



**SIDA'S PROJECT ON SPATIAL PLANNING IN THE COASTAL ZONE–DISASTER  
PREVENTION AND SUSTAINABLE DEVELOPMENT  
THAILAND**

**FINAL REPORT**



**Center of Excellence for Biodiversity of Peninsular Thailand  
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&  
Department of Marine and Coastal Resources  
Ministry of Natural Resources and Environment**

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## **I. COUNTRY BACKGROUND**

Thailand has an extensive coastline on both sides that are opened to the Gulf of Thailand on the east and the Andaman Sea on the west, covering area of 2,614 km. within 23 provinces. It claims an Exclusive Economic Zone (EEZ) of approximately 300,000 km<sup>2</sup> - about 60 percent of its land. Its coastal areas include 2,130 km<sup>2</sup> of coral reefs and 2,080km<sup>2</sup> of mangroves. Marine fisheries and aquaculture, as well as coastal tourism and marine transportation, are the main economic activities along the coast. These areas are important to the country in terms of economy and human settlement. A population of about 67 million people, 40% or 27 million of whom, lives along its 2,614 km of coastline.

Rapid economic growth and economic promotion of Thailand, according to the First to the Tenth National Economic and Social Development plan, during the last 50 years have stimulated establishment of economic activities and led these areas into intense pressure of area deterioration and resource depletion. Major heavy industries such as steel, oil refinery, petroleum chemical products, food processing factories and power plants are located along coastline especially on the east coast of the Gulf of Thailand. Agricultural activities are also major economic activities in coastal areas that contribute large amount of income at both local and national scales. The coastal areas are also popular locations for tourism and urban and industrial development. Over the past decades, Thailand's marine and coastal resources have come under threat as the population in the coastal provinces has grown and economic activities such as tourism, ocean transportation, and marine fisheries and aquaculture have increased. As a result, resources are being lost or degraded. Specifically, coastal wetlands are under threat. While some wetlands receive protection as designated RAMSAR sites, many continue to be impacted by the effects of coastal development, agriculture, and tourism. Mangrove wetlands, of which large areas have been lost during previous periods of large economic growth, today remain under pressure. A recent assessment of coral reefs classified over 80 percent of reefs along the Andaman Coast and over 50 percent of reefs along the Gulf as either in "fair," "bad," or "very bad" condition and concluded these reefs are at risk of continued degradation. Storms, coral bleaching, diving, fishing gear, dredging, sedimentation and landbased pollutants are the main factors. An international comparative study also indicated that at least 50 percent of all coral reefs in Thailand experience "high" or "very high" threats.

Finally, natural hazards and expected impacts of global climate change need to be addressed. Natural hazards frequently occur and can cause severe damage to coastal resources. Climate change and an associate rise in global sea level are expected to inundate coastal areas and negatively impact livelihoods and GDP. In particular impacts in the fl at and low-lying Gulf area, including Bangkok, are expected to be high.

Marine and Coastal issues in Thailand are summarized as followed;

