Research Center
  - Nagasaki Prefectural Institute of Fisheries
  - Saga Prefectural Goshiki Fisheries Research and Development Center
  - Yamaguchi Prefectural Fisheries Research Center



(Courtesy of Nagasaki Prefectural Institute of Fisheries)



### 1.3 Monitoring Items

**Items on HAB occurrence**  
Plankton, Cell density, Chlorophyll a, Shellfish poison, Maximum area, Ocean color

**Items on Oceanographic condition**  
Water temperature, Salinity, Dissolved oxygen, Visibility, Nutrient

**Items on Meteorological condition**  
Temperature, Precipitation amount, length of sunshine

### 1.4 Standards for HAB Occurrence

*Chaetoceros antiquus* (Warning: over 1 cell/ml, Alarm: over 10 cell/ml)  
*Chaetoceros marinus* (Warning: over 1 cell/ml, Alarm: over 10 cell/ml)  
*Chaetoceros glaberrimus* (Warning: over 10 cell/ml, Alarm: over 100 cell/ml)  
*Chaetoceros ovatus* (Warning: over 10 cell/ml, Alarm: over 100 cell/ml)  
*Karenia mikimotoi* (Warning: over 100 cell/ml, Alarm: over 500 cell/ml)  
*Cochlodinium polyarthrales* (Warning: over 10 cell/ml, Alarm: over 100 cell/ml)  
*Heterosigma akashiwo* (Warning: over 1,000 cell/ml, Alarm: over 10,000 cell/ml)  
*Heterosigma striatopapua* (Warning: over 10 cell/ml, Alarm: over 50 cell/ml)

Courtesy of Japanese Fisheries Institute of Fisheries

## 2. HAB Occurrence

### 2.1 Status of HAB events

### 2.2 HAB species

### 2.1 Status of HAB Occurrence

**Change of the number of HAB occurrence**

**Period of HAB occurrence**

Year	Period	0-1 days (Number of events)	1-10 days (Number of events)	11-20 days (Number of events)	Over 21 days (Number of events)	Total (Number)
1970						
2000		10	7	3	—	20

**Location of HAB occurrence**

Year	Number of HAB events in each sea area	Total Number	
2000	Western part	13	
	Western part	5	
	Western Island area	1	
	Sea Island area	1	
			20

Courtesy of Japanese Fisheries Institute of Fisheries

### 2.2 HAB Species

**HAB causative species**

**Harmful Red Tide causative species**  
 Dinophyceae: *Karenia mikimotoi*, *Cochlodinium polyarthrales*, *Heterosigma circularisquama*  
 Raphidophyceae: *Chaetoceros antiquus*, *Heterosigma akashiwo*  
 Bacillariophyceae: *Ecocypus radiatus*

**Toxin Producing Plankton**  
 PSP causative species: *Alexandrium catenella*, *Alexandrium tamarense*, *Cyanoecium colvatum*  
 DSP causative species: *Dinophysis acuminata*, *D. caudata*, *D. fortis*

**Maximum cell density**

Year	Event No.	Period	Region	Plankton	Ocean color	Maximum cell number	Maximum area
2000	00-1	May 1	Kyushu-Islands	<i>Dinodictyon</i>	45-40	50	6,000 km <sup>2</sup>
2000	00-2	May 10	Sea	<i>Heterosigma akashiwo</i>	34	3,000	6,000 km <sup>2</sup>
2000	00-3	Jun 1	Kyushu-Islands	<i>Prorocentrum</i> sp.	30-27	3,000	6,000 km <sup>2</sup>
2000	00-4	Jul 20	Kyushu-Islands	<i>Karenia mikimotoi</i>		6,000	unknown

Courtesy of Japanese Fisheries Institute of Fisheries

## 3. Environmental Condition

**Oceanographic condition**  
 Temperature, Salinity, Current speed/direction, Visibility, Dissolved Oxygen, Nutrient, Satellite image (SST, Chlorophyll a)

**Meteorological condition**  
 Temperature, Precipitation amount, Length of sunshine

## 4. Adverse effect by HAB

**Damage to fisheries**

Event No.	Area	Causative species	Kind of fishery	Object of damage	Volume of damage	Severity of damage (%)
00-4	Kyushu-Islands	<i>Karenia mikimotoi</i>	aquaculture	Small fish, Pagrus major	1,000 Tn	100,000 \$/1,000 \$/1,000

**Shipping control**

**Environment deterioration**  
 (oxygen deprived, amount of organic carbon)

Courtesy of Japanese Fisheries Institute of Fisheries

### 5. Summary

- Coastal environment  
Increase or decrease of number of HAB event in recent year  
Improvement or deterioration of eutrophication
- Collaboration and cooperation with other region and organization for sharing information on HAB  
List up the common concerned items among hot regions

