

SEA CUCUMBERS FISHERIES, UTILIZATION, AND TRADE IN THAILAND

by Ms. Ratana Munprasit⁸

1. Introduction

Sea cucumbers are benthic invertebrates generally found in coastal water with diverse species. They play the roles in ecosystem as decomposers and nutrient releasers in food chain. For human being, sea cucumbers have their long history as the traditional medical components and food. Thus, they are commercially important in many countries, especially in the Indian Ocean and South Pacific regions, for high-protein food, medical products, and supplementary food, resulted in a trend towards overfishing on the commercial species.

In Thailand, a number of sea cucumber species have long been harvested both from the Gulf of Thailand and the Andaman Sea for local consumption, restaurant, and international trade. To serve the sufficient fact and scientific information for internationally ecological concern, the taxonomic classification, biology, production, utilization, and trade of sea cucumbers in Thailand were gathered in this report. This information collection would be useful for the management of sea cucumbers in this area.

2. Taxonomic Information

Table 1 Summary for Sea Cucumber Species Composition in Thailand

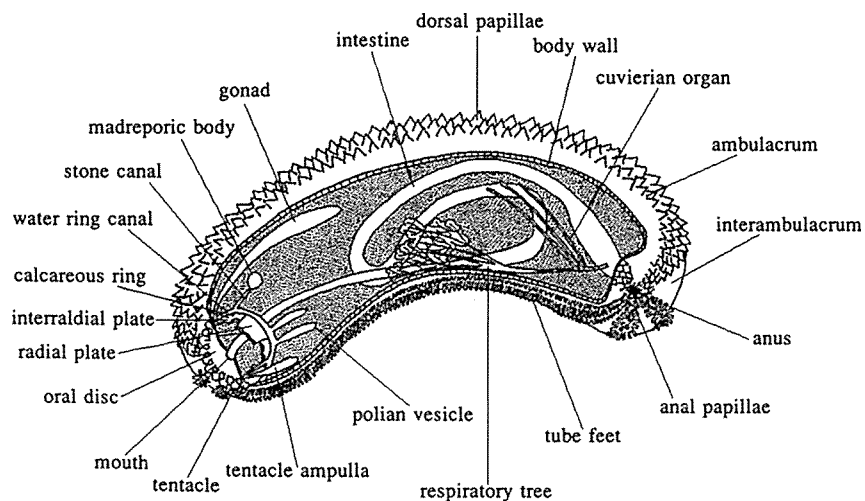
Sea cucumber species	Family name	Local name	Commercial value
1. <i>Actinopyga echinites</i> (Jaeger, 1833)	Holothuriidae		
2. <i>Actinopyga lecanora</i> (Jaeger, 1833)	Holothuriidae		
3. <i>Actinopyga mauritiana</i> (Quoy & Gaimard, 1833)	Holothuriidae		
4. <i>Actinopyga miliaris</i> (Quoy & Gaimard, 1833)	Holothuriidae		
5. <i>Actinopyga obesa</i> (Selenka, 1867)	Holothuriidae		
6. <i>Actinopyga</i> sp.1	Holothuriidae		
7. <i>Actinopyga</i> sp.2	Holothuriidae		
8. <i>Bohadschia argus</i> (Jaeger, 1833)	Holothuriidae		(1)
9. <i>Bohadschia marmorata</i> (Jaeger, 1833)	Holothuriidae	pling sri namtarn	(1)
10. <i>Bohadschia arta</i> (Massin et al., 1999)	Holothuriidae		
11. <i>Bohadschia (Holothuria) bivittata</i> (Mitzukuri, 1912)	Holothuriidae		
12. <i>Bohadschia vitiensis</i> (Semper, 1868)	Holothuriidae	pling fak thong	
13. <i>Holothuria (Acanthotrapeza) pyxis</i> (Selenka, 1867)	Holothuriidae		
14. <i>Holothuria (Acanthotrapeza) coluber</i> (Semper, 1868)	Holothuriidae		
15. <i>Holothuria (Cystipus) rigida</i> (Selenka, 1867)	Holothuriidae		
16. <i>Holothuria (Metriatyla) albiventer</i> (Semper, 1868)	Holothuriidae		
17. <i>Holothuria (Microthele) axiologa</i> (H.L. Clark, 1921)	Holothuriidae		
18. <i>Holothuria (Microthele) nobilis</i> (Selenka, 1867)	Holothuriidae		(1)
19. <i>Holothuria (Microthele) fuscopunctata</i> (Jaeger, 1833)	Holothuriidae		
20. <i>Holothuria (Selenkothuria) erinaceus</i> (Semper, 1868)	Holothuriidae		
21. <i>Holothuria (Selenkothuria) moebii</i> (Ludwig, 1883)	Holothuriidae		
22. <i>Holothuria (Semperothuria) cinerascens</i> (Brandt, 1835)	Holothuriidae		
23. <i>Holothuria (Theelothuria) notabilis</i> (Ludwig, 1875)	Holothuriidae		
24. <i>Holothuria (Theelothuria) squamifera</i> (Semer, 1868)	Holothuriidae		
25. <i>Holothuria (Theelothuria) spinifera</i> (Theel, 1886)	Holothuriidae		(1)
26. <i>Holothuria (Thymiosycia) arenicola</i> (Semper, 1868)	Holothuriidae		