- 1) Degradation of marine and coastal resources and its biodiversity.** Thailand's abundant and diverse marine biodiversity has suffered from urban and tourism development in the coastal area, waste water discharge, marine litter, tourist activities, sedimentation, destructive fishing gears in the open sea and coastal areas and climate change. Conversion of coastal mangrove forests into intensive shrimp farms creates conflicts of interest among small-scale fishermen and between fishermen and shrimp farmers. Marine Parks have also led to conflicts with fishermen.
- a.* Conversion of coastal mangrove forests into intensive shrimp farms lead to a loss of more than 50% of the original mangrove area in Thailand. The coral reef in the Gulf of Thailand has been degraded from coastal development and tourist activities such as sedimentation, sewage discharge, physical damages, and over fishing. Seagrass beds in 5 major areas in the Gulf of Thailand have also been degraded from sedimentation and sewage discharge.
  - b.* Land conversion and intense exploitation of water have led to rapid deterioration of natural resources. The legacy of deforestation is creating other environmental problems, such as conversion to dry lands, sedimentation to the sea, and loss of natural habitats. The agriculture sector also releases chemical fertilizers and insecticides to the coastal and marine environment.
  - c.* Erosion has become one of the primary environmental challenges. In many areas, the coastline is eroding at a rate of more than one to five meters per year, resulting in a loss each year of an area equivalent to two square kilometers, worth over THB 6 billion or about US\$ 150 million. While combating erosion will take major investments, the costs of not taking action in terms of a loss of land, loss of utilities, and impacts on communities, will likely exceed those investment costs.
  - d.* Derelict fishing gear has been identified as the type of marine debris most hazardous to marine species. Lost fishing gear and gear scraps have been shown to entangle to coral reef, marine turtles, manta ray. In Thai waters, reports of entangled and stranded marine wildlife are almost entirely limited to land-based observations over a small area of coastline. Some species of marine turtles are thought to mistake plastic bags and other plastic items for prey, especially hawksbills, eat encrusting organisms that grow on floating plastics and nets, and are likely to become ensnared when attempting to feed. There are also directly threaten to coral reef ecosystems through the abrading and scouring of coral substrates as derelict fishing gear snags on coral reef. There are many volunteer campaigns to remove fishing net form the coral reef.
  - e.* The aesthetic impact of marine debris on coastal environments in Thailand is obvious and compelling. Indeed, the aesthetic degradation that is evident on many beaches may be more compelling to the general public and policy makers than detailed analyses of animal mortality or other impacts. Anecdotal reports suggest that the navigational hazard posed by marine floating debris in Thai's waters is significant and increasing, though incidents remain poorly documented.
  - f.* Several endangered species live in the Thai coastal waters. Dugong is one such species. These marine mammals live in the country's shallow tropical waters where they primarily feed on sea grass beds. Since 1979, an average of 15 dugongs has been killed each year. The dugongs, considered a delicacy, are hunted for their meat or die as a result of inappropriate and destructive fishing practices. This

despite dugongs being listed in the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which forbids the use of fishing gear that could potentially harm the species. If this trend continues, dugong could be eliminated from Thai waters. Another marine species under threat is the whale shark. Whale sharks—the largest fish ever recorded—can grow to be 12-18 meters long. They are found in both the Gulf of Thailand and the Andaman Sea. Declared as protected species in 2000, the hunting of whale sharks is strictly prohibited.

## **2) Land and marine based pollution**

The increasing pressures from industrial and urban development, tourism, fisheries, and marine transportation are linked to rapid population and economic growth in the coastal provinces. While this overall growth brings shortterm benefits to the people of Thailand, it must be combined with a sustainable management of the natural resources in the coastal areas to preserve those resources—and its values—for current and future uses and generations. Sources of land and marine based pollution are as followed; Volumes of untreated domestic sewage, industrial wastewater and solid hazardous wastes have risen dramatically in recent years. The result is that roughly one third of Thailand's surface water bodies are considered to be of poor quality.

- a.* Discharge of wastes from shrimp farms. Shrimp farms are intensive farm that produce high quantity of shrimp by using various types of chemical for growth rate acceleration and diseases protection. These chemicals are released into the public waters and discharged into the coastal areas. The untreated water from the farms also discharged directly into the coastal areas.
- b.* Oil spill from marine transportation. There are many piers for fishing vessels and tour boats, and harbors for cargo vessels and navy base. Therefore, in each day there are many boats and vessels have visited the piers and harbors. Some oil and fuel are spilled from boats and vessels and distributed into coastal areas. The oil spill will be a considerable threat to the coastal and marine environment.
- c.* Red tides, caused by excessive algae growth and a result of pollution, are now yearly events, and the growth in marine transportation has led to problems related to accidents, oil spills, and invasive species

## **3) Over exploitation**

- a.* In the fisheries sector, Thai marine fish resources have traditionally been rich and abundant and marine fisheries contribute substantially to the country's GDP. In 2003, for example, Thailand accounted for three percent of the world's total fish catch. Of the total marine fisheries, 70 percent comes from the Gulf of Thailand and the remainder from the Andaman Sea. Total fish catch appears to be in decline and fishermen have to spend increased amounts of time to catch the same amount of fish as before. The amount of "trash fish"—commercially unimportant fish, including juveniles—per catch is also increasing.

