

Final Report
Khanom Marine Biodiversity Initiative Project
Nakhon Si Thammarat Province, Thailand
January 2006-December 2009

Executive Summary

Thailand is situated in the tropical region of Southeast Asia just north of the equator from N5° 37' to 20° 30' and from E97° 20' to 105° 39'. The country occupies an area of 513,115 km² with about 25% tropical forests and 2,600 km of coastline. This area includes the Gulf of Thailand facing the South China Sea in the east and the Andaman Sea in the west covering a total area of 420,000 km² which is rich in marine biodiversity and encompasses a highly productive fishery. Thailand is also well known for its natural wealth of white sandy beaches, beautiful coral reefs and rocky mountains all of which have become popular tourist attractions.

In the past decades, deforestation and environmental problems have led to tremendous loss of biodiversity and ecosystems. Nevertheless, Thailand still retains substantial bioresources and natural beauty to be enjoyed by casual visitors and naturalists as well as by professional biologists. Such is the case at Khanom – Mu Koh Thale Tai (or South Sea Islands) including Samui Island in the Gulf of Thailand. This area has beautiful scenery with natural treasures including some of the world's most famous beaches and diving sites, and marvelous caves as well as a cultural diversity in folklore, making the South Sea Islands one of the most popular destinations for tourists.

Recognizing the prime importance of bioresources in the coastal area, BRT has launched an area-based research program on “Marine Biodiversity: Khanom - Mu Koh Thale Tai Initiative”. Mu Koh Thale Tai (or South Sea Islands) includes 5 major islands, i.e., Tan Is, Rap Is., Wang Nok Is., Wang Nai Is., and Mudsum Is. These areas belong to Khanom District, Nakhon Si Thammarat Province. This 3-year (2006-2008) initiative project was aimed to support research and training in marine biodiversity for young biologists and local communities as well as gather basic information on marine life occurring in these pristine habitats. The project's management was based on a multidisciplinary approach among different groups of marine biologists. This project covered a general survey of marine life as well as an analysis of biotic and physical environments. The data collected will be useful for the long-term monitoring of the marine ecosystem in response to the effects of physical changes, e.g., a rise of sea temperature and water pollution.

This study has shown that “Khamon – Mu Koh Thale Tai” is rich in marine biodiversity and supports a variety of colorful fauna. A total of 719 species of marine life have been detected. These include rare and/or endangered species for Thailand, e.g., Pink Dolphins (i.e., Indo-Pacific Humpback Dolphins – *Sousa chinensis*), the Basket star (*Euryale aspera*) and the Gorgonian brittle star (*Ophiopsammium semperi*) as well as seagrass beds of only 0.1 km² which provide food and shelter for juveniles of many marine organisms. More than 46 species of marine algae have been found including green calcareous marine algae (*Halimeda macroloba*). These algae could help reduce the rate of global warming by changing CO₂ to calcium carbonate where it is deposited in the algae's tissues. In addition, this study has revealed the unseen variety of marine organisms that live in harmony making

the “Khanom – Mu Koh Thale Tai” one of the most valuable natural treasures in southern Thailand.

We can proudly say that the Khanom Marine Biodiversity Initiative Project has inspired and generated a new body of knowledge that has already appeared in scientific journals. Other publications such as books and magazines for general audiences have been made for public awareness of these valuable bioresources. Workshops and training for school students and local people have been conducted for appropriate management of Pink Dolphins and fireflies for ecotourism.

This colorful and informative book on marine life and ecosystems will provide a brief introduction to unseen southern Thailand’s biological, cultural and historical wealth for nature lovers and tourists.

“Khanom Marine Biodiversity Initiative Project” was partially funded by BRT, the TOTAL Foundation of France and TOTAL E&P Thailand, the gas and oil business cooperative in the Gulf of Thailand. The project thus forms part of corporate social responsibility (CSR) of the private sectors in collaboration with the BRT and local communities in an effort to promote biodiversity conservation and sustainable development in Thailand.

1. Introduction

Khanom Marine Biodiversity Initiative Project is developed by Biodiversity Research and Training Program (BRT) to support research and training in marine biodiversity. This project is to promote the effective management and joint working between researchers, students and the local communities by using Khanom - Mu Koh Tale Tai Marine National Park as a study site

This project is not only partially funded by BRT but is also sponsored by TOTAL Foundation and TOTAL E&P Thailand which operate gas and oil business and is also the co-investor of natural gas exploration and production in Gulf of Thailand. The company would like to commit to corporate social responsibility (CSR) by being partnership in long term reservation of biological resources of Thailand

Khanom Marine Biodiversity Initiative Project will be operated for 3 years (2006-2008) with the budget of 14 million baht. The goals, objectives and research directions of this project are summarized below.

2. Goals

- Biodiversity knowledge covering coastal and marine ecosystems at Khanom - Mu Koh Tale Tai Marine National Park
- Long term monitoring of climate change, seawater temperature monitor
- A better awareness on marine biodiversity and its importance through local education

3. Objectives

- To study biodiversity covering marine ecosystems at Khanom - Mu Koh Tale Tai Marine National Park
- To develop young researchers and students at all level ranging from undergraduates to doctoral degree

- To develop an area for multidisciplinary research team, to build an education networks in order to exchange ideas and information and incorporate all the gained knowledge for management of marine biodiversity.
- To apply the knowledge gained from the research to local community development particularly in schools.
- To raise public awareness in marine biodiversity and environmental conservation particularly students, enabling them to monitor change in population and ecosystem.
- To develop Database for Species founded in Khanom (<http://www.brtprogram.com/tnbi/home.asp>).
- To have a long term monitoring of climate change, seawater temperature monitor
- To produce media, book, etc for public education.

4. Research Directions

- To study the species diversity of coastal and marine organisms including their community e.g. algae, sponges, plankton and coral species diversity
- To study coral reef communities
- To build up the coastal and marine biodiversity database
- To build up the reference collection of coastal and marine organisms in Southern Thailand, and educate people on such knowledge via workshop and training
- To promote Marine Education Center for students, school teacher and others on coastal and marine biodiversity.
- To build up the permanent plots to study relationship between the changing temperature of seawater and the population of marine organisms.