⁷ Member of the Ad hoc Regional Working Group on Sea Cucumber Fisheries and National Focal Point for Thailand, Department of Fisheries, Thailand

27. <i>Holothuria (Thymiosycia) conussalba</i> (Cherbonnier & Feral, 1984)	Holothuriidae		
28. <i>Holothuria (Thymiosycia) hilla</i> (Lesson, 1830)	Holothuriidae		
29. <i>Holothuria monocaria</i> (Lesson, 1830)	Holothuriidae		
30. <i>Holothuria (Halodeima) atra</i> (Jaeger, 1833)	Holothuriidae	pling dam	(2)
31. <i>Holothuria (Halodeima) edulis</i> (Lesson, 1830)	Holothuriidae		(1)
32. <i>Holothuria (Semperothuria) flavomaculata</i> (Semper, 1868)	Holothuriidae	pling sri muang	
33. <i>Holothuria (Stauropora) discrepans</i> (Semper, 1868)	Holothuriidae		
34. <i>Holothuria (Stauropora) fuscocinerea</i> (Jaeger, 1833)	Holothuriidae	pling sri namtarn	
35. <i>Holothuria (Metriatyla) martensi</i> (Semper, 1868)	Holothuriidae		
36. <i>Holothuria (Metriatyla) scabra</i> (Jaeger, 1833)	Holothuriidae	pling khao	(3)
37. <i>Holothuria (Metriatyla) ocellata</i> (Jaeger, 1833)	Holothuriidae	pling tha lay	
38. <i>Holothuria (Platyperona) difficilis</i> (Semper, 1868)	Holothuriidae	pling tha lay lek	
39. <i>Holothuria (Thymiosycia) impatiens</i> (Forskål, 1775)	Holothuriidae	pling tha lay kheo	
40. <i>Holothuria (Lessonothuria) verrucosa</i> (Selenka, 1867)	Holothuriidae	pling namtarn chude far	
41. <i>Holothuria (Lessonothuria) pardalis</i> (Selenka, 1867)	Holothuriidae		
42. <i>Holothuria (Mertensiothuria) leucospilota</i> (Brandt, 1835)	Holothuriidae	pling dam	(2)
43. <i>Pearsonothuria graeffei</i> (Semper, 1868)	Holothuriidae	pling dam	
44. <i>Labidodemas semperianum</i> (Selenka, 1867)	Holothuriidae		
45. <i>Stichopus naso</i> (Semper, 1868)	Stichopodidae	pling hin	
46. <i>Stichopus chloronotus</i> (Brandt, 1835)	Stichopodidae		(1)
47. <i>Stichopus horrens</i> (Selenka, 1867)	Stichopodidae	pling hin	
48. <i>Stichopus japonicus</i> (Semper, 1868)	Stichopodidae		
49. <i>Stichopus ariegates</i> (Semper, 1868)	Stichopodidae		(2)
50. <i>Stichopus vatus</i> (Semper, 1888)	Stichopodidae		
51. <i>Stichopus herrmanni</i> (Semper, 1868)	Stichopodidae		
52. <i>Thelenota ananas</i> (Jaeger)	Stichopodidae		(1)
53. <i>Actinocucumis typicus</i> (Ludwig, 1875)	Cucumariidae		
54. <i>Cercodemas anceps</i> (Selenka, 1867)	Cucumariidae	pling sri shom phoo luang	
55. <i>Colochirus quadrangularis</i> (Troschel, 1843)	Cucumariidae	pling sri kheo	
56. <i>Pseudocnus (Cucumaria) echinata</i> (Von Marenzeller, 1881)	Cucumariidae		
57. <i>Cucumaria mosaica</i> (Kochler)	Cucumariidae		
58. <i>Cucumaria frondosa</i> (Gunner, 1767)	Cucumariidae		
59. <i>Pseudocolochirus violaceus</i> (Theel, 1886)	Cucumariidae		
60. <i>Pseudocolochirus</i> sp.	Cucumariidae		
61. <i>Pseudocolochirus axiologus</i> (Clark, 1914)	Cucumariidae	pling apple	
62. <i>Leptopentacta javanicus</i> (Sluiter, 1881)	Cucumariidae		
63. <i>Menamaria bilolumnata</i> (Dendy & Hindle, 1907)	Cucumariidae		
64. <i>Menamaria intercedens</i> (Lampert, 1885)	Cucumariidae		
65. <i>Plesiocochirus australis</i> (Ludwig, 1875)	Cucumariidae		
66. <i>Afrocucumis africana</i> (Semper, 1868)	Scleodactylidae		
67. <i>Cladolebes schmeltzi</i> (Ludwig, 1875)	Scleodactylidae		
68. <i>Stolus conjugens</i> (Semper, 1868)	Phylloporidae		
69. <i>Stolus buccalis</i> (Stimpson, 1855)	Phylloporidae	pling sri dam	
70. <i>Selenkiella malayense</i> (Heding & Panning, 1954)	Phylloporidae		
71. <i>Selenkiella siamense</i> (Heding & Panning, 1954)	Phylloporidae		
72. <i>Thyone okeni</i> (Bell, 1884)	Phylloporidae		
73. <i>Thyone cf. papuensis</i> (Théel, 1886)	Phylloporidae	pling sri luang	




