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**Final report on the Workshop**  
**"Industrial Development in Coastal Areas of South-East Asia"**  
Hanoi, Vietnam, 25-27 June 2001

*Prepared by Center for Marine Environment Survey Research and  
Consultation (CMESRC), 264 Doi Can str., Hanoi, Vietnam*

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## Final report

- **Workshop title:** Industrial Development in Coastal Areas of South - East Asia
- **Funding Organization:** UNIDO
- **Organizing institution:** ICS - UNIDO
- **Collaborated institution:** Center for Marine Environment Survey Research and Consultation (CMESRC)
- **Place:** CMESRC, 264 Doi Can str., Hanoi, Vietnam
- **Duration:** 25 - 27 June 2001.

**1. Background:** The South China Sea includes one of the largest marine ecosystems of the world. It contains valuable coastal and marine resources including the most bio-diverse coral reefs in the world, vast tracts of mangroves, highly productive estuaries and important fisheries resources. Millions of people rely on these resources for their livelihood. These resources are coming under increasing threat from over - exploitation, destructive use practices inappropriate coastal development, and pollution. The origin of pollution is not clear in many cases because the inventory of the industries of their technological level along the coastal areas is very difficult to achieve. Field observations and other direct measurements of the coastal areas have to be integrated with the results of proper interpretations of remotely sensed data. The development of an integrated information system for coastal sustainable development will be a necessary step to re-assess national industrial plans with the aim of reducing the spread of the industrial plant location and, concurrently, sparing coastal areas from such development.

Furthermore, there is an urgent need to develop strategies for cleaner production, monitoring industrial development, its pollution, and also to assess the industrial risk of already established industrial areas. To solve conflicts and/or find optimal solutions the integration of recent tools such as Geographic Information Systems (GIS), Image Processing Systems (IPS), Remote Sensing (RS), Process Simulation (PS) and Cleaner Production (CP) with Data Management, Data Analysis and Modeling, looks to be a promising exercise. As a matter of fact in the general information and guidance on developing and implementing an Integrated Coastal Management (ICM) program, UNEP (1995) includes specific tools and techniques of GIS and data management to face problems of protected areas, ecosystem management, impact assessment, economic evaluation and risk assessment.

Objective: This Workshop has presented the state of the art of DSS methodology and GIS technology and its applications in coastal zone management and has defined the role of ICS-UNIDO in the transfer of technology with the aim of enabling the countries facing to South China sea to improve their capacity in the use of spatial decision support systems:

- To identify optimal sites for the development of new industrial areas;
- To promote industries based on fisheries and aquaculture;
- To evaluate the technological level of production systems and developing programs for cleaner production;

- To develop networks suitable for monitoring the state of the environment, to assess risk and, eventually, to plan for mitigation, remediation and recovering actions in case of polluted industrial sites and in case of disasters.

The Workshop: "Industrial Development in Coastal Areas of South-East Asia" was held at CMESRC, 264 Doi Can str., Hanoi, Viet nam from 25 to 27 June 2001, organized by ISC-UNIDO (Italy) in collaboration with CMESRC, who is responsible for accomplishment of the Contract No. 2001/115 signed by UNIDO and CMESRC on 23.04.2001 .

## **2. List of participants:**

The selected and invited participants were agreed by ICS and CMESRC, they are from Cambodia (2), China (4), Indonesia (1), India (1), Malaysia (2), Philippines (1), Singapore (2), Thailand (2) and Vietnam (7). In the middle of June, Mr. Soedijo Winardi (Indonesia) informed that he could not participate in the Workshop due to his disease and six days before the Workshop, Prof. Mohd Lokman Husain (Malaysia) informed that he could not come due to an emergency at home although he had received the airtickets. Due to the transit procedure of Hong Kong, one participant from China (Prof. Cheng Jie Wei) did not come to Hanoi. So actual number of participants is 19. List of participants is presented in the Appendix A.

**3. Workshop Programme:** The Workshop started from morning 25 June and ended on 27 June 2001 following the agreed by ICS-UNIDO and CMESRC Programme shown in the Appendix B.

This Program is divided into 4 parts: Opening Ceremony session, ICS-UNIDO specialist's lectures, participant's presentations and discussion.