Over-harvesting of marine fisheries has reduced fishing yields by 90 percent. Overfishing derives from the increase in the number of small-scale fishers and in the improvement in fishing technology of commercial fishery. The light luring

fishing technique is employed by the commercial fishery and some high technology fishing equipments are installed on commercial fishing vessels. These have led to an increase in fishing efficiency and consequently to overfishing. Trawls and push nets are popular gears among the fishers due to their fishing efficiency. However, these gears create a severe impact to the coastal and marine environment through their operations. Several sea beds, seagrass beds, and coral reefs are destroyed by both small-scale and large scale of trawls and push nets. Overfishing results in shifts in fish size, abundance, and species composition within reef communities. Evidence suggests that removal of key herbivore and predator species may ultimately affect large-scale ecosystem changes. In addition, the fishing nets that fishers throw into the sea cover the coral reefs and result to the death of corals. The coastal areas have also been seriously degraded by expansion of shrimp aquaculture.

The decreasing availability of fish combined with increased competition is putting additional pressure on small-scale fisher folk and is leading to conflicts with commercial operators. Despite economic growth elsewhere in the country and along the coast, pockets of poverty continue to exist in coastal communities.

- b.* While marine capture continues to be an important industry, aquaculture, and especially shrimp farming, has grown rapidly over the past years. Shrimp farming has grown from 26 percent of total coastal aquaculture production in 1984 to 47 percent in 2003 and in area has reached the Government limit of 500,000 rai (80,000 hectares) across the country. Aquaculture products are valuable. While aquaculture production was about a quarter of total marine production in 2003, the total value for each was about the same.
- c.* Other important natural resources in the coastal and marine provinces are surface and ground water. Fresh water scarcity in the coastal areas, which occurs against a backdrop of low availability, high pollution, and increasing per capita consumption. There is a tremendous pressure on Thailand's water resources, as the country ranks the lowest in Asia for annual per capita water availability, but it ranks 14<sup>th</sup> in the world in industrial organic water pollution. Over-exploitation of ground water is a major cause of land subsidence. Marine-based pollution and run-off from the land have resulted in several locations with degraded or severely degraded water quality.

#### **4) Natural disaster and Climate change**

During the last 30 years, there was an increase in frequency of Global/regional disaster such as earth quake, storm surge, sea level rise, global warming, flood, drought, forest fires, and coral bleaching. Ecosystems in many areas have become vulnerable resulting in the losses of flora and fauna. Surface of the earth has undergone physical changes including coastal erosion and high tide resulting in the forced migration of coastal communities, the damage of infrastructure, tourist areas, and highly-investment industrial zone along the coastal lines. In addition, many communicable diseases and insect pests will cause the damages to human life, agricultural products and world food security. Moreover, poverty, migration and fights for resources have occurred. Natural disasters tend to be more severe threatening the production and well-being of the peoples.



## II. METHODOLOGY

The project ‘Spatial Planning in the Coastal Zone – Disaster Prevention and Sustainable Development’ was developed by the COBSEA Secretariat as a post-tsunami project during 2006 and submitted to the Swedish International Development Cooperation Agency (Sida), which approved it for funding in early 2009. The 3-year project focuses on spatial planning in coastal areas with an overall goal to prevent/reduce the impacts from natural disasters, climate change and sea-level rise, and to promote sustainable development of coastal areas through the application of spatial planning.

The project is being implemented in three phases: Phase 1 - Producing a Regional Resource and Guidance Document for the integration of new concepts, such as climate change adaptation, disaster-risk reduction, ecosystem-based management and results-based management into existing coastal spatial planning policies and procedures (complete); Phase 2 - National consultations and planning of national adaptation of the Regional Resource Document; and Phase 3 - Capacity building, national adaptation, demonstrations.