74. <i>Havelockia versicolor</i> (Semper, 1868)	Phylloporidae	pling sri kheo	
75. <i>Hemithyone semperi</i> (Bell, 1884)	Phylloporidae		
76. <i>Globosita argus</i> (Heding & Panning, 1954)	Phylloporidae		
77. <i>Phyllohorus (Phyllophorella) kokkutiensis</i> (Heding & Panning, 1954)	Phylloporidae		
78. <i>Phyllohorus (Phyllophorella) robusta</i> (Heding & Panning, 1954)	Phylloporidae		
79. <i>Phyllohorus (Phyllophorella) parvipedes</i> (H.L. Clark)	Phylloporidae		
80. <i>Phyllohorus (Phyllothuria) cebuensis</i> (Heding & Panning, 1954)	Phylloporidae		
81. <i>Phyllohorus (Urodemella) holothurioides</i> (Ludwig, 1875)	Phylloporidae		
82. <i>Phyllohorus</i> sp.	Phylloporidae		
83. <i>Molpadia (Ankyroderma) roretzi</i> (Von Marenzeller, 1877)	Molpadiidae		
84. <i>Acaudina molpadioides</i> (Semper, 1868)	Caudinidae		
85. <i>Acaudina leucoprocta</i> (H.L. Clark, 1938)	Caudinidae		
86. <i>Acaudina</i> sp.1	Caudinidae		
87. <i>Acaudina</i> sp.2	Caudinidae		
88. <i>Acaudina</i> sp.3	Caudinidae		
89. <i>Paracaudina chilensis</i> (Müller, 1850)	Caudinidae		
90. <i>Paracaudina</i> sp.	Caudinidae		
91. <i>Synaptula recta</i> (Semper, 1868)	Synaptidae		
92. <i>Synaptula aff. Virgata</i> (Sluiter, 1901)	Synaptidae		
93. <i>Synaptula maculate</i> (Chamisso & Eysenhardt, 1821)	Synaptidae		
94. <i>Synaptula</i> sp.1	Synaptidae	pling soy khai muke	
95. <i>Synaptula</i> sp.2	Synaptidae	pling soy khai muke khao	
96. <i>Protankyra pseudodingitula</i> (Semper, 1868)	Synaptidae		
97. <i>Polyplectana kefersteini</i> (Selenka, 1867)	Synaptidae		
98. <i>Pendekaplectana nigra</i> (Semper, 1868)	Synaptidae		
99. <i>Opheodesoma grisea</i> (Semper, 1868)	Synaptidae		
100. <i>Opheodesoma lineate</i> (Heding, 1928)	Synaptidae		
101. <i>Opheodesoma australiensis</i> (Heding, 1931)	Synaptidae		
102. <i>Opheodesoma clarki</i> (Heding, 1928)	Synaptidae		

Note: (1), (2), (3) mean commercial value (price/kg) gradually increase, most of which the price is double 1 to 2 times approximately for each level



Body structure of sea cucumber (Clark & Rowe, 1971)