### Attachment: List of HAB events

Event No.	Journal date	Temperature (°C)	Period	Area	Problem	Problem	Damage	State of damage	State of damage in 2009	Location area
001	2000/11			Choshi	Hagasaki	Diarrhoeal outbreak	none	-	1,000 infected	Choshi Bay
002	2000/10			Seno Bay	Hagasaki	Rarely outbreak	none	-	1,000 infected	Seno Bay
003	2000/10			Seno Bay	Hagasaki	Rarely outbreak	none	-	6,000 infected	Seno Bay

Event No.	Water temperature (°C)	Salinity	Current development	Visibility	Temperature	Wind development	Precipitation amount	Length of outbreak	Problem	Location area
001	17.0	33.0								
002										
003										

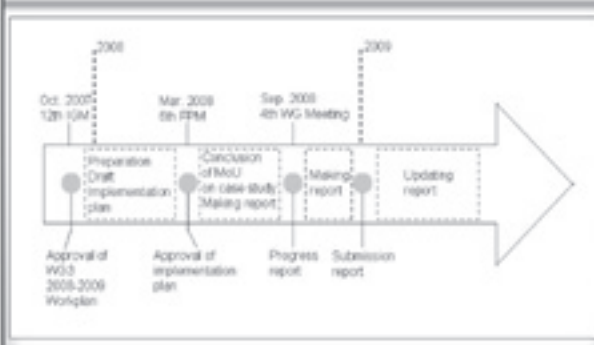
(Courtesy of Hagasaki Prefectural Institute of Technology)

### Expected Output

These case studies will contribute to establish effective and laborsaving ways for sharing information among the NOWPAP member states.

The achievement of case studies will be listed on a database established by CEARAC, so the information will be available for wider community.

### Schedule for making booklet





## HAB Integrated Website

CEARAC  
18 Sep. 2007

## Objective

- To provide and share information on HAB in order to enhance activities against HAB in the NOWPAP region

## Main Tasks

- Preparation of draft outline of the website
- Coordination with other international organization
- Development of HAB Integrated Website

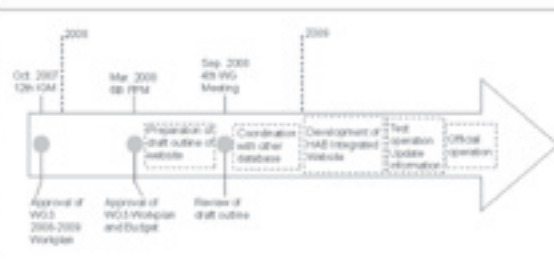
## Expected Outcome

This website

can provide useful information to support actions against HABs in the NOWPAP Member States

contributes to exchange information and share information with other regional seas and international organizations

## Time Schedule



## Image of this website

### Publications

National Reports on HAB, Integrated Report on HAB, Booklet of "Countermeasures against HABs"

### Database

HAB Reference Database, HAB Hot Region Database  
Link to HAE-DAT(PICES), HAB-BIB(IOC/HAB)

### Topics

Cochlodinium Website  
Link to Marine Environmental Watch Project



## Proposal for development of educational materials for utilization of remote sensing data for marine environment conservation

CEARAC  
Sep 18, 2007

### 1. Background

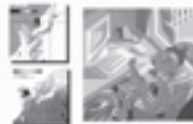


### 2. Objective

- 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.

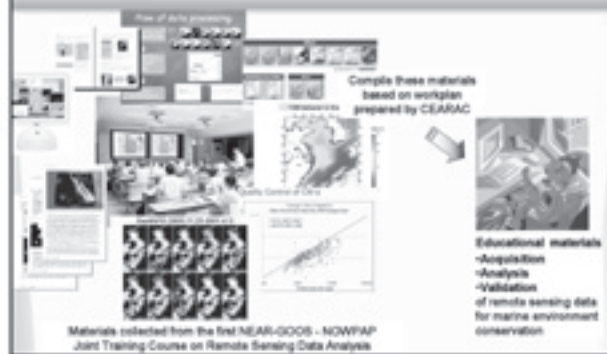


Targets



Educational materials

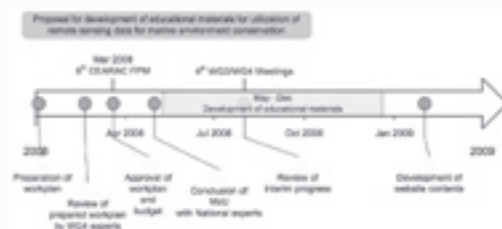
### 3. Main tasks



### 4. Expected outcome

- to 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 contents of the educational materials(1/3)