In Phase 1, a Regional Resource Document (RRD) - “*Spatial Planning in the Coastal Zone of the EAS Region: Integrating Emerging Issues and Modern Management Approaches*” was developed to promote the application of ecosystem-based management principles and stakeholder involvement (including coastal communities) in spatial planning processes. In addition, a menu of possible capacity-building activities was prepared with the aim of adapting the Regional Resource Document to the specific needs of individual countries.

In order to ensure tangible outcomes of the project, the Center of Excellence for Biodiversity of Peninsular Thailand (CBIPT), Faculty of Science, Prince of Songkla University assigned Coral Reef and Benthos Research Unit to conduct the activities with the overall management and coordination by National Coordinator and National Focal Point. The Research Center is responsible for:

- Translation of Regional Resource Document into National Language;
- Developing a National Resource Document in National Language;
- Developing a Training Syllabus in National Language;
- Organizing a National Consultative Meeting to review and approve on the National Resource Document and Training Syllabus;
- Organizing a National Training Course for the National Officers and Local Authorities; and
- Developing Report.

## III. PROJECT ACTIVITIES

As provided in the contract with COBSEA, CBIPT implement the following phase-3 activities:

1. Translate the Regional Resource Document into National Language;
2. Develop a National Resource Document in National Language;
3. Develop a Training Syllabus;
4. Organize a National Consultative Meeting to review and approve on the National Resource Document and Training Syllabus relatively;

5. Conduct a National Training Course.

#### **IV. PROJECT IMPLEMENTATION AND ACHIEVEMENTS**

##### **1. Training the Trainer course**

National team members attended the **Training the Trainer on Spatial Planning in the Coastal and Marine Zone of the East Asian Seas Region** organized by COBSEA on May 14 – 18, 2012, in Phuket, Thailand. The Cambodian participants and their affiliations are as follows:

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**2. Translation of the Regional Resource Document into National Language and preparation of national training couse document**

COBSEA Regional Resource Document and other 3 resources documents have been translated. (see book cover in Annex I).

Ellik Adler, 2012. Spatial Planning in the Coastal Zone of the East Asian Seas Region: Integrating Emerging Issues and Modern Management Approaches. Coordinating Body on the Seas of East Asia (COBSEA).

Ehler, Charles, and Fanny Douvère, 2009. Marine Spatial Planning: a step-by-step approach toward ecosystem-based management. Intergovernmental Oceanographic Commission and Man and the Biosphere Programme. IOC Manual and Guides No. 53, ICAM Dossier No. 6. Paris: UNESCO. (English)

UNEP 2011. Taking Steps toward Marine and Coastal Ecosystem-Based Management- An Introductory Guide.

Asian Disaster Preparedness Center (ADPC) 2012. Regional Training Manual on ‘Disaster Risk Reduction for Coastal Zone Managers.

In addition, a main training manual: Spatial planning and disaster protection for sustainable development in coastal areas was adapted from

- Asian Disaster Preparedness Center (ADPC) Regional Training Manual on Disaster Risk Reduction for Coastal Zone Managers,
- the COBSEA Spatial Planning in the Coastal Zone of the East Asian Seas Region: Integrating Emerging Issues and Modern Management Approaches,

- UNESCO-IOC Marine Spatial Planning: A Step-by-Step Approach toward Ecosystem-based Management,
- UNEP Taking Steps Toward Marine and Coastal Ecosystem-Based Management – An Introductory Guide ,and
- Ecology of sandy beach and rocky shore of Pathiew coast, Chumporn

### **3. National Training Course**

National Training Course on Coastal Spatial Planning to Address Disasters and Climate Change held during January 28 to February 1, 2013 in Chumphon province. (Annex II) Forty nine participants from six provinces (Petchaburi, Prachuap Kirikhan, Chumphon, Surathani, Nakorn Srithammara and Songkla) met in Chumphon, Thailand to participate in the Sida-sponsored, UNEP/COBSEA National training Course on Spatial Planning in the Coastal and Marine Zone in the EAS Region. The five-day training course provided instruction by the senior coastal resource and mangrove management experts from Department of Marine and Coastal resources (DMCR) and the COBSEA's representative to future marine spatial planners on how to integrate emerging issues such as climate change, sea-level rise, natural disaster as well as degradation and overexploit of marine and coastal utilization from human and nature, and new management approaches including ecosystem-based management, disaster-risk reduction and marine spatial planning, into provinces spatial planning processes in the coastal and marine environments.