Table 2. Biology of sea cucumbers in Thailand

FAMILY: Holothuriidae	
<p>Scientific Name: <i>Actinopyga echinites</i> (Jaeger, 1833) Common Name: deep-water red fish Local Name: -</p> <p>Description: Body dark brown/chocolate with hard body wall. Mouth with 20 dark brown peltate tentacles locate nearly ventral. Around anus were 5 calcareous teeth. A number of ciliated papillae scatter at dorsal part. Dark brown tube feet locate along the 3 bands of ambulacrum. Habitat: attaching on substrates such as rocks around coral reef at the depth of about 6 m Distribution: Indo-West Pacific: Indian Ocean, east Africa, Madagascar, Arabian Sea, Bengal Bay, East Indies, north Australia, the Philippines, China, Japan, and South Pacific islands</p>	 <p>Size: 200x65 mm, 5.0 mm-thick body wall Figure: Sumaitt Putchakarn Site: Samaesarn, Chonburi Province</p>
<p>Scientific Name: <i>Bohadschia marmorata</i> (Jaeger, 1833) Common Name: chalky fish Local Name: pling sri namtarn</p> <p>Description: Body long cylindrical with dorsal dark gray and ventral yellowish white. Mouth with 20 whitish yellow peltate tentacles locate at ventral side. No teeth at anus but 5 anal papillae. A number of black spot-like papillae scatter at dorsal part. Dark brown spot-like tube feet scatter around ventral part with high density at ambulacrum. Habitat: lying on or burying in sandy bottom around the outer part of coral reef at 5-10 m depth Distribution: Indo-West Pacific: east Africa, Madagascar, Red Sea, Bengal Bay, East Indies, north Australia, the Philippines, China, Japan, and South Pacific islands</p>	 <p>Size: 220x60 mm, 1.0 mm-thick body wall Figure: Sumaitt Putchakarn Site: Laem Thong Lang, Koh Lan, Chonburi Province</p>
<p>Scientific Name: <i>Bohadschia vitiensis</i> (Semper, 1868) Common Name: sea cucumber Local Name: pling fak thong</p> <p>Description: Body golden yellow, long cylindrical. Mouth with 20 whitish yellow peltate tentacles locate nearly ventral. No teeth at anus but 5 anal papillae. A number of dark brown spot-like papillae scatter at dorsal part. Dark brown spot-like tube feet scatter around ventral part with high density at ambulacrum. Habitat: lying on or burying in sandy bottom around the outer part of coral reef at 5-8 m depth Distribution: Indo-West Pacific: Bengal Bay, East Indies, Indonesia, north Australia, the Philippines, China, Japan, and South Pacific islands</p>	 <p>Size: 200x80 mm, 4.0 mm-thick body wall Figure: Arom Mucharin Site: Ao Tang Khen, Phuket Province</p>

Scientific Name: *Holothuria (Halodeima) atra* (Jaeger, 1833)

Common name: lolly fish

Local name: pling dam

Description: Body black, long cylindrical, with rather hard and slippery skin. Mouth with 20 black peltate tentacles locate ventrally. A number of black spot-like papillae scatter at dorsal part. Short tube feet locate densely along the 3 bands of ambulacrum.

Habitat: lying on sand along sandy beach or coral reef at 3-6 m depth

Distribution: wide distribution at Indo-West Pacific: west Indian Ocean, east Africa, Red Sea, Arabian Sea, Persian Gulf, Maldives, Bengal Bay, East Indies, north Australia, the Philippines, China, Japan, South Pacific islands, Hawaii, and Tahiti



Size: 230x35 mm, 4.0 mm-thick body wall

Figure: Sumaitt Putchakarn

Site: Samaesarn, Chonburi Province

Scientific Name: *Holothuria (Halodeima) edulis* (Lesson, 1830)

Common Name: pink fish

Local Name: -

Description: Body long cylindrical with dorsal black and ventral dark pink, rather hard and slippery. Mouth with 20 pink peltate tentacles locate ventrally. A number of very small black spot-like papillae scatter at dorsal part. Short tube feet locate along the 3 bands of ambulacrum.

Habitat: lying in large group on the sand around the outer part of coral reef at 3-5 m depth

Distribution: Indo-West Pacific: east Africa, Red Sea, Madagascar, Red Sea, Arabian Sea, Bengal Bay, east India, north Australia, the Philippines, China, Japan, South Pacific islands, Hawaii, and Tahiti



Size: 180x35 mm, 1.0 mm-thick body wall

Figure: Sumaitt Putchakarn

Site: Koh Tao, Surat Thani Province

Scientific Name: *Holothuria (Semperothuria) flavomaculata* (Semper, 1868)

Common Name: -

Local Name: pling sri muang

Description: Body reddish brown, long cylindrical. Mouth with 20 dark-yellow-tip peltate tentacles locate front most. Some yellow knob-like dorsal papillae scatter along the 2 bands of ambulacrum. Long dark-yellow tube feet locate along the 3 bands of ambulacrum, densely at body front.

Habitat: hiding among corals at the depth of 3-4 m

Distribution: Indo-West Pacific: Red Sea, East Indies, and South Pacific islands



Size: 190x40 mm, 1.0 mm-thick body wall

Figure: Sumaitt Putchakarn

Site: Leam Thong Lang, Koh Lan, Chonburi Province

Scientific name: *Holothuria (Stauropora) discrepans* (Semper, 1868)
Common name: -
Local name: -

Description: Body dark green, cylindrical, soft and mucous. Mouth with 20 peltate tentacles locate nearly ventral. Some dorsal papillae scatter along the 2 bands of ambulacrum. Tube feet scatter around ventral part.
Habitat: found under dead corals at 2-3 m depth
Distribution: reported in Thailand and South Pacific islands



Size: 70x25 mm, 3.0 mm-thick body wall
Figure: Arom Mucharin
Site: a specimen collected in Marine Science Institute, Bang Saen, Chonburi Province