### Proposed contents of the educational materials(2/3)

- 1. Introduction
  - Eutrophication
  - Aquatic ecosystem
  - Harmful algal bloom (HAB) and red tide
  - Common Procedure for the Identification of the Eutrophication Status of the Maritime Area
  - National 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
    - Chlorophyll concentration
    - SST
    - Turbidity (Kd90)
  - 2.2 Sensors
    - Chlorophyll concentration
      - SeaWiFS
      - MODIS
      - SeaWiFS
      - MODIS
      - SeaWiFS
      - MODIS
    - SST
      - SeaWiFS
      - MODIS
- 2.3 Obtaining data
  - Chlorophyll concentration
    - Ocean Color Web
    - Marine Environment Watch Homepage
    - EOLIANEB
  - SST
    - Marine Environment Watch Homepage
    - Marine Remote Sensing Laboratory, NERSC
    - Ocean Color Web
  - Turbidity (Kd90)
    - Ocean Color Web
- 2.4 Data processing method
  - SeaDAS
  - WRF
  - TerraScan
  - ERODAS Imagine
  - ENVI
  - BRUN
- 2.5 Region-specific issues
  - CERRAC
  - COCTS

### Proposed contents of the educational materials(3/3)

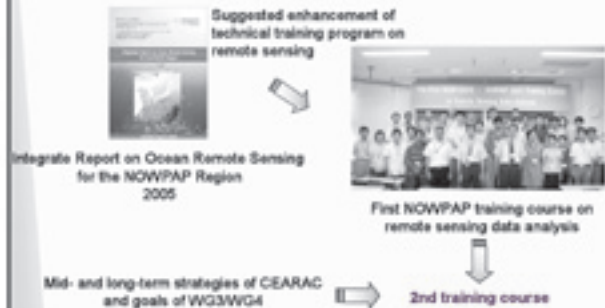
- CCD
  - MODIS
  - SeaWiFS
  - MODIS
  - CCD
3. In situ Data
- Calibration
  - Validation
  - 3.1 Parameters and measurement method
    - Chlorophyll concentration
    - Nutrients
    - Temperature and Salinity
    - Transparency
    - OOD
    - SS
    - ODOM
    - Water-leaving radiance
    - Phytoplankton 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
  - Position-reverse retrieval model
  - NN models
  - Genetic algorithm
- 5.2 Application of high-resolution satellite data
- ALOS
  - Landsat
  - SPOT
- 5.3 New sensor
- MERIS
  - GOCI



## Proposal for the second NOWPAP training course on remote sensing data analysis

CEARAC  
Sep 18, 2007

### 1. Background



### 2. Objective

- to conduct an intensive training course on remote sensing data analysis for students, young researchers and coastal managers to obtain useful skills and knowledge to utilize remote sensing data in monitoring and assessment of marine environment.



### 3. Main tasks

- Expected tasks of NOWPAP WG4
  - Review of workplan
    - Venue, schedule, budget, etc
  - Review of syllabus
    - Time for each lecture
    - Composition of lectures and hands-on practices
  - Nomination of lecturers
  - Recommendation of potential trainees



### 4. Potential partnership with other organizations

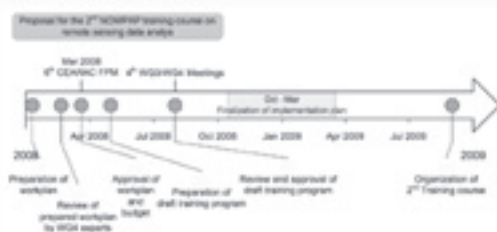


### 5. Expected outcome

- to contribute to capacity building of the NOWPAP Member States for utilizing remote sensing data for marine environment conservation. It is also expected to obtain useful information to consider future directions of CEARAC activities related to remote sensing.



## 6. Schedule



7

## Annex

### Outline of the second NOWPAP training course on remote sensing data analysis

8

### Outline of the training course (1/3)

- Composition of the training course
  - - Lectures -
    - Satellite oceanography, introduction to ocean color remote sensing, availability of satellite data, case studies of red tide, monitoring of eutrophication, validation of algorithms, monitoring of oil spill;
  - - Hands-on practice sessions
    - Operation of remote sensing software; visualizing and verification of ocean color satellite data, time series analysis of ocean color data
  - - Submission of case study report
    - Conducting case study on specific subject

9

### Outline of the training course (2/3)

- Duration of training course
  - 1 week (5 business days)
- Venue
  - T.B.D (one of NOWPAP member states)
- Class Capacity
  - number trainee is limited to around 12
- Cost/Tuition
  - Tuition will be free
  - Transportation and accommodation fee will be borne by participant. Limited scholarships may be available depending on budget
- Application procedures
  - Applicant submits application form with statement outlining the suitability of their backgrounds and the reason(s) for interests in the course.

10

### Outline of the training course (3/3)

- Language
  - English
- Obligation of the participants
  - All participants are requested to review training materials to be used at the training course and make constructive comments for future improvement.