5. Activities and Results

5.1 A Total of 16 research projects and 4 Thesis on Biodiversity are fund

A. Research

No	Project Title	Principal Investigator
1.	Biodiversity of Marine Fungi at Khanom Beach and South Sea Islands National Park	Dr. Jariya Sakayaroj BIOTEC
2.	Species Diversity of Acetic Acid Bacteria at Khanom-Mu Ko Talay Tai National Park, Nakhon Si Thammarat Province	Dr. Pattaraporn Rattanawaree BIOTEC
3.	Species Diversity and Collection of Yeasts at Khanom-Mu Ko Talay Tai National Park	Dr. Sasitorn Jindamorakot BIOTEC
4.	Diversity, distribution abundance and monitoring of seaweed at Khanom-Mu Ko Talay Tai marine national park, Nakhon Si Thammarat Province, Thailand	Assistance Professor. Dr. Anchana Prathep Prince of Songkla University
5.	Diversity, distribution and abundance of seagrass at Khanom- Mu Ko Talay Tai Marine National Park Nakhon Si Thammarat Province, Thailand.	Assistance Professor. Dr. Anchana Prathep Prince of Songkla University

No	Project Title	Principal Investigator
6.	Diversity study on Echinoderms in Khanom Beach – South Sea Islands National Park, Nakhon Si Thammarat Province	Miss Arom Mucharin National Science Museum
7.	Species diversity of marine ascidians dwelling in the coral reefs in Khanom-South Islands National Park, Nakhon Si Thammarat Province	Mr. Sucha Munkongsomboon Burapha University
8.	Species diversity of marine sponges (Demospongiae, Porifera) dwelling in the coral reefs in Khanom-South Islands National Park, Nakhon Si Thammarat Province	Mr. Sumaitt Putchakarn Burapha University
9.	Intertidal Crabs Diversity of Khanom Coastal, in Had Khanom-Mu Ko Talay Tai National Park	Assistance Professor. Dr. Pitiwong Tantichodok Walailak University
10.	Species diversity and distribution of gorgonians at Had Khanom-Mu Ko Talay Tai National Park	Dr. Voranop Viyakarn Chulalongkorn University
11.	Organisms associated with the seagrass bed at Koh Tarai, Nakhon Si Thammarat Province	Dr. Voranop Viyakarn Chulalongkorn University
12.	Species diversity of nudibranch at Had Khanom-Mu Ko Talay Tai National Park	Assistant Professor Dr. Suchana Chavanich Chulalongkorn University
13.	Species Diversity and Community Dynamics of Coral Reef Fish in Mu Ko Talay Tai, Nakhon Si Thammarat Province, Thailand	Dr. Sakanan Plathong Prince of Songkla University
14.	Status of Dolphin in Talay Tai Archipelago, Thailand	Mr. Atichat Inthongcum
15.	The plankton community in relation to environmental factors along Khanom Canal, Khanom Beach and South Sea Islands, Nakhon Si Thammarat Province	Ms. Supiyanit Maiphae Prince of Songkla University
16.	Recruitment processes and community dynamics of juvenile scleractinian corals on inshore reefs around Khanom-South Sea Islands Marine National Park	Ms. Srisakul Piromvaragorn Prince of Songkla University

B. Thesis

No	Project Title	Principal Investigator
17.	Water circulation and suspended sediment dispersion around Khanom Beach to Southern Sea Island	Mr. Nikom Onsri Chulalongkorn University
18.	Interspecific Competition by Scleractinian Corals in Koh Tan, Suratthani Province, Thailand	Ms. Supranee Limpaungkaew Walailak University
19.	Comparison among fish communities in seagrass beds, mangrove, sandy beach and	Mr. Surasak Sichum Walailak University

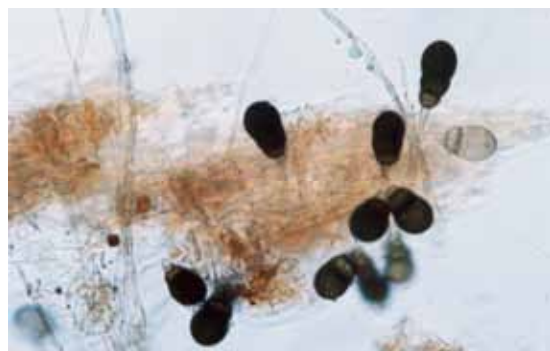
No	Project Title	Principal Investigator
	mudflat at Had Khanom-Mu Ko Talay Tai National Park, Nakhon Si Thammarat Province	
20.	Species composition and habitat uses of <i>Acetes</i> shrimps and their fish predators at Taladyai Bay, Had Khanom-Mu Ko Talay Tai National Park	Miss Usawadee Datsri Walailak University

5.1.1 Endophytic fungi associated with seagrass (Enhalus acoroides, Hydrocharitaceae) at Had Khanom Mo Ko Talay Tai National Park, southern Thailand

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Seagrasses are flowering plants inhabiting coastal and marine environments, with a worldwide distribution in temperate and tropical regions. They serve as feeding, breeding and nursery grounds for important marine organisms. Little information is available on fungi associated with seagrasses, especially fungal endophytes. Therefore, the tropical eelgrass *Enhalus acoroides* was collected from Had Khanom-Mo Ko Talay Tai National Park. The objectives of this project were to investigate the presence of endophytes in *E. acoroides* and test for their antimicrobial activity. This study yielded 42 fungal assemblages, isolated from four collections over one year. Our results confirm that *E. acoroides* harbored fungal endophytes. This is the first report of endophytes associated with seagrasses from Thailand. Molecular identification of endophytes based on LSU and ITS1, 2, 5.8S rRNA sequences revealed a diversity of fungal groups including two Phyla: Ascomycota (98%) and Basidiomycota (2%). Three major Ascomycota classes, including the Eurotiomycetes, Sordariomycetes and Dothideomycetes, were determined. Eight genera and two species were fully identified while others remain to be characterized. The predominant 12 isolates (29%) were members of the Hypocreales, followed by the Eurotiales and the Capnodiales, respectively. Fermentation broths, from selected fungal endophytes, were tested for their antimicrobial activity by agar well diffusion. Approximately 16% displayed antimicrobial activity against at least one pathogen with significant inhibition zones. Therefore, our study has revealed that marine endophytes are potentially useful as good sources of natural antimicrobial compounds.



Trichocladium achrasporum



Aigialus grandis

5.1.2 Species diversity of acetic acid bacteria at Khanom-Mo Ko Talay Tai National Park, Nakhon Si Thammarat province

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¹National Center for Genetic Engineering and Biotechnology, Pathum Thani, Thailand, ²Chulalongkorn University, Bangkok, Thailand

One hundred and eighty-three bacterial isolates were made from 179 natural samples, such as flowers, fruits, algae, sand, etc., in Khanom-Mo Ko Talay Tai National Park, Nakhon Si Thammarat province, collected in March, 2007 and May, 2008. All isolates were purified and preserved in the BIOTEC Culture Collection for further studies. Seventy-nine representative isolates from different samples were selected for 5' end determination of 16S rDNA sequences. From a phylogenetic tree based on the 5' ends of 16S rRNA gene sequences and constructed by the neighbor-joining method, nine isolates did not belong to the cluster of acetic acid bacteria, fifty-two isolates were included in the lineage of three genera of acetic acid bacteria, *Acetobacter* (1 species), *Asaia* (3 species) and *Gluconobacter* (4 species), and eighteen isolates (25.7%) are suggested to be 5 new species. Among the 18 isolates, 3 isolates of three new species belonged to a new genus. Three isolates of three new species candidates belonging to two new genera, AH11, AH13 and AH15, were selected for further characterization of the proposed new genera and new species. The name of *Swingsia* gen. nov. was proposed with *Swingsia thailandicus* sp. nov. and *Swingsia tanensis* sp. nov. being proposed as names for AH11 and AH13, respectively.