The national training course concluded with the initiative draft provincial or sub-provincial (cell) spatial plans by each of the six provincial teams, which concerned issues were analyzed and discussed under the spatial planning process for the further development and implementation of their own responsibilities.

National course instruction and three key resources documents (e.g., training course presentation, manuals, and guidance documents) have been translated into Thai to facilitate ease of learning and increase depth of understanding of key concepts and approaches.

The workshop process was conducted by taking the MSP theory into practices thru GIS and 1:20000 maps for each province with visualize and actively exercise. The six provincial groups discussed and developed maps of their natural resources, disaster risk areas and protected areas before making a draft of the marine spatial plan in the most critical issue in their area.

The initiative draft plans will be considered and selected for being pilot demonstration site (s) in the full marine spatial planning process with resolutions by DMCR. It is sincere hope of UNEP, COBSEA, the participating provinces and the generous sponsor Sida, that the impact of this workshop will be significant and long-term. The highly collaborative and consultative nature of this workshop, especially with DMCR ensured that the phased activities adapted to and met the needs and priorities of the participating provinces.

The fact that a now nationally trained cadre of national experts and instructors may be extending further awareness and training support in Thailand through DMCR centers network covering the whole coastline, gives promise to the effective and nationally specific incorporation of emerging issues and modern management approaches into priorities provincial spatial planning regimes and decision-making process.

### **Key speakers and topics**

1. **Sasin Chalermnarb** : Coastal Environmental System, Uses & Conflict management  
Seubnakasatian Foundation
2. **Asst. Prof. Dr. Somporn Chuay-aree** : Climate Change & Community communication  
Faculty of Science and Technology, Prince of Songkla University, Pattani campus
3. **Worawoot Tantiwanit** : Coastal Geomorphology, Storm surge and erosion  
Department of Marine and Coastal Resources
4. **Dhana Yingcharoen** : Concept of Marine Spatial Planning  
Department of Marine and Coastal Resources
5. **Weranit Thansuporn** : Environmental Protected Area  
Office of Natural Resources & Environment Policy and Planning
6. **Prasan Itthipornkul** : Environmental Impact Assessment Process  
Office of Natural Resources & Environmental Policy and Planning
7. **Sarawut Siriwong** : Marine Spatial Planning: toward Ecosystem-based Management  
Faculty of Marine Technology, Burapha University
8. **Phongtheera Buapet**: Coastal Hazard, vulnerability & Risk  
Faculty of Environment and Management, Prince of Songkla University, Phuket campus
9. **Sakanan Plathong**: Degradation of marine and Coastal Resources  
Faculty of Science: Prince of Songkla University, Hatyai campus

### **Assistance:**

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### **National Training Participants and Affiliations:**

Target participants of this course are policy decision makers consist of head of organization from responsible local organizations from the provinces in the western-upper Gulf of Thailand such as Pechaburi, Prachuap Kirikhan, Chumporn, Surathani, Nakorn Srithammarat. In addition, representatives from central government agencies are invited, including;

- Provincial natural resources and Environment officers
- Department of Marine and Coastal resources,
- Office of Natural Resources and Environmental policy and planning,
- Department of Fisheries,
- Department of national park, wildlife and plant conservation
- Universities & Research institutes
- Member of Local Administrative Organization

#### 4. National Training Syllabus

National Training Syllabus on Integrating of Coastal Spatial Planning to Address Emerging Coastal Disasters and Climate Change was revised from recommendation from participants based on the results and lessons learned from the national training course. Attached as Annex III is the Final National Training Syllabus.