11

### The First NEAR-GOOS NOWPAP Joint Training Course on Remote Sensing Data Analysis

- Organizers
  - IOC/WESTPAC and CERRAC
- Co-organizer and supporter
  - Nagasaki University (co-organizer) and YSLME (Supporter)



12

### The First NEAR-GOOS NOWPAP Joint Training Course on Remote Sensing Data Analysis

- Participants
  - 23 trainees from 8 countries
    - Occupation
      - 13 research professionals, 9 postgraduate students and 1 undergraduate student
    - Nationalities
      - 7 Japanese, 4 Korean, 4 Russian, 3 Chinese, 2 Indonesian, 1 Indian, 1 Thai and 1 Vietnamese
  - 11 lecturers from 5 countries
    - Occupation
      - 5 research professionals, 4 university professors and 2 government officers
    - Nationalities
      - 6 Japanese, 2 Korean, 1 Chinese, 1 Russian and 1 American

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### Snapshots from the first training course



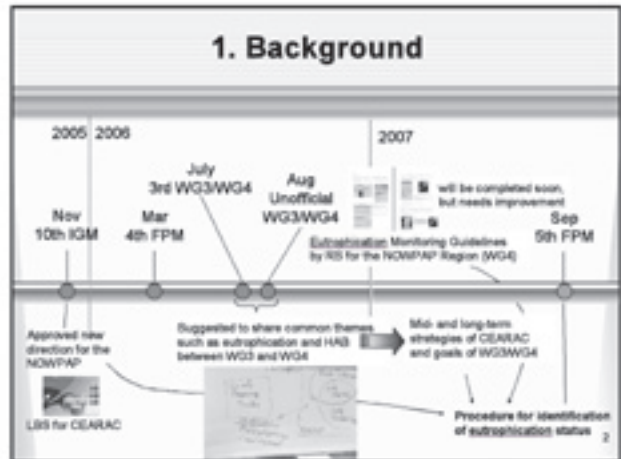
### Snapshots from the first training course





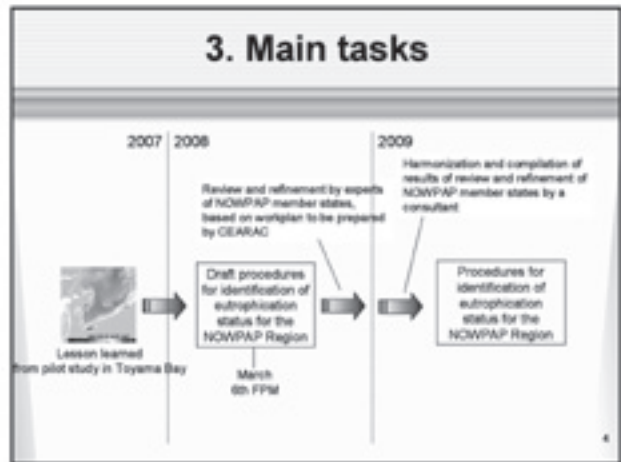
**Proposal for development of procedures for assessment of eutrophication status including evaluation of land base sources of nutrients for the NOWPAP Region**

CEARAC  
Sep 18, 2007



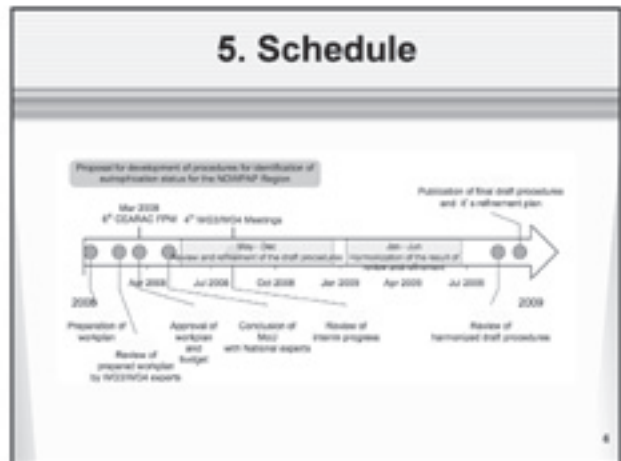
### 2. Objective

- to develop useful procedures for identification of eutrophication status by utilizing remote sensing techniques that can be shared among the NOWPAP members, based on lessons learned from a pilot study conducted in Toyama Bay.



### 4. Expected outcome

- to contribute to identification of eutrophication status, including evaluation of Land Based Source, by utilizing remote sensing techniques in each NOWPAP member state.