## **4. Opening Ceremony session:**

Attending the Opening Ceremony session on the morning of 25 June, there are the following invited guests:

- H.E. Pham Khoi Nguyen, Vice Minister of Science Technology and Environment
- H.E. Luigi Solari, Italian Ambassador in Vietnam
- Dr. Gennaro Longo, Director, Area of Earth, Environmental and Marine Science and Technologies, ICS - UNIDO.
- Prof. Dr. Sc. Nguyen Cao Menh, Director, Institute of Mechanics
- Dr. Ebe Muschialli, from the Italian Embassy in Vietnam
- The UNIDO representative in Hanoi
- The guests from Department for Science Education and Environment (Ministry of Planning and Investment), National Environment Agency (Ministry of Science Technology and Environment)

Vice Minister Pham Khoi Nguyen, Ambassador Luigi Solari, Prof. Nguyen Cao Menh, Dr. Gennaro Longo made Welcome speeches, presenting the aim and sense of Workshop and wishes of the success for the Workshop. Dr. Gennaro Longo presented ICS activities and the Area of Environment and Prof. Enrico Feoli introduced on the objectives of the Workshop.

**5. Lectures:** There are two lectures made by ICS-UNIDO specialists:

- Dr. Gennaro Longo: "Role of Process Simulation for Sustainable Development".

- Prof. Enrico Feoli: "Spatial decision support systems for integrated coastal area management".

## **6. Participant's presentations:**

### **+ On Remote sensing:**

- N.C. Gautam and others (India): Land Development in a coastal district of Andhra Pradesh: A case study of East Godavari

### **+ On Mathematical modeling:**

- Pham Van Ninh and Dinh Van Manh (Vietnam): "Mathematical modeling of pollutants spreading in water".
- Narumitr Sawangphol (Thailand): " Real - time flood Forecasting System for Southeast Asia: Area 1. The Mekong Basin"

### **+ On GIS:**

- Sombat Yumuang (Thailand): "GIS Modeling of Groundwater, Groundwater Potential and Land Subsidence in Bangkok and its Vicinity during 1993 - 1999"
- Nguyen Thi Viet Lien (Vietnam): "GIS application in CMESRC"
- Cheng Heqin (China):" Application of GIS to the Instability Evaluation of Nearshore Bedform in the Qiongzhou strait, South China sea"

### **+ On pollution sources and industrial development in coastal areas:**

- Ahmad Ismail (Malaysia):" Pollution Sources and Heavy Metal Pollution in the West Coast of Peninsular Malaysia".
- Nin Vanntha and Touch Vina (Cambodia):" Industrial Development in Coastal Zone in Cambodia".
- Laura T. David (Philippines):" Coastal Treasures and Coastal Pressures: Development in the Philippines".
- Loke Ming Chou and Wang Tat Chan (Singapore):"Industrial Development in the Coastal Area of Singapore and the Management of Marine Pollution" .
- Le Trinh (Vietnam): "Potential Water pollution at the Dongnai River Estuary and Southern Coastal Zone under Cumulative Impacts of Industrialization and Urbanization".
- Phung Chi Sy (Vietnam): "Some Urgent Environmental Issues in the South - Eastern Coastal Area and Mitigation Measures".
- Nguyen Thi Lam Giang (Vietnam): "Industrial Development and Cleaner Production Perspectives in Vietnam".

### **+ On Spatial decision support systems for coastal management:**

- Shouyong Yan (China): "Design of a Spatial Decision Support System for Harbor Development in Hainan".
- Wang Daoru (China): "Sanya Coral Reefs Management Decision Support System".

7. **Project's proposals:** Under the chairing of Prof. E. Feoli the participants discussed on the common project's proposals. There are 10 project's proposals for ICS-UNIDO selection. They are on the application Geographic Information Systems, Spatial Decision Support Systems (SDSS), Process Simulation (PS), Data

Management, Data Analysis and Modeling and the training courses on SDSS, PS, in the region (see Appendix C.).

The project concepts elaborated can be grouped in the following areas:

- Sea Products: Pathways of production, including the supporting industries in the assessment of environmental impact
- Rural-Urban Interface and Industry with special emphasis on Water resource management in coastal areas
- Cleaner Production: Exploring ways to generate cooperation from the industries
- Production & Biodiversity
- Waste Management and Recycling: Making use of one industry's waste product as raw material for another
- Information technology for integrated coastal zone management.

#### **8. Other Organization matters:**

The lodging and board for all foreign and 3 Vietnamese participants have been arranged at the LaThanh hotel, 218 Doi Can str., Hanoi. This hotel is very close to CMESRC.