#### V. FINANCIAL REPORT

Summary of expenditures of the implementation of Phase 3 activities in Thailand.

Description	Thai Baht	\$US
<b>Training expenses</b>		
Accommodation & DSA for participants	126,100.00	4,203
Travelling (Participants)	133,110.00	4,437
Food	112,654.50	3,755
Guest Lecturer Travel & DSA allowance	135,652.00	4,522
Preparation of lecture content & activities of guest speaker	92,000.00	3,067
Resources materials for participants	9,958.00	332
Van rent	10,500.00	350
Petrol	4,670.00	156
Photocopies of handout materials	7,671.00	256
Printer inkjet	4,300.00	143
Mr. Sarawut Siriwong (DSA allowance)	10,000.00	333
Mr. Phongtheera Buapet (DSA allowance)	10,000.00	333
Ms. Narissara Kongcharoenkit (DSA allowance)	10,000.00	333
Ms. Radda Larpnun (DSA allowance)	10,000.00	333
Ms. Kornkarnok Charoenmas (DSA allowance)	10,000.00	333
Ms. Piyapan Hemnukool (DSA allowance)	10,000.00	333
<b>Sub total 1</b>	<b>696,615.50</b>	<b>23,221</b>
<b>Course Syllabus development</b>		
Travelling and DSA allowances (Bangkok - Songkhla)	80,000.00	2,667
Translation (4 resource materials)	193,387.50	6,446
Ms. Radda Larpnun (Resources materials editing)	150,000.00	5,000
Mr. Phongtheera Buapet (Project assistance)	30,000.00	1,000
Mr. Sarawut Siriwong (project assistance)	80,000.00	2,667
Ms. Narissara Kongcharoenkit (Project assistance)	70,000.00	2,333
Ms. Kornkarnok Charoenmas (Project assistance)	50,000.00	1,667
Missellaneous expenses, mailing & communication fee)	30,000.00	1,000
<b>Sub total 2</b>	<b>533,387.50</b>	<b>22,780</b>
<b>Total Budget (\$US)</b>		<b>46,000</b>

## VI. RESULTS AND LESSONS LEARNED

Participants have cleared understanding of new approach of spatial planning and are able to set up their own plan in coastal and marine spatial planning. The main outputs of the program were:

- 1) Developed six draft coastal spatial plans covering the six provinces in the western-upper Gulf of Thailand: Phetchaburi, Prachuap Kirikhan, Chumporn, Surathani, Nakorn Srithammarat and Songkla; and
- 2) Established six provincial training teams who can:
  - a) Understand composition of spatial planning and shape a framework of their own spatial plan;
  - b) Integrate emerging issue and new approach to fit into their own plan regarding specific risk of target area such as ecosystem-based management, disaster-risk reduction, climate-change adaptation, and results-based management; and
  - c) Understand principle of a new coastal and marine spatial planning considering particular issue in selected area and are able to address their responsibility in the plan. They also understand how to analyze exiting problem of given area.

In addition, following the training course, a Prachuap kirikhan's representative from the provincial Ministry of Natural Resources and Environment (MoNRE) will use the spatial planning discussion result on the six coastal districts extending environment protected area spatial plan in the Prachub Khiri Khan-MoNRE participatory public hearings as well as with ONEP and concerning stakeholders during these three months. DMCR also expressed their willingness to conduct marine spatial plan training course in their coastal authorities or select a potential plan for implementation in depth.

Therefore, the key result of the national training course is increased awareness and understanding among the six provincial training teams, of the key issues and modern management approaches that are advocated for effective coastal and marine spatial planning. These provincial trainers were equipped with the necessary knowledge and skills to design and conduct similar training programs in their own provinces/areas. The objectives are to increase knowledge and understanding as well as strengthen the capacity of concerning coastal provincial government agencies to plan and manage their coastal zones more sustainably at provincial and local scales; to main stream Ecosystem based into current coastal zone management; enhance the application of disaster risk reduction and develop the guideline of coastal and marine spatial planning.