## Table of Contents

- I Preparation
  - 1 Selection of assessment area
  - 2 Collection of relevant information
  - 3 Division of assessment area into sub-areas
  - 4 Selection of assessment parameters
    - 4.1 Parameters that indicate nutrient enrichment
    - 4.2 Parameters that indicate direct effects from nutrient enrichment
    - 4.3 Parameters that indicate indirect effects from nutrient enrichment
    - 4.4 Other possible parameters that indicate effects from nutrient enrichment
  - 5 Selection of monitoring sites of the assessment area
- II Data Analysis
  - 1 Analysis of monitoring data for establishing assessment levels
  - 2 Analysis of satellite data
  - 3 Analysis of monitoring data for the classification of assessment area
- III Classification of Assessment Area
  - 1 Initial classification
  - 2 Overall classification

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### I Preparation

#### • Step I - 1 Selection of assessment area

##### Criteria of assessment area:

- Sea area with uniform characteristics
- Established water quality monitoring programs
- Established water quality assessment system



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### I Preparation

#### • Step I - 2 Collection of relevant information

- Collect information on the water-quality monitoring programs conducted in the assessment area
  - Organizations conducting water-quality monitoring
  - Monitoring locations
  - Monitoring parameters
  - Monitoring frequency
  - etc.



Identify the appropriate monitoring programs for the assessment

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### I Preparation

#### • Step I - 3 Division of assessment area into sub-areas

- Divide the assessment area into sub-areas for local-scale assessment (if necessary)



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### I Preparation

#### • Step I - 4 Selection of assessment parameters (1)

- Classify available water quality parameters into the following 4 categories

Category 1: Indicator of nutrient enrichment

Category 2: Indicator of direct effects of nutrient enrichment

Category 3: Indicator of indirect effects of nutrient enrichment

Category 4: Other possible indicators of nutrient enrichment

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### I Preparation

#### • Step I - 4 Selection of assessment parameters (2)

##### Examples of indicators of nutrient enrichment (Category 1)

- Riverine input and direct discharges of T-N and T-P (Indicator of nutrient enrichment from land-based sources)
- Winter DIN and DIP concentration (Indicator of nutrient enrichment levels when algal activity is lowest)
- Winter N/P ratio (Increased N/P ratio increases the risk of nuisance and toxic algal species)

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I Preparation

- **Step I - 4 Selection of assessment parameters (2)**

---

Examples of indicators of direct effects of nutrient enrichment (Category 2)

- Chlorophyll-a concentration  
(Indicator of increase in primary production from nutrient enrichment)
- Phytoplankton species  
(Indicator of increase occurrences of HAB species from nutrient enrichment)

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I Preparation

- **Step I - 4 Selection of assessment parameters (3)**

---

Examples of indicators of indirect effects of nutrient enrichment (Category 3)

- DO  
(Indicator of oxygen deficiency induced by decaying algal blooms and long-term nutrient enrichment)
- Changes/kills in zoobenthos  
(Indicator of oxygen deficiency and long-term nutrient enrichment)
- Fish kills  
(Indicator of oxygen deficiency and HABs)

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I Preparation

- **Step I - 4 Selection of assessment parameters (4)**

---

Other possible indicators of nutrient enrichment (Category 4)

- Algal toxins in shellfish  
(Indicator of occurrences of toxin-producing planktons)

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I Preparation

- **Step I - 4 Selection of assessment parameters (5)**

---

• Select parameters for each assessment category which could be used for the assessment process (the quantity/quality of the data must be sufficient for the assessment process)

Example

C1: Indicator of nutrient enrichment	T-N, T-P Winter DIN/DIP
C2: Indicator of direct effects of nutrient enrichment	Chlorophyll-a
C3: Indicator of indirect effects of nutrient enrichment	DO
C4: Other possible indicators of nutrient enrichment	Algal toxins


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I Preparation

- **Step I - 5 Selection of monitoring sites of the assessment area**

---

- Select monitoring sites that conduct regular monitoring of the selected parameters in Step 4



The monitoring site should have 5 years of continuous data

Data from the selected monitoring sites will be used for the assessment

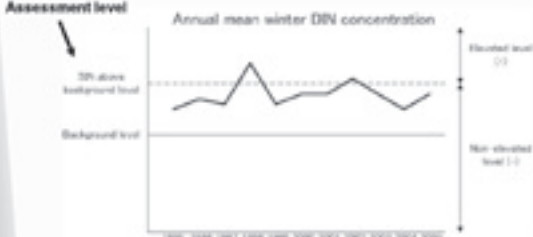
23

II Data analysis

- **Step II - 1 Analysis of monitoring data for establishing assessment levels**

---

- Establish assessment level of the selected parameters by analyzing past monitoring data (e.g. winter DIN)



Assessment level

Annual mean winter DIN concentration

30% above background level

Background level

Established level (C)

Non-observed level (D)

1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

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**II Data analysis**

- **Step II - 1 Analysis of monitoring data for establishing assessment levels**

---

- Establish assessment level of the selected parameters by analyzing past monitoring data (e.g. DO)

Assessment level

Annual mean DO concentration

1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

mg/L

Oxygen non-deficient (-)

Oxygen deficient (+)

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**II Data analysis**

- **Step II - 2 Analysis of satellite data**

---

- Supplement the monitoring data with satellite-derived chlorophyll-a concentration data by calculating its mean and maximum

NIMBUS/CZCS → ADEOS/OCTS → Orbview2/SeaWiFS → TERRA-AQUA/MODIS

1978 Sep to 1996 Jan  
— 10 years blank period  
1996 Nov to 1997 Jun  
1997 Sep to 2004 Dec (LAC around Asia)  
2002 Jun to present (Aqua)  
2007 Jan to present (Terra)

26

**II Data analysis**

- **Step II - 3 Analysis of monitoring data for the classification of assessment area**

Outer

Middle

Inner

Analyze the monitoring data to grasp the trends of the selected assessment parameters (e.g. annual mean, annual maximum, etc.)