Almost participants came to Hanoi on 24 June, one day before the Workshop, except Ms. Laura T. David (Philippines) came to Hanoi on 25 June due to her requirement and almost participants left Hanoi for their countries on 28 June and some others left Hanoi on 29 June and 30 June as there was no flight from Hanoi to their countries on 28 June (or 29 June).

Pocket money have been provided for foreign and Vietnamese (outside of Hanoi) participants according to the number of their nights in Hanoi (the place of meeting) and following the instruction of ICS - UNIDO.

#### **9. Conclusions:**

According to the participants, the Workshop has been organized in a good way, satisfying all requirements of an international scientific event.

It was recommended that ICS, in close cooperation with UNIDO:

- should develop a network for supporting the planning activities of industrial development of coastal areas of South China sea;
  - ICS should help preparation of pilot study projects to be submitted to donors;
- ICS-UNIDO should organize long-term training courses in cooperation with other UN Agencies on Decision Support Systems and other technological tools for Coastal Zone Management.

Hanoi, 17.07.2001



*Prof. Pham Van Ninh*  
CMESRC, Director

**Workshop on  
“Industrial Development in Coastal Areas of South-East Asia”  
Hanoi, Vietnam, 25-27 June 2001**

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**Workshop on**  
**“Industrial Development in Coastal Areas of South-East Asia”**  
*Hanoi, Vietnam, 25-27 June 2001*  
**Appendix B: Workshop Program**

**Monday, 25 June 2001**

08:30-09:00	Registration
09:00-09:30	Welcome speeches by hosts and invited H.E. Pham Khoi Nguyen, Vice Minister of Science Technology and Environment H.E. Luigi Solari, Italian Ambassador in Vietnam Prof. Dr. Sc. Nguyen Cao Menh, Director, Institute of Mechanics Dr. Gennaro Longo, Director, Area of Earth, Environmental and Marine Science and Technologies, ICS - UNIDO
09:30-10:00	Presentation of ICS activities and the Area of Environment (Mr. G. Longo)
10:00-10:15	Presentation of the objectives of the Workshop (Mr. E. Feoli)
	Introduction of Participants
10:15-10:45	Coffee break
10:45-11:45	Role of Process Simulation for Sustainable development (Mr. G. Longo)
11:45-12:30	Methodology and models for controlling pollution on coastal areas (Mr. P. Van Ninh)
12:30-14:00	Lunch break
14:00-15:00	Spatial decision support systems for coastal management (Mr. E. Feoli)
15:00- 16:00	Remote sensing for monitoring industrial development in coastal areas by IRS Indian satellites (Mr. N.C. Gautam)
16:00-16:30	Coffee Break
16:30- 17:30	Remote Sensing applications in Coastal areas of China (Mr. S. Yan and Mr. C. Wei)
18:30	Welcome dinner

**Tuesday, 26 June 2001**

08:30-09:30	Industrial Development in Coastal Areas of Thailand (Mr. S. Yumuang and Mr. N. Sawangphol)
09:30-10:30	Industrial Development in Coastal Areas of China (Ms. H. Cheng and Mr. W. Daoru)
10:30-11:00	Coffee break
11:00-12:00	Industrial Development in Coastal Areas of Vietnam (Mr. P.C.Si and Ms. N.T.V.Lien)
12:00-13:30	Lunch break
13:30-14:00	Industrial Development in Coastal Areas of Malaysia (Mr. A. Ismail)
14:00-14:30	Industrial Development in Coastal Areas of Philippines (Ms. Laura T. David)
14:30-15:30	Industrial Development in Coastal Areas of Cambodia (Mr. N. Vanntha and Mr. T. Vina)
15:30-16:00	Coffee break
16:00-17:00	Industrial Development in Coastal Areas of Singapore (Mr. C. L. Ming and Mr. C. Weng Tat)
18h30	Dinner given by CMESRC

**Wednesday, 27 June 2001**

08:30-09:30	Industrial Development in Coastal Areas of Vietnam (Mr. Le Trinh and Ms. N.T.L. Giang)
09:30-10:30	Working groups developing common projects
10:30-11:00	Coffee break
11:00-12:00	Continuation of working groups
12:00-13:30	Lunch break
13:30-15:30	Continuation of working groups
15:30-16:00	Coffee break
16:00-17:00	Conclusions and recommendations – Closure of the Workshop

***The Workshop on  
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**Appendix C: Project's proposals**

**1. Project's title: The Environmental changes of the South China Sea Coastal Zone, their linkage with the Industrial Development.**

+ Objectives:

- To use GIS and Decision Support System (DDS) in determining the changes in the coastal zone of South China sea and the linkage with the Industrial Development and propose of appropriate measures.
- To improve the capacity of GIS, DSS in each countries.