Scientific Name: *Holothuria (Stauropora) fuscocinerea* (Jaeger, 1833)
Common name: -
Local name: pling sri namtarn

Description: Body brownish orange, long cylindrical, soft, with rough skin. Mouth with 20 light brown peltate tentacles locate nearly ventral. Big knob-like papillae with base-capsules for papillae protecting scatter at dorsal part. Short tube feet scatter densely along ambulacrum but sparsely along interambulacrum.
Habitat: hiding among corals in the rich coral reef at 2-6 m depth
Distribution: Indo-West Pacific: east Africa, Madagascar, Red Sea, West Indies, Bengal Bay, East Indies, north Australia, the Philippines, China, Japan, and South Pacific islands



Size: 140x30 mm, 3.0 mm-thick body wall
Figure: Sumaitt Putchakarn
Site: Koh Phai, Chonburi Province

Scientific Name: *Holothuria (Metriatyla) martensi* (Semper, 1868)
Common Name: -
Local name: -

Description: Body cylindrical. Dorsal dark gray with some black vertical bands. Mouth with 20 white peltate tentacles locates front most. Big and long cone-like dorsal papillae locate densely along ambulacrum. Ventral light gray with short tube feet along the 2 bands of ambulacrum.
Habitat: lying on sand around the outer part of coral reef
Distribution: Indo-West Pacific: east Africa, Madagascar, Arabian Sea, Maldives, East Indies, north Australia, the Philippines, China, and Japan



Size: 110x25 mm, 1.0 mm-thick body wall
Figure: Arom Mucharin
Site: a specimen collected in Marine Science Institute, Bang Saen, Chonburi Province

Scientific Name: *Holothuria (Metriatyla) scabra* (Jaeger, 1833)

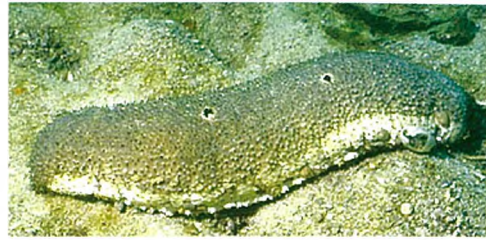
Common Name: sand fish

Local name: pling khao

Description: Body cylindrical with dorsal blackish gray and ventral white. Body bent ventrally. Mouth with 20 white peltate tentacles locate nearly ventral. A number of papillae scatter around dorsal part. Black spot-like tube feet scatter ventrally.

Habitat: lying on sand around the outer part of coral reef at about 6 m depth

Distribution: Indo-West Pacific: east Africa, Madagascar, Red Sea, Bengal Bay, East Indies, north Australia, the Philippines, China, Japan, and South Pacific islands



Size: 250x70 mm, 4.0 mm-thick body wall

Figure: Sumaitt Putchakarn

Site: Had Sai Khao, Koh Lan, Chonburi Province

Scientific Name: *Holothuria (Metriatyla) ocellata* (Jaeger, 1833)

Common Name: -

Local name: pling tha lay

Description: Body haft cylindrical and soft. Mouth with 20 gray peltate tentacles locate nearly ventral. Dorsal blackish gray with roughly knob-like skin and unnoticed dorsal papillae. Ventral light gray with spot-like tube feet locating along the 3 bands of ambulacrum.

Habitat: lying on sand around the outer part of coral reef at the depth of about 12 m

Distribution: Indo-West Pacific: Red Sea, Bengal Bay, East Indies, north Australia, China, and south Japan



Size: 70x25 mm, 2.0 mm-thick body wall

Figure: Arom Mucharin

Site: a specimen collected in Marine Science Institute, Bang Saen, Chonburi Province

Scientific Name: *Holothuria (Platyperona) difficilis* (Semper, 1868)

Common Name: -

Local name: pling tha lay lek

Description: Body haft cylindrical and soft. Mouth with 20 gray peltate tentacles locate nearly ventral. Dorsal blackish green with some hard and small knob-like papillae. Ventral blackish green with rather long tube feet locating along the 3 bands of ambulacrum.

Habitat: attaching on big substrates in coral reef at the depth of about 5 m

Distribution: Indo-West Pacific: Indian Ocean, Red Sea, Bengal Bay, East Indies, north Australia, the Philippines, China, south Japan, and South Pacific islands



Size: 50x10 mm, 1.0 mm-thick body wall

Figure: Sumaitt Putchakarn

Site: Koh Rin, Chonburi Province

Scientific Name: *Holothuria (Thymiosycia) impatiens*
(Forskål, 1775)

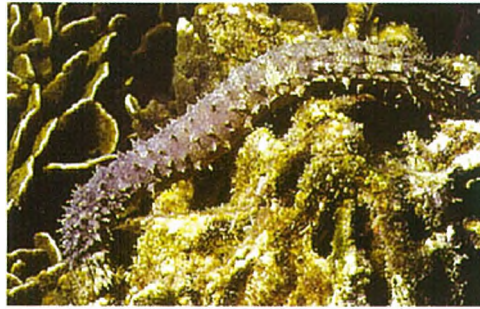
Common Name: -

Local name: pling tha lay kheo

Description: Body long cylindrical, rough, with anterior part smaller than the posterior one. Mouth with 20 greenish gray peltate tentacles locate nearly ventral. Dorsal blackish green with black vertical bands and hard papillae densely scattering on the head. Ventral blackish green with short tube feet locating along the 3 bands of ambulacrum.