5.1.3 Species diversity of yeasts at Khanom-Mo Ko Talay Tai National Park

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The diversity of yeast at Khanom-Mo Ko Talay Tai, Nakhon Si Thammarat Province, was investigated. One hundred and fifty yeast strains were isolated from sea water (58), plant materials in sea water and mangrove forest (57), seaweeds (18), soils and sands in mangrove forest (13) and miscellaneous substrates (4). A membrane filtration technique, and direct streaking and enrichment technique were used for isolation. Among the isolates, 111 strains were ascomycetous yeasts and 39 strains were basidiomycetous yeasts. Based on the D1/D2 domain sequence of the 26S rDNA gene, 129 strains were identified as 51 known species in 21 genera. The remaining 21 strains differed by 4 nucleotide substitutions or more from any known species; they are considered to represent 17 new species in 8 genera. It is concluded that yeasts are diverse in Khanom-Mo Ko Talay Tai National Park. Two strains of black yeasts, ST-1082 and ST-1158, are under study for morphological and physiological characteristics and chemotaxonomy in order to propose them as new yeast species from Khanom-Mo Ko Talay Tai National Park, Thailand.

5.1.4 Diversity and Distribution of Seaweeds at Khanom-Mo Ko Talay Tai National Park, Nakhon Si Thammarat Province, Thailand

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Diversity and Distribution of seaweeds at Khanom-Mo Ko Talay Tai National Park, Nakhon Si Thammarat Province, Thailand were carried out between October 2005 and May 2008 at 5 islets: Koh Tan, Koh Mud Sum, Koh Rab, Koh Wang Nai and Koh Wang Nok. A total of 60 species were identified including 23 species of Chlorophyta, 19 species of Phaeophyceae in the Chromophyta, 16 species of Rhodophyta and 2 species of Cyanobacteria. Of these, 8 species are believed to be new records for the Thai marine flora. The number of species varied from site to site. Ko Tan had the highest diversity with 49 species and KoWang Nok had the lowest diversity with 22 species. This study provides a more complete species list for further comparative studies between the Gulf of Thailand and the Andaman Sea. We have intensively reviewed the seaweed study of Thailand, which were very limited. However, recent work on population and community structure have increased from 2005, which help providing a baseline for future more complex ecological studies; and informing coastal management and exploring seaweed potential practical uses.



5.1.5 Diversity, Distribution and Abundance of Seagrass at Khanom-Mo Ko Talay Tai National Park, Nakhon Si Thammarat Province, Thailand

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Diversity and abundance of seagrasses were studied at Ko Ta Rai, Khanom-Mu Ko Thalae Tai Marine National Park, Nakhon Si Thammarat, Thailand. The study was carried out from July 2006- September 2007. A total of three permanent transect lines were investigated following the method of *SeagrassNet*. Light and temperature were also monitored using this protocol. This indeed provides important information for the climate change, which is an important issue in the recent years. The first data collection was monitored in July 2006, however, there were problems with the water visibility and weather conditions, thus field collections cannot be carried out according to plans. Recent field collections were done again in August and September 2007; and new method would be applied if the weather does not permit for the field collection. So far, 4 species of seagrasses were found, *Thalassia hemprichii* (Ehrenb.) Aschers, *Halodule uninervis* (Forsskål) Aschers, *Cymodocea rotundata* Ehrenb. Et Hempr. Ex Aschers and *Enhalus acoroides* (L.f.) Royle . We hope to have the field monitoring for at least 2 years since this would give a good understanding of seagrass population at ThaRia. In addition, the seagrass bed in Tharai, is the only seagrass bed found in the area, which provides sheltered for many marine organisms. These are used for the local fisheries communities in the area. Also, the area is proposed under the *SeagrassWatch* project, which local school students can monitor the seagrass and learn about the marine biodiversity at the area.



5.1.6 Diversity study on echinoderms in Had Khanom – Mo Ko Talay Tai National Park, Nakhon Si Thammarat Province

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Echinoderms of Had Khanom – Mo Ko Talay Tai National Park, Nakhon Si Thammarat Province, located in the southern part of the Gulf of Thailand were studied at 12 sites at Ko Tan (4 sites), Ko Mudsum (2 sites), Ko Wang Nai (2 sites), Ko Wang Nok (2 sites) and Ko Rab (2 sites) in November, 2006 and May 2008. The investigations were carried out by SCUBA diving in the daytime and random searching throughout the reefs. The results yielded 24 species of Echinoderms from 5 classes, 10 orders, 14 families and 20 genera. The most abundant echinoderms in the study area are: *Lamprometra palmata*, *Ophiothrix (Ophiothrix) exigua*, *Holothuria (Metensiothuria) leucospilota* and *Diadema setosum*. All observed species are commonly found in the Gulf of Thailand and the Indo-Pacific.



ดาวตะกร้า, ดาวตาข่าย, *Euryle aspera* Lamarck



ปลิงหิน, *Stichopus horrens* Selenka

5.1.7 Species diversity of marine Ascidians dwelling in the coral reefs of the Khanom-South Islands, Nakhon Si Thammarat Province

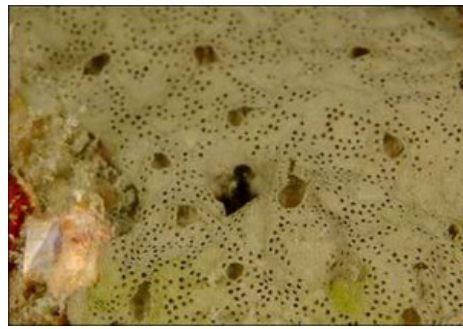
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The species diversity and distribution of ascidians dwelling in the coral reefs of Had Khanom – Mo Ko Talay Tai National Park, Nakhon Si Thammarat Province, the southern Gulf of Thailand were investigated. The investigations were conducted at 12 sites in the Mo Ko Talay Tai area and were carried out by SCUBA diving during the daytime and random observation throughout the reefs. The results yielded 10 species of ascidians from 3 orders, 3 families and 5 genera. The genera were *Didemnum* (6), *Diplosoma* (1), *Eudistoma* (1), *Polycarpa* (1) and *Ascidia* (1).



เพรียงหัวหอมเดี่ยวท่ใหญ่, *Polycarpa*, sp.



เพรียงหัวหอมกลุ่มเคลือบสีน้ำตาล, *Didemnum*, sp.

5.1.8 Species diversity of marine sponges dwelling in coral reefs of Had Khanom – Mo Ko Talay Tai National Park, Nakhon Si Thammarat province, Thailand

Sumaitt Putchakarn

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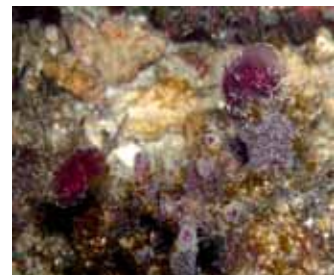
The species diversity of demosponges dwelling in the coral reefs of Had Khanom–Mo Ko Talay Tai National Park, located in the southern Gulf of Thailand was investigated with field surveys undertaken at 14 sites in November 2006 and May 2007 using SCUBA and random observation. 47 species of demosponges from 10 orders, 24 families and 34 genera were recorded. The Order Haplosclerida had the highest species abundance with 15 species, followed by Poecilosclerida with 9 species and Dictyoceratida with 6 species. The massive sponge was the most dominant growth form of the study area. The most abundant and common sponges in this area are *Oceanapia sagittaria*, *Neopetrosia* sp. “blue”, *Xestospongia testudinaria* and *Haliclona (Gellius) cymaeformis*. Most species are common representatives of the Indo-Pacific fauna found throughout the Gulf of Thailand.