+ Participating countries: Cambodia, China, Indonesia, Malaysia, Philippines, Singapore, Thailand, Vietnam and ICS (Italy).

+ Innovation:

- Maps showing the changes in different aspects of the Environment of the Coastal Zone: Coast line, Mangroves, Coral reefs, Sea grasses, Lagoons, Tidal flat, water and sediment quality, industrial units location, kind of industries, scale of industries for the last 20, 30 years for the whole region.
- Appropriate measures on location, kind of industries, scale of industries for each country.

+ ICS-UNIDO role: Know - how transfer, technical adviser and leader for project's improvement.

+ Work plan: Training, equipment for GIS, DSS supply, case study in each country, common outputs, Workshop.

**2. Project's title: Linkage of GIS and modelling.**

+ Objectives:

- Know how to make GIS linked with Environmental modelling.
- To apply the findings to the Gulf of Tonking.

+ Participating countries: Vietnam, China, ICS (Italy) and United Kingdom.

+ Innovation:

- Scientific: Know how is quite new.
- Practice: Application for the Gulf of Tonking is new.

+ Work plan:

- Training on how to link the modelling of hydrodynamics.
- Apply the findings for the Gulf of Tonking.
- Workshops.

### **3. Project's title: Coastal Ecosystem Management: Urban and industrial areas.**

#### + Objectives:

- To identify problems in the coastal ecosystem near urban and industrial areas in developing countries.
- To help developing countries making the plans and pollution control strategy towards sustainable urban and industrial areas.

+ Innovation: To provide the best tools to help the developing countries in their planning and management of their coastal ecosystem near industrial and urban areas.

+ Work plan: Development of a good planning and management system towards sustainable urban and industrial areas.

+ Implementation: Training program and Workshops.

### **4. Project's title: Methodologies for infrastructure planning in the Environment.**

#### + Objectives:

- To identify/ develop a set of case studies where the application of the policy and planning methodology.
- Provide training on the selected planning methodologies.
- Scope: Infrastructure projects in: industrial development, transportation network development, port/harbor development, solid waste disposal, sewage treatment, urban renewal.

+ Innovation: To provide the best tools to help the developing countries in their infrastructure planning.

+ Work plan: Development of a good planning and management system towards sustainable urban and industrial areas.

+ Implementation: Training program and Workshops

### **5. Project's title: Integrated sustainable coastal zone management of East coast of India with special references to mangrove forest.**

+ Objectives: To generate a database and find out the solution by putting the action plan for generation of mangrove.

+ Methodology: The methodology to achieve the above focus: remote sensing (RS), Decision support Systems (DSS), Integration of spatial and non-spatial data in GIS mode.

+ Steps to be taken: Steps to be taken to determine the coastal practices for sustainable development showed given focus such as: short term/ long term policies and benefits, capacity building, benefit to the local and surroundings, technology transfer.

+ Recommendations:

- Remote sensing as a tool may be enough for data collection and monitoring.
- GIS, DSS may be used for data integration and finding solutions.

## **6. Project's title: Planning the coastal zone by GIS-tech.**

+ Objectives:

- To build up a criterion of coastal zone function classified.
- To build up a synthetic database.
- To address the main problem in the demonstration site.
- To carry out the developmental strategy and Environmental protection plan.
- To provide the suggestion to the local government for coastal zone management.

+ Innovation:

- Set up an inter-countries database in coastal zone, strength the exchanging of tech and experiment among the countries.
- GIS-tech is used for coastal zone planning realizing the combination of multi fields of sciences.

+ Work plan: Select different interesting type of coastal zone.

## **7. Project's title: Coastal area Industrial coast minimization and exchange program**

+ Objective:

- To reduce the total amount of coast generated in the whole area
- To help decision makers on siting of industrial establishment to optimize waste minimization and exchange activities
- To reduce the impact of industrial development on coastal environment

+ Innovation:

- Use of GIS to identify spatial position of appropriated industries within the coastal area .