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**III Classification of assessment area**

- **Step III - 1 Initial classification**

---

- Classify each assessment parameter into elevated (+) or non-elevated level (-) by comparing its trend values with the assessment level

```

    graph TD
      A[Assessment parameter] --> B[Above assessment level]
      B -- Yes --> C[Elevated level (+)]
      B -- No --> D[Non-elevated level (-)]
  
```

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**III Classification of assessment area**

- **Step III - 2 Overall classification (1)**

---

- Classify each assessment category into elevated or non-elevated level by integrating the classification results of the assessment parameter

	Parameter	Elevated (+) or non-elevated (-) level	Integrated assessment*
Category 1 Nutrient enrichment	T-N, T-P	+	+
	Winter DIN, DIP	+	
	Winter N/P ratio	-	

\*: Integrated assessment will be "+" when there are more than one parameter showing an elevated level

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**III Classification of assessment area**

- **Step III - 2 Overall classification (2)**

---

- Classify the eutrophication status of assessment area into problem, potential problem or non-problem area by integrating the classification of each assessment category

Category 1 Nutrient enrichment	Category 2 Direct effects	Category 3 Indirect effects	Category 4 Other possible effects	Overall classification*
+	+	+	+	Problem area
+	-	-	-	Potential problem area
-	-	-	-	Non-problem area

\*: The criteria for the overall classification is subject to further consideration

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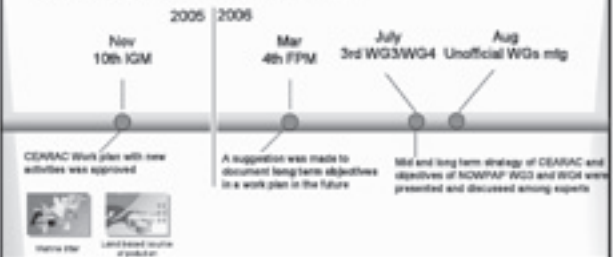


## Mid- and long-term strategies of CEARAC and goals of NOWPAP WG3 and WG4

CEARAC  
September, 2007

### 1. Background (1/2)

- New directions and need for mid and long term objective and strategy



### 1. Background (2/2)



Unofficial WGs meeting  
Busan, Korea on Aug 3, 2006



Conceptual diagram for CEARAC  
activities in mid- and long-term

### 2. Mid- and long-term strategy of CEARAC

- Given responsibility of CEARAC
  - Memorandum of Understanding between UNEP and NPEC

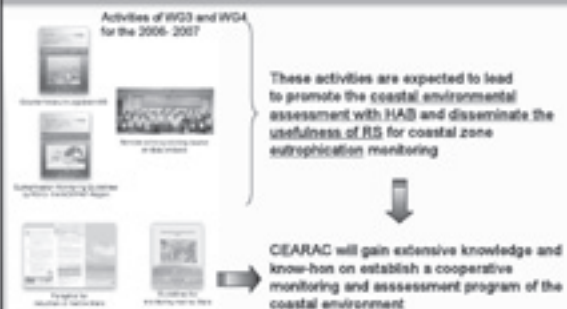
coordination of regional activities for assessment of the state of the marine, coastal and associated freshwater environment, including assessment of pollutant input for the purpose of comparison with the monitoring result. CEARAC is also expected to develop tools for environmental assessment, which can be used and shared among the member States as assessment tool that include special techniques for monitoring and assessment.