ฟองน้ำหนัง, *Chondrosia reticulata* (Carter)



ฟองน้ำฝิ่งตัวสีดำ, *Aka mucosa* (Bergquist)



ฟองน้ำท่อพุ่มสีแดง, *Oceanapia sagittaria* (Sollas)

5.1.9 Biodiversity of Marine Brachyuran Crabs at Had Khanom, Moo Kho Thalay Tai National Park, Nakhon Si Thammarat

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Inventory of species diversity of marine crabs (Decapoda: Brachyura) at Had Khanom – Moo Kho Thalay Tai National Park (Nakhonsithammarat and Suratthani Provinces) in 6 habitat types: sandy beach, rocky shore, seagrass beds, seaweed beds, mangrove areas and subtidal bottom was investigated from January to December 2007. This aims at providing baseline data on marine

biodiversity of this area. A total of 57 species from 36 genera of 15 families were collected. One of which (sesarmid species) is undescribed and probably new to science. *Paracleistostoma tweediei* is new to Thailand and three other species (*Camposcia retusa*, *Charybdis acutifrons* and *Episesarma palawanense*) are first records in the Gulf of Thailand. All specimens were deposited at the Zoological Reference Collection at Walailak University. Photographs of brachyuran crabs were taken.



5.1.10 Species diversity and distribution of gorgonians at Had Khanom – Mo Ko Talay Tai National Park, Nakhon Si Thammarat, Thailand

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Gorgonians are invertebrates in the Subclass Octocoralli, Order Gorgonacea. Gorgonians can be found in every ocean from tropical to temperate zones. In Thailand, only a few studies have been done on gorgonians. The purpose of this study was to investigate the diversity of gorgonians at Had Khanom – Mo Ko Talay Tai Marine National Park. The study areas included Ko Wang Nai, Ko Wang Nok, Ko Rab, Ko Tan, and Ko Mat Sum. A total of 15 genera in 7 families were found in the areas. The families and genera were: the Family Anthothelidae, *Solenocaulon*; the Family Subergorgiidae, *Subergorgia*; the Family Melithaeidae, *Melithaea*; the Family Acanthogorgiidae, *Anthogorgia*; the Family Plexauridae, *Euplexaura*, *Echinomuricea*, *Echinogorgia*, *Menella*, and *Astrogorgia*; the Family Gorgoiidae, *Rumphella* and *Pseudopterogorgia*; and the Family Ellisellidae, *Ctenocella*, *Junceella*, *Dichotella*, and *Verrucella*. Ko Rab had the highest gorgonian diversity (15 genera), followed by Ko Tan (13 genera). Ko Wang Nai had the lowest diversity (6 genera). *Subergorgia*, *Astrogorgia*, *Ctenocella*, *Junceella* and *Dichotella* were found on every island. In contrast, *Solenocaulon* occurred only at Ko Rab. From this study, *Astrogorgia* and *Verrucella* were first records of these genera in the Gulf of Thailand and in Thai waters, respectively.



Junceella sp.



Verrucella sp.



Astrogorgia sp.

5.1.11 Organisms associated with gorgonians at Mo Ko Talay Tai, Surat Thani and Nakhon Si Thammarat

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The organisms associated with 3 different colony forms of gorgonians were investigated. Three gorgonian genera, *Subergorgia*, *Dichotella* and *Verrucella*, were chosen as representatives of 3 different forms, i.e., sparse, bushy and planar, respectively. Samples of each genus were collected from 3 different depths of water, shallow (< 5 m), mid-depth (5–10 m) and deep (> 10 m) in each study site of Mo Ko Talay Tai, Surat Thani and Nakhon Si Thammarat. The study sites included Ko Tan, Ko Mat Sum, Ko Rap, Ko Wang Nok and Ko Wang Nai. A total of 4,992 individuals in 8 phyla were found from 32 gorgonian samples. The 8 phyla were Porifera, Cnidaria, Platyhelminthes, Annelida, Sipunculida, Mollusca, Arthropoda and Echinodermata. The brittle stars (Ophiuroidea) and amphipods (Amphipoda) comprised the largest numbers of organisms associated with gorgonians. Moreover, there was a correlation between the numbers of organisms and forms of gorgonians. The highest number of associated organisms was found for *Subergorgia* with 4,579, followed by *Dichotella*, 341, and *Verrucella*, 72, respectively. From these results, the morphology of gorgonians is likely to influence habitat selection by associated organisms.

5.1.12 Species diversity of nudibranches at Had Khanom – Mo Ko Talay Tai National Park, Nakhon Si Thammarat province Thailand

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Nudibranches belong to the mollusk group but have no shell protecting their soft bodies. In Thailand, approximately 60 species of nudibranchs have been found in the Gulf of Thailand and the Andaman Sea. However, no study has been done on the distribution and biology of nudibranchs in Thailand. The purposes of this study were to investigate species diversity of nudibranchs at Had Khanom - Mo Ko Talay Tai Marine National Park and to gather baseline data for conservation and management of natural resources. There were five islands in the study: Ko Wang Nai, Ko Wang Nok, Ko Rab, Ko Tan, and Ko Mat Sum. A total of 19 species in 15 genera and 9 families were found at depths between 1-15 m. The difficulty and the ease in finding these nudibranchs were 42.1%. Phyllidiidae and Chromodorididae were the dominant groups. The dominant species was *Jorunna funebris*. From this study, *Chromodoris sinensis*, *Glossodoris cincta*, *Dendrodoris denisoni*, *Platydoris dierythros* and *Bornella stellifer* were first records of these species in Thai waters.



Jorunna funebris



Phyllidiella nigra



Bornella stellifer

5.1.13 Diversity of reef fish in Had Khanom-Mo Ko Talay Tai National Park, Nakhon Si Thammarat

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Data collection for a reef fish study was conducted 3 times in February, May and July, 2007, around Had Khanom - Mo Ko Talay Tai National Park at 5 stations: Ko Wang Nai, Ko Wang Nok,

Ko Rab, Ko Mud Sum and Ko Tan. Coral reefs of each island were located on reef flats on the leeward and windward sides and on reef slopes on the leeward and windward sides. 97 species of reef fish were recorded during the study period. The dominant fish families were Pomacentridae (23 species) and Labridae (14 species). Fish community diversity did not differ significantly ($p>0.05$) between island or between windward and leeward sides of each island while species abundances and numbers on reef slopes and reef flats showed significant differences among all stations ($p<0.05$). The number of species in the reef slope fish communities was higher than in the community of reef flat areas. On the other hand, the diversity index and evenness index of the reef flat were higher than for the reef slope. From this study it was obvious that there were two types of fish community: the fish community of reef flats and the fish community of reef slopes. However, data on fish populations in different seasons should be collected in order to get more information on fish community patterns.