- Use of Database software to setup a Database of Industrial plants. key activity and their material coast – make it available on internet So that every enterprises in the region can access and contact one another for waste exchange and registrar in to the list.

+ Work plan:

- Survey and study on existing and potential industrial plants in the region
- Study on type of waste and type of material each enterprise produce/Sea
- Set up GIS for the region and make it accessible for decision-makers.
- Write software to register enterprise's information

**8. Project's title: Development of training program for coastal Zone Management in the Southern Vietnam.**

+ Objectives:

- To formulate an appropriate training program for coastal zone management in the southeast Asian countries.
- To transfer knowledge and experiences for local environmentalists and production companies in environmental management, integration of economic development and biodiversity conservation.
- To set up a net work in environmental training for the Southeast Asian region.

+ Innovation:

- Prepare lecture note using international and national literatures and experiences.
- Using modern techniques in training (informative system, GIS, mapping ...)
- Training on spot (at the places)

+ Work plan

- To formulate the project: 2 months
- To prepare lectures: 2 months
- To collect participants from the related countries: 2 months
- To conduct the training course: 7 – 10 days

**9. Project's title: Information technology**

+ Objective

- General: Need to improve the knowledge skill on in formation technology concern to industrial development to inflow the information in the region.
- Specific:
  - to identify the problem on industrial development in coastal zone
  - Setup the networking group in region to share in formation/data base through transfer GIS technology.
  - To survey for case study writing focus in industrial development in coastal zone relevance the environmental aspect.
  - To train the human resources in region through to provide the fellowship to participants short and long time

+ Innovation: to update information/ data base for vaulting and company what are happened and changing that impact the environment system in coastal zone.

- + Work plan
  - To train a short or long time concern information technology
  - To survey to collect data/information industrial activities and to identify the problems impact ecosystem.
  - Case study and to share information in region.

#### **10. Project's title: Water resource Management**

- + Objectives:
  - Control for water quality
  - Control waste discharge (solid and liquid) (Industrial/waste agriculture waste household waste)
- + Innovation:
  - Use GIS to identify industrial location settlements, topography...
  - R.S to classify land use
- + Work plan:
  - Collect industrial information
  - Collect waste discharge and waste production
  - Settlement, population
  - Water quality checking
  - Other survey

#### **11. Project's title: Development of a Client/Server-based Interactive Image Interpretation System**

##### + Objectives:

##### General objectives:

To give users a powerful tool in low cost for their obtaining of the thematic information from different kind of remote sensing data, and then to support users' remote sensing applications.

##### Specific objectives:

- (1) To provide a technical tool for many interpreters separately to carry out an image interpretation task with large scale or region;
- (2) To provide a technical tool for the task director to check the quality of the image interpretation by interpreters with different experiences;
- (3) To provide a technical tool for training courses or schools to train the new interpreters or students of image interpretation.

##### + Innovation:

To integrate visual image interpretation and digital image processing, remote sensing and geographic information, and geo-sciences and information technology together efficiently and fruitfully.

##### + Work plan:

- To develop the software platform of C/S based Interactive Image Interpretation System;



- To develop the software for assessment or evaluation of image interpretation results, and analysis of mistakes in the results;
- To develop the training materials for schools or training courses to train students or new interpreters in different fields, such as ecological environment, land use/land cover, natural resources inventory, urban management, etc. The materials include typical images step by step, the corresponding standards of interpretation results, the software for analysis of interpretation mistakes and corresponding supplementary training assignments, etc.

## **12. Project's title: Monitoring Platform and Station in the River Estuary**

### + Background

The developed largest cities in the South-East Asia as Haikou, Hu Chi-Ming city, Manila, Kuala Lumpur are located in the river estuaries, where the most strong interactivity of land and sea exists. And in the estuaries, the pollution from industrial urban area and agricultural rural area in the whole catchment basin is very important for the extensive demands of coastal environmental management. The some policy and some technique to control the pollution works very well in some cities separately around the South China Sea.

### + Objective

Communication between these policy and cities are necessary for the successful coastal management because the pollution are transported and communicated around the coastal zone. Therefore, the standardization of previous data and future data in the different cities analyzed and detected by different institutes is needed for the collaboration of coastal management between the South-East Asian countries.

### + Innovation

- Monitoring platform of GIS will be designed
- Monitoring station in the field will be established

### + Work plan

- Selection of physical-chemical-biological parameters for the monitoring platform
- Selection of best cities for the easy control in the coming two or three years.