### **Agreement**

The main focus of this national training course was to provide the six provincial teams with a solid background in and functional awareness of a set of key issues and modern management approaches with disaster reduction that can be incorporated into spatial planning regimes and processes in their own coastal and marine areas.

It was agreed that the most effective approach, going forward, is to continue to develop the depth of implementation in provincial level such as Prachub Khiri Khan and Petchaburi provinces, community level at Kanom district in Nakorn Sri Thammarat province. Six marine

and coastal resources conservation centers and six of mangrove forest resources centers which covers coastline of Andaman Sea and the Gulf of Thailand under DMCR will be considered as pioneer agencies in MSP developing. Building their capacity in the MSP process for their areas proactive marine spatial plan will be possibility way forward. MSP may be implemented in the actively on-going site (s) or voluntary upon area(s) need and request.

Furthermore, the participants shared their opinion about possibility of MSP implementation in practice that it should take the marine spatial plan into the provincial strategy plan for being consistent with provincial group or provincial development strategy. However, most of the coastal provinces do not include related marine and coastal strategy. Lack of financial and key potential host like provincial authority organization, municipality and Tambon authority Organization are still challenge in convincing them to lead and demonstrate these concepts and approaches in real-life settings.

Resource materials including the guidance documents and manuals on ecosystem-based management, disaster-risk reduction, and coastal and marine spatial planning will also be published upon available funding support to further facilitate understanding and adoption of these important concepts.

## **Annex I**

### **National Resources Materials**

1. Main training manual: Spatial planning and disaster protection for sustainable development in coastal areas. Edit by National Consultant and Team Members.
2. Ellik Adler, 2012. Spatial Planning in the Coastal Zone of the East Asian Seas Region: Integrating Emerging Issues and Modern Management Approaches. Coordinating Body on the Seas of East Asia (COBSEA).
3. Ehler, Charles, and Fanny Douvere, 2009. Marine Spatial Planning: a step-by-step approach toward ecosystem-based management. Intergovernmental Oceanographic Commission and Man and the Biosphere Programme. IOC Manual and Guides No. 53, ICAM Dossier No. 6. Paris: UNESCO. (English)
4. UNEP 2011. Taking Steps toward Marine and Coastal Ecosystem-Based Management- An Introductory Guide.
5. Asian Disaster Preparedness Center (ADPC) 2012. Regional Training Manual on ‘Disaster Risk Reduction for Coastal Zone Managers.



**COBSEA**  
COORDINATING BODY ON  
THE SEAS OF EAST ASIA

คู่มือฝึกอบรมเชิงปฏิบัติการ  
การวางแผนเชิงพื้นที่ และการป้องกันภัยพิบัติ  
เพื่อการพัฒนาอย่างยั่งยืนในพื้นที่ชายฝั่งทะเล

ธนา ยิ่งเจริญ ศักดิ์อนันต์ ปลาทอง สราวุธ ศิริวงศ์  
พงศัธร บัวเพชร รัชดา ลากहन และนริศรา ก้องเจริญกิจ





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การวางแผนเชิงพื้นที่ในเขตชายฝั่งของภูมิภาคทะเลเอเซียตะวันออกเฉียงใต้:  
บูรณาการปัญหาที่ปรากฏใหม่และแนวทางการจัดการสมัยใหม่



ศักดิ์อนันต์ ปลาทอง วิภูดา ลากหนูน สราวุธ ศิริวงศ์ พงศ์ธีระ บัวเพชร  
นริศรา ก้องเจริญกิจ และธนา ยิงเจริญ