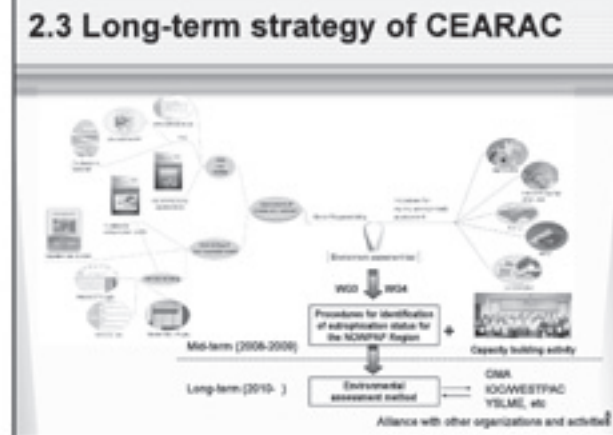
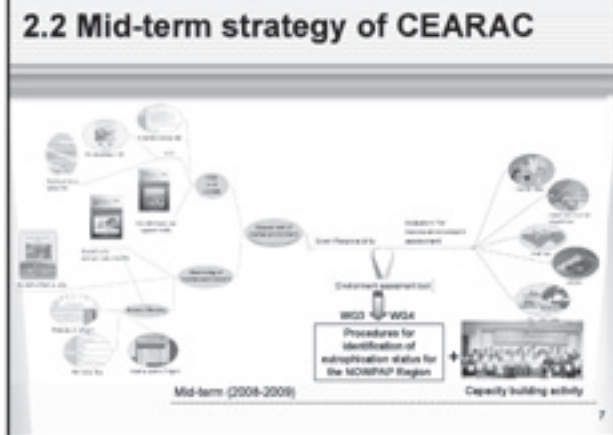
### 2.1 Guiding principles of the strategy



- a. To focus on assessment of the state of the marine, coastal and associated freshwater environments
- b. To make the best use of the accumulated experiences and achievements gained from the past activities
- c. To make the best use of ongoing CEARAC activities
- d. To be able to accommodate new activities
- e. To lead to a positive outcome in the most synergistic and non-duplicating way, through cooperating with other NOWPAP RACs and relevant national regional/international institutions/organizations

### 2.2 Mid-term strategy of CEARAC





### 3. Objectives and goals of WG3

**Objectives of WG3 is the following,**

- **Objective**  
To coordinate development of assessment tools for coastal environment with HAB (red tide and harmful algal bloom) as an indicator

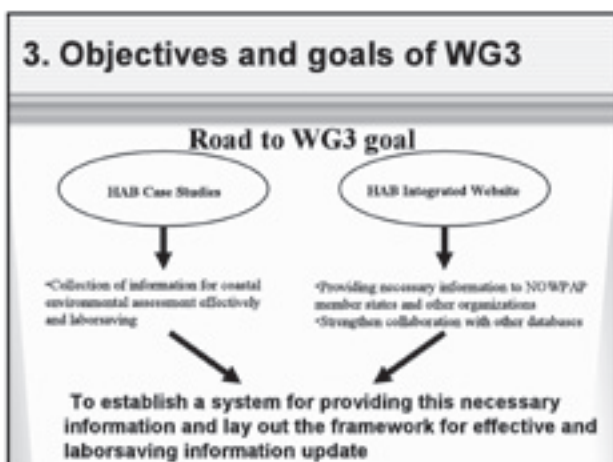
### 3. Objectives and goals of WG3

**Activities of WG3 to achieve the objective**  
Need activity to understand interaction between HAB occurrence and oceanic and meteorological condition.

↓

**HAB Case Studies**

- The most effective and laborsaving ways for sharing information among NOWPAP member states will be established  
➔ **HAB Integrated Website**
- Common concerned items in the hot region are summarized  
➔ Indicators for coastal environmental assessment



### 4. Objectives and goals of WG4

**Objectives of WG4 is the following,**

- **Objective**  
To coordinate the development of environment assessment tools utilizing remote sensing techniques, with focusing on the assessment of eutrophication, realizing that they are basic indicators for water quality of the region

### 4. Objectives and goals of WG4

**Activities of WG4 to achieve the objective**  
Need to coordinate requirements of remote sensing for the NOWPAP Member States for establishing such environmental assessment tools by taking into account of technological development of the members and other regional seas.

↓

- ➔ Educational materials for utilization of RS data for marine environment conservation
- ➔ Second NOWPAP training course on RS data analysis

### 4. Objectives and goals of WG4

**Road to WG4 goal**

Educational material for RS → Second RS training

\*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.

↓

\*Facilitate the usefulness of the developed educational materials, so to contribute to establishment of environmental assessment tools through evaluation of developed tools during the training course.

Goal of WG4

Development of RS techniques to serve environmental monitoring and assessment in the Northwest Pacific Region.

### 5 Joint activity of NOWPAP WG3 and WG4

2007 2008 2009

Lesson learned from pilot study in Toyama Bay

WG3 & WG4  
To review and refinement by experts of NOWPAP member states, based on workshop to be prepared by CEARAC

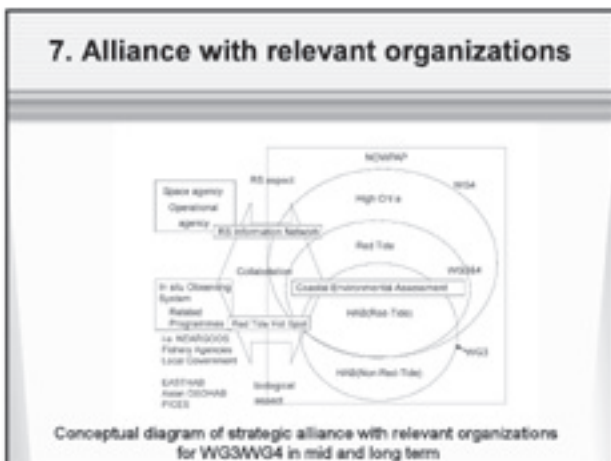
Draft procedures for identification of eutrophication status for the NOWPAP Region  
March 6th FPM