5.1.14 Status of dolphin in Had Khanom -Thale Tai Archipelago, Thailand

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The status of dolphin at Hadd Khanom-Thale Tai Archipelago had been surveyed during August 2006-July 2007, from Ko tarai to Thong-yang bay and covering Ko Tan, Ko Rab, Ko Vangnai, Ko Vangnok and Ko Madsum. Interviewing of fishermen and tourists totally about 43 persons in Khanom district, Nakorn Si Thammarat province were conducted and resulted that 100% of them saw 3 types of Dolphins *Sousa chinensis*, *Orcaella brevirostris* and *Neophocaena phocaenoides*. 17 trips of ship-based survey found 2 species of dolphin (Family Delphinidae) which were Indo-Pacific hump backed dolphin (*S. chinensis*) and Irrawaddy dolphin (*O. brevirostris*). The first species (*S. chinensis*) was found 7-19 individuals/group, showing to be local species because of finding every trips, distributed along Thongshing bay, Kwang Phao bay, Thongnod bay, Thongnain bay, Taled bay and Ko Tharai. The second species (*O. brevirostris*) was found 5-7 individuals/group, distributed along Taled bay, Thongtakhum bay and Ko Tharai. Dolphin behavior such as swimming, eating, diving, resting and Travelling were also investigated. The data of stranding dolphins since 2006-2007 showed 3 species from 12 stranding samples. 6 samples of Indo-Pacific hump backed dolphin (*S. chinensis*) were found at Thongnian bay and Niphao beach. 1 stranding sample Irrawaddy dolphin (*O. brevirostris*) was found at Thongnian bay. 3 stranding samples Finless porpoise (*N. phocaenoides*) were found at Nadan bay and Niphao beach. Mostly stranding were caused by fishing gears and some unkwon caused. The status of dolphin in Hadd Khanom -Thale Tai Archipelago is critically endangered.



5.1.15 The Plankton community in the relation to the environmental factors along Khanom canal, Khanom beach, Mo Ko Thale-Tai, Nakhon Si Thammarat

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The present study aimed to examine plankton species diversity along Khanom Canal, Khanom beach, Mo Ko Thale-Tai, Nakhon Si Thammarat Province. Samplings were carried out covering 15 stations starting from Cho water fall to Khanom canal and around five islands of Mo Ko Thale-Tai (Wang nok, Wang nai, Rap, Tan and Mudsum) during October 2006 and September 2007. A total of 184 phytoplankton taxa in three Divisions were recorded. The most diverse Division was Chromophyta, comprising of Class Bacillariophyceae 41 genera (104 taxa), Class Dinophyceae 17 genera (51 taxa) and Class Dictyochophyceae 1 genus (2 taxa). Moreover, it was obviously shown that *Bacteriastrum* sp1, *Chaetoceros diversus* and *Chaetoceros lorenzianus* were the high frequently found taxa throughout sampling periods. However, based on the density, *Bacteriastrum* sp1 dominated phytoplankton of all stations sampled through out sampling period (7.27×10^7 ind./l). In addition, it showed the highest density in March 2007 ($1.17 \times 10^6 \pm 2.21 \times 10^6$ ind./l) followed by October 2006 ($8.80 \times 10^5 \pm 1.28 \times 10^6$ ind./l) and September 2007 ($8.68 \times 10^5 \pm 6.24 \times 10^5$ ind./l), respectively. Moreover, 61 taxa in 11 Phylum of zooplankton were recorded. Arthropoda was the most diverse phylum, comprising of 24 taxa. Of which, nineteen were the members of the Copepoda. Based on the density, nauplius of crustacean dominated zooplankton at all stations over the sampling period (1,316.67-5,293.02 ind./l). In addition, it showed the highest density in January ($5,297 \pm 8,387$ ind./l), March ($4,662 \pm 6,315$ ind./l) and September 2007 ($3,437 \pm 4,279$ ind./l), respectively. However, beside nauplius of crustacean, *Tintinnopsis orientalis* and *Codonellopsis ostenfeldi* also showed high density at all times during sampling period. Environmental factors differed from headwater, Khanom canal and Mu Ko Thale-Tai but the amount of each factors, especially nutrients, turbidity, DO are over standard though the turbidity was relatively high in Khanom canal and some parts of Koh Wang nai, Wang nok and Koh Tan.

These results showed the good sign that Mu Ko Thale-Tai is a good nursery are and still rich of the marine organisms. However, for sustainable use, their water quality and general environmental factors need to be conserved in proper conditions as at the moment. Moreover, in order to explain the trophic relations at Mu Ko Thale-tai, more information on the association between plankton community and others ecosystem such as seaweed, seagrass and coral are necessary. Of which, such knowledge can be used to produce the whole ecosystem guidelines to regulate and manage them in a sustainable approach in the future.

5.1.16 A preliminary study of coral recruitment processes on reefs of Mo Ko Talay Tai

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In this preliminary study, we compared the early recruits onto settlement panels during the spawning peak of year 2007 with *in situ* juvenile abundance on reef substrates. The population of newly settled recruits was predominantly *Pocillopora damicornis* (60%) with lesser proportion of the genera *Porites* (16%), *Fungia* (10%), *Acropora* (4%), mixed faviid genera (4%), *Montipora* (1%) and unidentified group (5%). On the other hand, the majority of *in situ* juveniles were *Montipora* (24%), *Pocillopora* (18%), *Tubastrea* (13%), *Fungia* (11%) and *Favia* (10%). We found that coral recruitment varied spatially among the five islands of Mo Ko Talay Tai. While settlement rate was generally higher on Ko Mudsum and Ko Rab, settlement rate seem to be consistently lower on Ko Wang Nai. Moreover, average *in situ* juvenile abundance on reefs at Ko Taen and Ko Mudsum were higher than at the other reefs. Despite high rates of settlement at Ko Rarb, juvenile abundance there was low, implying that post-settlement mortality plays an important role in shaping the community structure. In addition, density of recruits on settlement panels translates to ~270 spat per square meter of bare substrate which is many times the density of juveniles found on natural substrate. Because bare substrate is quickly fouled by algae and sediment, further study is needed to differentiate the roles of substrate limitation and post-settlement mortality as controls on natural coral recruitment processes on these islands.

5.1.17 Application of a numerical water circulation model and dispersal of coral eggs and planula larvae around Had Khanom - Mu Ko Talay Tai

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In this study, a 2-D circulation model was applied to simulate tidal currents at Had Khanom – Mu Ko Talay Tai during 2008, and the dispersal of coral eggs and larvae during February - April 2008 was assessed based on velocity fields. Numerical model results showed that tidal currents in Had Khanom – Mu Ko Talay Tai were relatively weak, being less than 0.4 m/s. Strong tidal currents occurred only in the deep channels between islands. Eddies and current meandering occurred at the tips of the islands and these helped in mixing of the water mass, nutrient mixing and dispersal of coral eggs and planula larvae. The current simulation for February to April indicated that if coral spawned their eggs during the spring tide, there was a good chance that planula larvae would settle down at the brooding colony or nearby site with a high survival rate. But if the spawning occurred during the neap tide, there was a good chance that the planula larvae would settle down at a farther distance from their brooding colony. Finally, the relation between the spawning time and flood-ebb cycle revealed that if spawning occurred during the ebb cycle, there was a good chance that the current would carry the eggs and larvae out to sea, thus reducing the survival rate. But if the spawning occurred during the flood cycle, the current would carry the eggs and larvae to the islands north of the study site and the larvae could settle down around the islands there or come back to the spawning area by the ebb current.