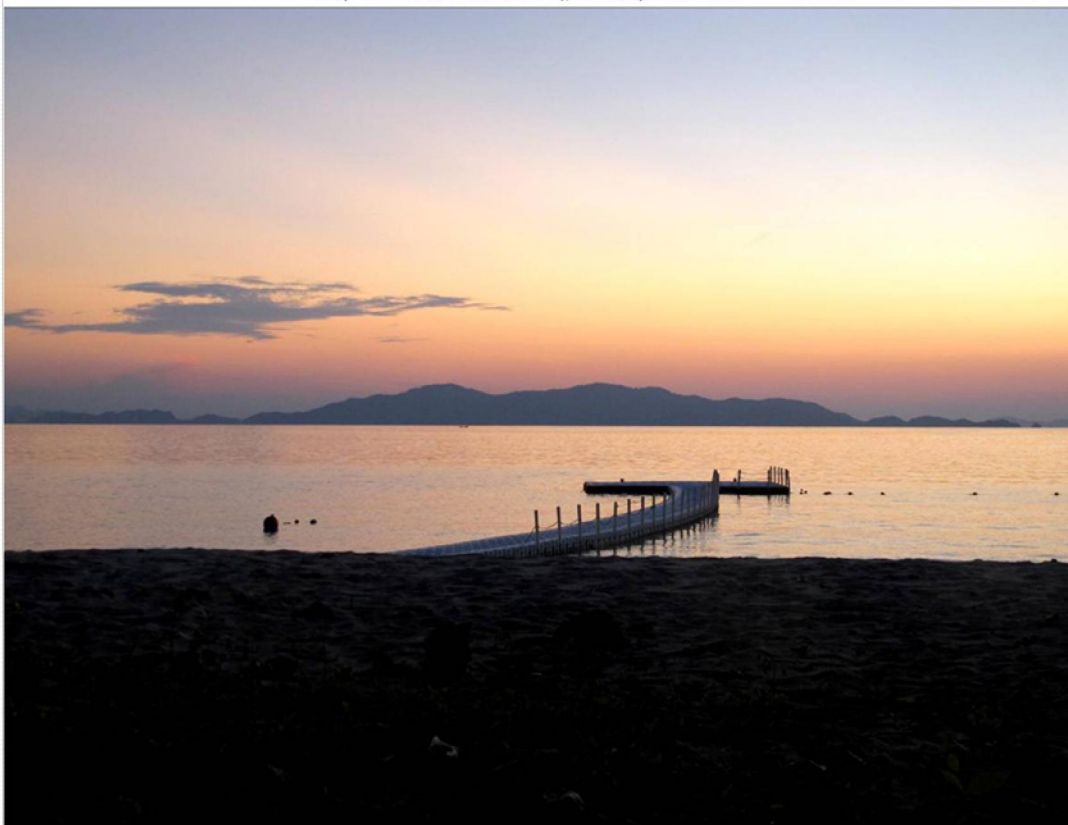


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## การวางแผนเชิงพื้นที่ทางทะเล ขั้นตอนปฏิบัติสู่การจัดการที่มีระบบนิเวศเป็นศูนย์กลาง

สราวุธ ศิริวงศ์ ศักดิ์อนันต์ ปลาทอง วัฏดา ลากหนูน พงศ์ธีระ ปวีเพ็ชร นริศรา ก้องเจริญกิจ และธนา ยิ่งเจริญ



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คู่มือแนะนำเบื้องต้น

# ก้าวสู่การจัดการทะเลและชายฝั่ง ที่มีระบบนิเวศเป็นศูนย์กลาง

ศักดิ์อนันต์ ปลาทอง รัชฎา ลากทูน สราวุธ ศิริวงศ์ พงศ์ธีระ บัวเพชร นริศรา ก้องเจริญกิจ และธนา ยิ่งเจริญ



**COBSEA**  
COORDINATING BODY ON  
THE SEAS OF EAST ASIA



Sida



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คู่มือการฝึกอบรมระดับภูมิภาค  
การลดความเสี่ยงจากภัยพิบัติในพื้นที่ชายฝั่งทะเล

พงศ์ธีระ บัวเพชร คักคือนันต์ ปลาทอง รัฎฐดา ลากหนูน สรวุฒ ศิริวงค์ นริศรา ก้องเจริญกิจ และธนา ยิ่งเจริญ



## Annex II

### Training Course Summary Report

## Annex III

### National Course Syllabus