Habitat: hiding among corals in coral reef at 3-6 m depth

Distribution: widest distribution in Indo-West Pacific: Indian Ocean islands, east Africa, Madagascar, Red Sea, Persian Gulf, West Indies, Pakistan, Maldives, Bengal Bay, East Indies, north Australia, the Philippines, China, south Japan, and South Pacific islands



Size: 90x35 mm, 1.0 mm-thick body wall

Figure: Sumaitt Putchakarn

Site: Koh Rin, Chonburi Province

Scientific Name: *Holothuria (Lessonothuria) verrucosa*
(Selenka, 1867)

Common Name: -

Local name: pling namtarn chude far

Description: Body long cylindrical, soft, with anterior part smaller than the posterior one. Mouth with 20 brown peltate tentacles locate nearly ventral. Around anus are 5 papillae. Dorsal brown with a number of large blue-tip papillae. Ventral light brown with a number of long tube feet.

Habitat: hiding among corals in coral reef at 3-5 m depth

Distribution: Indo-West Pacific: east Africa, Madagascar, East Indies, north Australia, the Philippines, South Pacific islands, and Hawaii



Size: 270x50 mm, 3.0 mm-thick body wall

Figure: Arom Mucharin

Site: Koh Mak, Trat Province

Scientific Name: *Holothuria (Lessonothuria) pardalis*
(Selenka, 1867)

Common Name: -

Local name: -

Description: Body long cylindrical, soft, with thin body wall. Anterior part smaller than the posterior one. Mouth with 20 warm-yellow peltate tentacles locate nearly ventral. Around anus are 5 papillae. Dorsal orangey brown around which are numbers of white spots and some papillae. Ventral orangey brown with a number of ciliated tube feet.

Habitat: burying in sand or hiding beneath the rocks in coral reef at 3-4 m depth

Distribution: Indo-West Pacific: Indian Ocean islands, Madagascar, Red Sea, West Indies, Pakistan, Maldives, Bengal Bay, East Indies, north Australia, the Philippines, China, Japan, South Pacific islands, and Hawaii



Size: 130x45 mm, less than 1.0 mm-thick body wall

Figure: Sumaitt Putchakarn

Site: Mae Ram Pueng Beach, Rayong Province

Scientific Name: *Holothuria (Mertensiothuria) leucospilota* (Brandt, 1835)

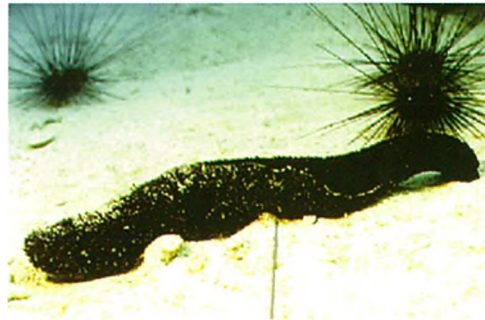
Common Name: -

Local Name: pling dam

Description: Body black, long cylindrical, and soft. Mouth with 20 black peltate tentacles locate nearly ventral. A number of papillae scatter at dorsal part. Long tube feet are dense along ambulacrum bands but sparse along interambulacrum.

Habitat: sandy beach and sand bottom of coral reef at 3-6 m depth

Distribution: Indo-West Pacific: Indian Ocean islands, east Africa, Madagascar, Red Sea, Persian Gulf, West Indies, Pakistan, Maldives, Bengal Bay, East Indies, north Australia, the Philippines, China, Japan, South Pacific islands, and Hawaii



Size: 230x40 mm, 1.0-2.0 mm-thick body wall

Figure: Sumaitt Putchakarn

Site: Koh Sak, Chonburi Province

Scientific Name: *Pearsonothuria graeffei* (Semper, 1868)

Common Name: -

Local Name: pling dam

Description: Body long cylindrical and rough. Mouth with 20 black and white-tip peltate tentacles locate nearly ventral. Anus locate nearly dorsal. Dorsal dark-brown and white longitudinally. A number of big blackish-brown and knob-like papillae closely scatter around dorsal part. Long and big dark-brown tube feet scatter densely along ventral ambulacrum bands.