5.1.18 Interspecific competition by scleractinian corals at Koh Tan, Surat Thani province, Thailand

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Coral reefs are one of the most dynamic and diverse marine communities with many of species highly specialized to a particular niche. At present, coral reefs are subject to many destructive forces of both natural and human induced agents that can severely damage coral communities. The physical environment plays an important role in determining the composition of coral communities, while the biological environment creates the wealth of species that is characteristic of coral reefs. Coral's aggressive capacities play a central role in the determination of its coverage and distribution. Information on which coral species can tolerate different kinds of competitive interaction and which coral species can succeed in certain conditions is required for future coral propagation and coral rehabilitation. This research will provide the first quantitative evidence of patterns and outcomes of competitive ability among corals in Thailand. The objectives of this study are: to investigate patterns of interspecific interaction and indicate competitive ability by quantification among different species of corals, and to identify interspecific interactions of corals under different conditions for coral reefs at Koh Tan, Surat Thani Province. The proposed study sites are the coral reefs at Koh Tan which is an island south of Koh Samui in the Gulf of Thailand. There is an urgent need to study the ecology of coral reefs at Koh Tan and the research outcomes from this study can be applied for future reef restoration or rehabilitation.



5.1.19 Comparisons of fish communities among seagrass beds, mangroves, sandy beaches and mudflats at Had Khanom Mu Ko Talay Tai National Park, Nakhon Si Thammarat Province

Surasak Sichum* and Pitiwong Tantichodok

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Had Khanom Mu Ko Talay Tai National Park encompasses various important coastal ecosystems such as mangroves, seagrass beds, coral reefs and other types of wetlands which act as spawning, nursery and feeding grounds for various kinds of aquatic life. Nowadays, the increasing loss of heterogeneous coastal habitats as well as the consequences of a number of human activities, such as sedimentation from construction into the sea, encroachment and reclamation of mangrove forests, wastewater from fisheries industries and domestic sources, illegal and destructive fishing, over fishing, all cause reductions in the ecological roles in goods and services of the Had Khanom coastal ecosystems.

This study explores the fish assemblages of various habitats including seagrass beds, mangroves, sandy beaches and mudflats within Had Khanom Mu Ko Talay Tai National Park in order to describe the relative importance of each habitat type in terms of diversity, abundance, and biomass of fish species of commercial importance throughout the year, as well as to determine the size distributions of fish in these habitats the data for which will be collected using a beach seine. This study will provide basic ecological information and understanding for decision makers, coastal zone managers, and park rangers for coastal zone management and conservation that eventually will lead toward sustainable development.



*5.1.20 Species composition and habitat use and the influence of predators on habitat selection of *Acetes* spp.*

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The species of the genus *Acetes* are mainly fished and are of significant commercial importance at Taladyai Bay, Had Khanom Mu Ko Talay Tai National Park, Nakhon Si Thammarat. They are small planktonic shrimp living in fresh water rivers, brackish water, the open ocean, mangroves and seagrass beds. Changes in water temperature, rainfall, tide, local winds, food supply and the presence of predators may be important for fishing seasons. This present study aims to gather information about the species composition, habitat uses, and habitat preference of *Acetes* shrimps. As well, the influence of predatory fish on habitat selection by *Acetes* shrimps will be investigated. The outcome of this study will provide ecological data for management of the *Acetes* shrimp fishery.



5.2 Research Projects have impacts on conservation and policy makers

BRT provided the information to National Human Rights Commission of Thailand: On the new ferry port at at Ao Talet, Tong Nian District, Khanom, Nakhon Srithammarat Province

According to BRT role in supporting marine biodiversity projects since 2006, National Human Rights Commission on Water, Coastal and Mineral resources asked BRT to provide the information in Khanom marine biodiversity on April 20th, 2007.

Ao Taled communities had proposed the protest to the National Human Rights Commission of Thailand in harbor construction by Seatran Port company at Ao Talet, Tong Nian District, Khanom, Nakhon Srithammarat Province. The people are afraid that the harbor construction might have an effect on the dolphin habitat and seagrass beds.

According to the researches, BRT reported that in Khanom area, there is high abundance of seagrass beds which have the ecological roles as nurseries grounds to crabs and shrimp; and they are also important for small local fisheries. Estuarine and coastal waters of nutrients, contaminants, and sediments filters. Moreover, the area is known to be home of pink dolphin; and it is an important ecotourism site.

5.3 Species of marine organisms has been listed

The datasheets of marine organisms found in research projects were collected for producing the species list of marine organisms found in the area. The species list is presented as follows:

No.	Type of Organism	Number of species
1	Gorgonians	15
2	Nudibranch	15
3	Fish	96
4	Crab	98
5	Ascidians	10
6	Plankton	120
7	Marine Sponges	55
8	Marine Fungi	164
9	dolphin	3
10	Seaweeds	46
11	Seagrasses	4
12	Echinoderms	24
13	Coral	70
Total		719

5.4 Conservation for Dolphins, Seaweeds and Coral Reefs in Khanom : Bouys

Projects

On December 18th, 2009 BRT in corporation with TOTAL E&P Thailand, TOTAL Foundation French Republic and Department of Marine and Coastal Resources, Ministry of Natural Resources and Environment delivered ceremony at the sea buoy project at Khanom District, Nakornsrihammarat Province. Khanom area is rich in marine biodiversity including healthy coral reefs, seagrass beds and the largest habitat of the Pink Dolphins (Indo-Pacific Humpback Dolphin). Therefore, this sea buoy project set up for the local community at Khanom with the aim for marking the marine and coastal conservation zones, especially for the Pink Dolphin conservation. This project first started at Raja Kiri Resort and Spa, Nakornsrihammarat Province.

The project installed 30 buoys along the coastline of 12 kilometers long starting from Koh Phi, the border between Suratthani and Nakornsrihammarat Provinces, to Ao Node. This area is the large habitat for the Pink Dolphins. Additionally, Thong Nuan community participation is crucial for successfully management of the buoys installed for marine and coastal conservation.

It is expected that the buoys installed at Khanom would help marking the Pink Dolphin habitat. The buoys can be used to mark a location where tourists can watch Dolphins. Moreover, the buoys could help marking the prevention zones from the dropped and dragged anchors by the fishing boats and ships. The trawled boats and ships create great damage to corals, seagrass beds and especially the Dolphin habitats. Thus, the installed buoys would help prevention the loss of marine bioresources at Khanom coastline.