Harmonization and compilation of results of review and refinement of NOWPAP member states by a consultant

Procedures for identification of eutrophication status for the NOWPAP Region

### 6. Implementation structure of NOWPAP WG3 and WG4

	2006-2007	2008-2009	2010-
WG3	• Publication of booklet of countermeasures against IJABs	• Implementation of IJAB Case Studies • Establishment of IJAB Integrated Website	• Operation of IJAB Integrated Website • Revision of the Integrated Report
WG4	• Publication of eutrophication monitoring guidelines by remote sensing • 1 <sup>st</sup> training course on remote sensing data analysis	• Educational materials for utilization of remote sensing data for coastal environment • 2 <sup>nd</sup> training course on remote sensing data analysis	• Establishment and operation of integrated RS database • Revision of the Integrated Report
Joint Activity		• Procedures for identification of eutrophication status	• Development of environment assessment method for NOWPAP



### 8. Expected role of CEARAC in NOWPAP

CEARAC Provide useful information for POMRAC

Environment assessment tools and methods → Integrated Coastal and River Basin Management

↓

- Goal of NOWPAP -

The wise use, development, and management of marine and coastal environment so as to obtain the utmost long-term benefits for the human population of the region, while securing the region's sustainability for the future generations.



**Draft Guideline  
on establishment and disbanding  
of Working Groups**

**NOWPAP CEARAC**  
18–19 Sep. 2007

**1. Background**

• The 10th IGM of NOWPAP (24-25 November 2005, Toyama, Japan) has approved the new directions for the NOWPAP RACs, including new CEARAC activities, such as those involving Land Based Sources of Pollution (with other RACs) and Marine Litter (with other RACs).

• Following the 10<sup>th</sup> IGM decisions, the revised TOR for the NOWPAP CEARAC FPM, which enables the FPM to establish and disband Working Groups of CEARAC, were submitted by CEARAC Secretariat to the 4<sup>th</sup> FPM (8-9 March 2006, Toyama, Japan).

• The 4th FPM agreed to submit the draft TOR for the FPM to the 11th IGM, and to prepare the "Guidelines on the Establishment and Disbanding of Working Groups of CEARAC" for the next FPM.

• The 11th IGM approved the revised Terms of Reference for the NOWPAP CEARAC FPM.

**2. Establishment of Working Groups**

- A Working Group is an ad hoc group of experts established with the approval of the NOWPAP CEARAC Focal Point Meeting (hereinafter referred to as the FPM).
- The Terms of Reference of each Working Group stipulate its objectives, function, participation, sessions, and tasks, as well as other necessary matters for smooth operation of the Group.

**3. Tasks of Working Groups**

- A Working Group shall undertake specific tasks according to its TOR, within the framework of CEARAC activities, which is stated in the Memorandum of Understanding (MoU) between UNEP and NPEC, a hosting organization of CEARAC.

**4. Working Group Members**

- A Working Group shall consist of experts of NOWPAP Members, who have the necessary knowledge and experience to achieve the objectives of the Group.
- The FPs shall appoint Working Group members from each NOWPAP Member for each Working Group.
- The FPs shall inform the Secretariat promptly, in writing, of any changes in the names of Working Group members.

**5. Sessions**

- The meetings of a Working Group shall be held as requested by the FPM. The FPM will discuss the needs and timing of the meeting, depending on recommendations by each Working Group.
- Besides the Working Group members, other relevant international and/or regional bodies and organizations, with objectives relevant to those of a CEARAC Working Group, may be invited to participate in Working Group Meetings as observers.

## 6. Secretariat

- The CEARAC Secretariat shall serve as the Working Group Secretariat.

## 7. Disbanding of Working Groups

- The FPM shall decide to disband a Working Group (i) when the FPM recognizes the completion of the Group's tasks, including submission of their outcomes, as stated in the TOR of the Group; (ii) when the FPM recognizes inadequate progress of the Group in achieving its tasks; (iii) when the FPM recognizes it to be appropriate for other groups to take over the tasks of the Group; or (iv) when the FPM recognizes that disbanding the Group is inevitable for a reason other than (i), (ii) or (iii) above.

## 8. Supervision of Working Groups

- The progress of tasks undertaken by Working Groups shall be reviewed regularly by the FPM.

## 9. Amendment or Suspension of the Guidelines

- The rules in these Guidelines on the Establishment and Disbanding of Working Groups may be amended or suspended only by a decision by the FPM.
- Any proposal involving changes to these Guidelines shall be considered at the FPM.