Habitat: attaching on big rocks or corals in coral reef at 3-8 m depth

Distribution: Indo-West Pacific: Red Sea, Maldives, Bengal Bay, East Indies, the Philippines, and South Pacific islands



Size: 300x50 mm, 5.0 mm-thick body wall

Figure: Sumaitt Putchakarn

Site: Koh Mak, Trat Province

FAMILY: Stichopoidae

Scientific Name: *Stichopus naso* (Semper, 1868)

Common Name: -

Local Name: pling hin

Description: Body long tetragonal, light brown with some black vertical bands. Two bands of big cone-like papillae locate longitudinally at dorsal edges. Mouth with 20 light brown peltate tentacles locate nearly ventral. Anus locate nearly dorsal. Long tube feet scatter along the 3 bands of ambulacrum

Habitat: sandy bottom around the outer part of coral reef at 6-15 m depth

Distribution: reported in Thailand and the Philippines



Size: 120x45 mm, 10.0 mm-thick body wall

Figure: Sumaitt Putchakarn

Site: Koh Phai, Chonburi Province

Scientific Name: *Stichopus chloronotus* (Brandt, 1835)

Common Name: teat fish

Local Name: -

Description: Body totally black, long tetragonal, with smooth and slippy skin. Big cone-shaped papillae black with yellow tip, scattering in 2 bands along dorsal edges. Mouth with 20 black peltate tentacles locate nearly ventral. Anus locate nearly dorsal. Long tube feet scatter along the 3 bands of ambulacrum

Habitat: sandy bottom or dead corals around the coral reef at 1-2 m depth

Distribution: Indo-West Pacific: west Indian Ocean islands, east Africa, Madagascar, Maldives, Bengal Bay, East Indies, north Australia, the Philippines, China, Japan, South Pacific islands, and Hawaii



Size: 220x60 mm, 2.0 mm-thick body wall

Figure: Sumaitt Putchakarn

Site: Rawaii Beach, Phuket Province

Scientific Name: *Stichopus horrens* (Selenka, 1867)

Common Name: -

Local Name: pling hin

Description: Body long tetragonal. Two patterns of body color were found: yellowish brown and blueish yellow. The yellowish-brown one has short, big-base, and black-tip dorsal papillae. It has ventral light brown with long tube feet scattering along the 3 bands of ambulacrum. The blueish yellow one has short, knob-like, big white-base, and blue-tip dorsal papillae, scattering along dorsal edges. It has ventral light yellow with tube feet scattering along the 3 bands of ambulacrum. Both have their mouths, with 20 light brown peltate tentacles each, locating ventral. Anus locate nearly ventral.

Habitat: sandy bottom around the outer part of coral reef at the depth of about 6 m

Distribution: Indo-West Pacific: East Indies, north Australia, the Philippines, China, Japan, South Pacific islands, and Hawaii



Size: 180x50 mm, 10.0 mm-thick body wall

Figure: Sumaitt Putchakarn

Site: Koh Leum Noi, Chonburi Province

Scientific Name: *Stichopus herrmanni* (Semper, 1868)

Common Name: curry fish

Local Name: -

Description: Body blackish brown/chocolate, long tetragonal. Short dorsal papillae with reddish-brown-tip and big brown-base scattering in 2 bands along dorsal edges together with the smaller ones scattering around. Mouth with 20 brown peltate tentacles locate nearly ventral. Anus locate nearly dorsal. Ventral brown with tube feet scattering along the 3 bands of ambulacrum

Habitat: sandy bottom around the outer part of coral reef at the depth of about 6 m

Distribution: Indo-West Pacific: East Indies, north Australia, the Philippines, China, Japan, South Pacific, and Hawaii



Size: 280x60 mm, 10.0 mm-thick body wall

Figure: Sumaitt Putchakarn

Site: Koh Leum Noi, Chonburi Province

FAMILY: Cucumaridae

Scientific Name: *Actinocucumis typicus* (Ludwig, 1875)

Common Name: -

Local name: -

Description: Body dark gray, long pentagonal-spindle. Dark gray ciliated papillae scatter in 2 bands at dorsal part. Around the mouth are 20 dark gray dendritic tentacles. Tube feet scatter along the 3 bands of ventral ambulacrum. Interambulacrum black.

Habitat: found beneath the sponges in dead corals around coral reef at the depth of about 3 m.

Distribution: Indo-West Pacific: West Indies, Pakistan, Bengal Bay, East Indies, north Australia, China, and Japan



Size: 70x20 mm, 1.0 mm-thick body wall

Figure: Arom Mucharin

Site: a specimen collected in Marine Science Institute, Bang Saen, Chonburi Province

Scientific Name: *Cercodemus anceps* (Selenka, 1867)

Common Name: -

Local Name: pling sri shom phoo luang

Description: Body pink, cylindrical-spindle, with dark pink dorsal papillae. Around the mouth are 10 light pink dendritic tentacles. Tube feet scatter along the 3 bands of ventral ambulacrum.