5.5 Trainings & Educations & Others

1	Ecological Research Training Course	24 April – 21 May 2006
2	Long term ecological Plot at Koh Tan	9-10 June 2006
3	1 st Capacity building camp on marine conservation for students and local community	1-2 September 2006
4	2 nd Capacity Building Camp on Marine Conservation for Students and Local Community	8-10 November 2006
5	BRT organized the exhibition "Seagrass conservation for the King"	14 February 2007
6	Seaweed Biodiversity and Reference Collection Workshop was organized	16-20 April 2007
7	Preliminary Survey on Seagrasses	22-27 June 2007
8	3rd Capacity Building Camp on Marine Conservation for Students and Local Community	1-7 October 2007
9	First year research of Khanom Mu Koh Thalaе Tai was presented to students at OPEN House organized by Faculty of Science Prince of Songkla University	10 November 2007
10	1 st Marine Photo trip at Khanom-Mu Koh Talay Tai Marine National Park for publishing the coffee table booklet	30 March – 1 April 2008
11	4th Capacity Building Camp on Marine Conservation for Students and Local Community	30 April - 4 May 2008
12	Capacity Building Workshop at PSU for Students	15-16 May 2008
13	2 nd Marine Photo trip at Khanom-Mu Koh Talay Tai Marine National Park for publishing the coffee table booklet	21-24 May 2008
14	An exhibition of underwater photograph of marine life and way of life of local community of Khanom Mu Koh Talay Tai was displayed at 12 th BRT Annual meeting	10-12 October 2008
15	30 Bouys sent to Khanom Community	18 December 2009



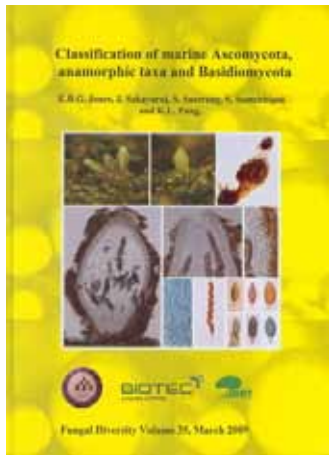
5.6 Outreaches and books

5.6.1 “The breath of Mu Koh Thalay Tai”

Breath of Mu Koh Thalay Tai was published. This booklet was launched and presented in 11th BRT meeting at Udon Thani during 15th -18th October, 2007. Basic knowledge of marine biology and diversity of marine life in Mu Koh Thalay Tai has been presented.

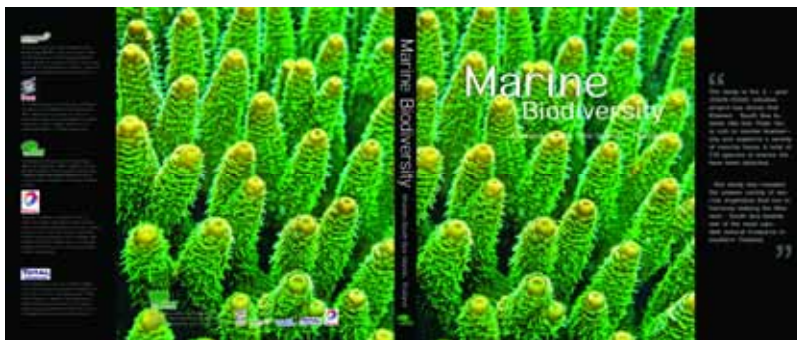


5.6.2 Classification of Marine Ascomycota, anamorphic taxa and Basidiomycota โดย E.B.G. Jones, J. Sakayaroj, S Suetrong, S. Somrithipol and K.L. Pang



Over 10 years of marine fungal research, under the support by BRT, an up-to-date modern classification of 530 marine fungi has been published by BIOTEC researchers: E.B.G. Jones, J. Sakayaroj, S Suetrong, S. Somrithipol and K.L. Pang. They published this volume in the high impact international journal Fungal Diversity, Volume 35, in March 2009. This is a well-illustrated hard covered book, with 200 pages. This volume will be useful to marine biologists, those interested in marine animal diseases and to mycologists whose interest is in fungal phylogeny

5.6.3 Marine Biodiversity : Khanom South Sea Islands, Thailand



The new released book provides a brief introduction to the marine biodiversity at Khanom South Sea Islands, Nakhon Si Thammarat Province. This is under the 3-year Khanom Marine Biodiversity Initiative Project. Researchers involved in this project in corporation with

the professional photographers put their effort in bringing together the most beautiful photographs with biological meaning. Many photographs include the rare species for Thailand e.g. the live Gorgonian brittle star, Flagfin prawn goby and Basket star.

This colorful hard-covered book comprises 160 pages, A4 size. It is well written in both languages, Thai and English. This is the one essential handbook for tourists and those nature lovers who are interested to appreciate the wealth of marine biodiversity, cultural and local history hidden in the south sea of Thailand.

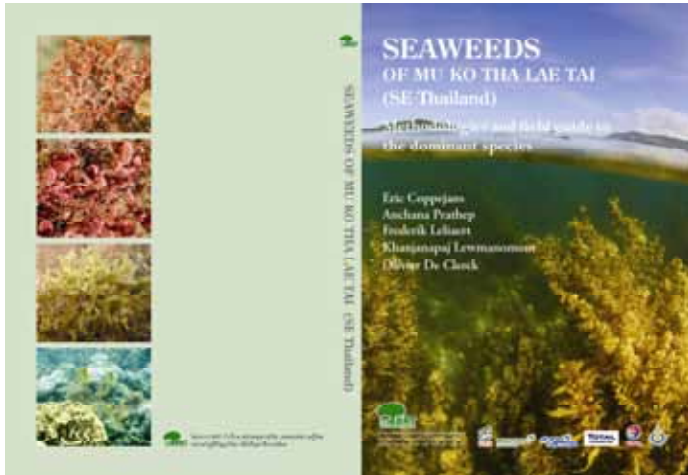
5.6.4 Nudibranchs of Thailand



The book “Nudibranchs of Thailand” is a fine piece of work, a contribution to science of Thai reef organisms, accessible by a broad audience. It contained both English and Thai languages. The book not only identified and classified nudibranchs found in Thailand, but also provided general biology and ecology of nudibranchs from authors’ extensive personal experience. Since very little has still been known about these small

and beautiful creatures, the book will add enormously to the body of knowledge about nudibranchs in Thailand. More than 90 species of nudibranchs were in this book with photos shown intimate behavior aspects of their lives

5.6.5 Seaweeds of Mu Koh Thalay Tai



This guidebook “Seaweeds of Mu Ko Tha Lae Tai (SE Thailand): Methodologies and field guide to the dominant species” presents many unseen beautiful seaweeds of the Gulf of Thailand and of the region. The total of 77 recorded taxa with 10 new records for Thailand and one new species is the result. This is one of only a few books from the region that provide a comprehensive knowledge on the biology and ecology of seaweeds.

5.7 Publications

A. Published in International Journal

5.7.1 Puchakarn, S. 2007. Species diversity of marine sponges dwelling in coral reefs in Had Khanom-Mo Ko Thale Tai National Park, Nakhon Si Thammarat Province, Thailand. *Journal of the Marine Biological Association of the United Kingdom* 87:1635-1642.

5.7.2 Prathep, A., A. Darakrai, P. Tantiprapas, J. Mayakun, P. Thongroy, B. Wichachucherd & S. Sinutok. 2007. Diversity and community structure of macroalgae at Koh Taen, Haad Khanom-Mu Koh Tale Tai, Marine National Park, Nakhon Si Thammarat Province, Thailand. *Mar. Res. Indonesia* 32(2): 153-162.

5.7.3 Promdam, R., & Peter, K.L.N. 2009. *Lithoselatum tantichodoki*, a new species of intertidal crab (Crustacea: Brachyura: Sesarmidae) from southern Thailand. *Zootaxa* 2291: 24–34.

5.7.4 Jones, E.B.G., Sakayaroj, J., Suetrong, S., Somrithipol, S. and Pang, K.L. (2009). Classification of marine Ascomycota, anamorphic taxa and Basidiomycota. *Fungal Diversity* 35

Jitkue, K.,W. Srisang,C. Yaiprasert,K. Jaroensutasinee and M. Jaroensutasinee. 2007. Integration of multi-source data to monitor coral biodiversity. *International Journal of Mathematical, Physical and Engineering Sciences* 1:238-242.

5.7.5 Sakayaroj, J., Preedanon, S., Supaphon, O., Jones, E.B.G. and Phongpaichit, S. (2010). Phylogenetic diversity of endophyte assemblages associated with the tropical seagrass *Enhalus acoroides* in Thailand. *Fungal Diversity* 41: 10.1007/s13225-009-0013-9.

5.7.6 Suetrong, S., Schoch, C.L., Spatafora, J.W., Kohlmeyer, J., Volkmann-Kohlmeyer, B., Sakayaroj, J., Phongpaichit, S., Tanaka, K., Hirayama, K. and

B. Proceedings

5.7.7 Tuntiprapas P. et al. 2008. The Effect of Seagrass Coverage on Swimming Crabs (Portunidae) at Kon Tha Rai, Khanom Mu Koh Talay Tai National Park, Nakorn Si Thammarat Province. *Proceedings of the 6th IMT-GT UNINET Conference 2008*

C. Review Papers in Songkhlanakarin Journal (Submitted)

- 5.7.8 Diversity and distribution of seaweeds at Mu Koh Tale Tai, Nakorn Si Thammarat Province, Gulf of Thailand. Assist. Prof. Anchana Prathep Prince of Songkla University
- 5.7.9 Seasonal variations in percentage cover and biomass at Koh Tha Ria, Nakhon Si Thammarat Province, Gulf of Thailand. Assist. Prof. Anchana Prathep Prince of Songkla University
- 5.7.10 Higher marine fungi from Had Khanom Mu Ko Thale Tai National Park, Nakhon Si Thammarat Province, southern Thailand. Dr. Jariya Sakayaroj BIOTEC
- 5.7.11 Diversity of the diatoms and dinoflagellates at Mo Ko Thale-tai, Nakhon Si Thammarat Province, Thailand. Dr. Supiyanit Maiphae Prince of Songkla University
- 5.7.12 Diversity of the Copepoda at Mo Ko Thale-tai, Nakhon Si Thammarat Province, Thailand. Dr. Supiyanit Maiphae Prince of Songkla University
- 5.7.13 The present status of Echinoderm of Had Khanom-Mu Ko Thale Tai National Park, Nakhon Si Thammarat Province, southern Thailand. Arom Mucharin, National History Muesuem

D. in manuscript

- 5.7.14 Two new species of yeasts found at Haad Khanom- Mu Ko Tale Tai, the genus *Moniliella*
- 5.7.15 Two new species of bacteria found at Haa Khanom- Mu Ko Tale Tai, *Swingsia thailandicus* and *Swingsia tanensis*

5.8 Poster Presentation

- 5.8.1 Poster presentation in 9th BRT Annual Meeting, 10-13 October 2005, Sofitel Raja Orchid Hotel, Khon Kaen By Dr Anchana Prathep et al, Prince of Songkla University, Thailand
- 5.8.2 Poster Presentation at Khanom Beach for School Children and Communitie On 17th August 2006, BRT joined a biodiversity exhibition in “Protect Khanom’s Dolphins for the King” event at Khanom Golden Beach hotel, Khanom, Nakhon Si Thammarat
- 5.8.3 Poster Presentation in 10th BRT Annual Meeting, 8-11 October 2006, Maritime Park and Spa Resort Thailand, Krabi, Thailand
- 5.8.4 Poster presentation in 11th BRT Annual Meeting, 15-18 October 2007, Napalai Hotel, Udonthani
- 5.8.5 Poster presentation in 12th BRT Annual Meeting, 10-12 October 2008, Diamond Plaza Hotel, Surat Thani
- 5.8.6 Poster presentation in 13th BRT Annual Meeting, 12-14 October 2009, Holiday Inn, Chiangmai
- 5.8.7 Poster presentation in the Asian Mycology Congress (AMC) 2007 and the Xth International Marine and Freshwater Mycological Symposium (IMFMS), 2-6 December 2007, Park Royal Hotel, Penang, Malaysia.
- 5.8.8 Poster presentation in the International Conference on Fungal Evolution and Charles Darwin: From Morphology to Molecules, 9-11 July 2009, Thailand.

5.8.9 Poster presentation in the Asian Mycological Congress 2009 and XIth International Marine and Freshwater Mycological Symposium, 15-19 November 2009, National Museum of Natural Science, Taichung, Taiwan, ROC.

5.9 Oral Presentation

5.9.1 Oral Presentation in 10th BRT Annual Meeting, 8-11 October 2006 at Maritime Park and Spa Resort Thailand, Krabi, Thailand

5.9.2 Oral presentation in 11th BRT Annual Meeting, 15-18 October 2007, Napalai Hotel, Udon thani

5.9.3 Marine National Park was presented in an International conference, Newzealand

5.9.4 Oral presentation in 12th BRT Annual Meeting, 10-12 October 2008, Diamond Plaza Hotel, Surat Thani (Khanom group session)

5.9.5 Oral presentation in the Asian Mycology Congress (AMC) 2007 and the Xth International Marine and Freshwater Mycological Symposium (IMFMS), 2-6 December 2007, Penang, Malaysia.

5.9.6 Oral presentation in the International Conference on Fungal Evolution and Charles Darwin: From Morphology to Molecules, 9-11 July 2009, Thailand.

5.9.7 Four Oral presentations in the Asian Mycological Congress 2009 and XIth International Marine and Freshwater Mycological Symposium, 15-19 November 2009. National Museum of Natural Science, Taichung, Taiwan, ROC.

5.10 Meetings

No	Meetings	Date
1	1st Meeting between researchers and BRT	29 January 2006
2	Meeting with Head of Khanom Marine National Park	30 January 2006
3	MOU Signing Ceremony between TOTAL E&P THAILAND, TOTAL FOUNDATION FRANCE and BRT	18 February 2006
4	2 nd Meeting between researchers and BRT	11 April 2006
5	3 rd Meeting between researchers tand BRT	2 September 2006
6	Oral Presentation in 10 th BRT Annual Meeting	8-11 October 2006
7	4th Meeting between Researchers and BRT	24 May 2007
8	5th Meeting between Researchers and BRT	23 June 2007

No	Meetings	Date
9	6th Meeting between Researchers and BRT	17 July 2007
10	7th Meeting between Researchers and BRT	20 July 2007
11	Meeting with TOTAL CEO for reporting the progress and adjusting the project plan	28 August 2007
12	9th Meeting between Researchers and BRT	7 December 2007
13	TOTAL and BRT Management Trip in Khanom, Nakhon Sri Thammarat for observing the research area	28-29 March 2008
14	10th Meeting with Khanom project researchers and BRT	24 April 2008
15	11th Meeting with Khanom project researchers and BRT	19 February 2009
16	1st Meeting with Local People	5-6 May 2009
17	12th Meeting with Khanom project researchers and BRT	27 May 2009
18	2nd Meeting with Local People	1-2 June 2009