Habitat: lying on sand or attaching on substrates in and out of coral reef at 3-15 m depth

Distribution: Indo-West Pacific: East Indies, the Philippines, China, Japan, and South Pacific islands



Size: 85x30 mm, 1.0-2.0 mm-thick body wall

Figure: Sumaitt Putchakarn

Site: Ta Waen Beach, Koh Lan, Chonburi Province

Scientific Name: *Colochirus quadrangularis* (Troschel, 1846)

Common Name: -

Local Name: pling sri kheo

Description: Body greenish gray, long tetragonal-spindle, with cone-shaped dorsal papillae. Around the mouth are 10 light yellow dendritic tentacles. Tube feet scatter along the 3 bands of ventral ambulacrum.

Habitat: lying on sand or attaching on substrates around the outer part of coral reef at 10-15 m depth

Distribution: Indo-West Pacific: Bengal Bay, East Indies, north Australia, the Philippines, China, and Japan



Size: 125x30 mm, 1.0-2.0 mm-thick body wall

Figure: Sumaitt Putchakarn

Site: Ta Waen Beach, Koh Lan, Chonburi Province

Scientific Name: *Pseudocolochirus axiologus* (Clark, 1914)

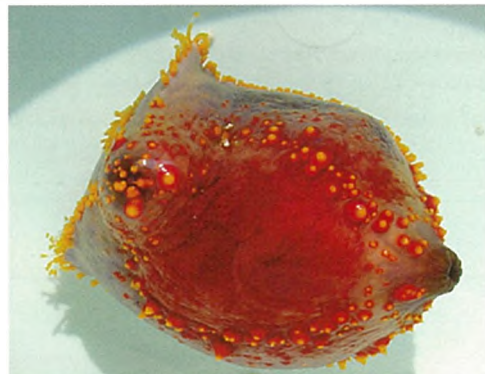
Common Name: red sea cucumber

Local name: pling apple

Description: Body round. Big cone-shaped dorsal papillae with yellow tip and red base scatter in 2 bands along the bright red dorsal part. Around the mouth are 10 yellowish red dendritic tentacles. Long yellow tube feet scatter along the 3 bands of ventral ambulacrum.

Habitat: lying on sand or attaching on substrates around coastal zone or coral reef at more than 10 m depth

Distribution: reported in Thailand and north Australia



Size: 80x50 mm

Figure: Arom Mucharin

Site: Bang Saen, Chonburi Province

<p>FAMILY: Phyllophoridae</p> <p>Scientific Name: <i>Stolus conjugens</i> (Semper, 1868)</p> <p>Common Name: -</p> <p>Local Name: -</p> <p>Description: Body blackish brown, cylindrical-spindle, with short dorsal papillae scattering around. Around the mouth are 10 dark brown dendritic tentacles. Indistinct tube feet scatter along the ventral ambulacrum.</p> <p>Habitat: burying in sand along sandy beach at the depth of about 3 m</p> <p>Distribution: Indo-West Pacific: West Indies, Pakistan, the Philippines</p>	 <p>Size: 32x15 mm, 1.0 mm-thick body wall</p> <p>Figure: Arom Mucharin</p> <p>Site: a specimen collected in Marine Science Institute, Bang Saen, Chonburi Province</p>
<p>Scientific Name: <i>Stolus buccalis</i> (Stimpson, 1855)</p> <p>Common Name: -</p> <p>Local Name: pling sri dam</p> <p>Description: Body blueish purple, long cylindrical-spindle, with indistinct dorsal papillae. Around the mouth are 10 dark gray with black-tip dendritic tentacles. Tube feet scatter along the 3 bands of ventral ambulacrum.</p> <p>Habitat: burying in sand along sandy beach at the depth of about 3 m</p> <p>Distribution: Indo-West Pacific: east Africa, Madagascar, Arabian Sea, Persian Gulf, West Indies, Pakistan, Bengal Bay, East Indies, north Australia, the Philippines, China, and Japan</p>	 <p>Size: 80x15 mm, 1.0-2.0 mm-thick body wall</p> <p>Figure: Sumaitt Putchakarn</p> <p>Site: Koh Lan, Chonburi Province</p>
<p>Scientific Name: <i>Thyone cf. papuensis</i> (Théel, 1886)</p> <p>Common Name: -</p> <p>Local Name: pling sri luang</p> <p>Description: Body deep yellow, small, cylindrical-spindle, with small dorsal papillae. Around the mouth are 10 yellow with black-tip dendritic tentacles. Tube feet scatter along the 3 bands of ventral ambulacrum.</p> <p>Habitat: burying in sand around the outer part of coral reef at 6-8 m depth</p> <p>Distribution: Indo-West Pacific: Bengal Bay, East Indies, and north Australia</p>	 <p>Size: 25x10 mm, 1.0 mm-thick body wall</p> <p>Figure: Sumaitt Putchakarn</p> <p>Site: Koh Leum Noi, Chonburi Province</p>

Scientific Name: *Havelockia versicolor* (Semper, 1868)

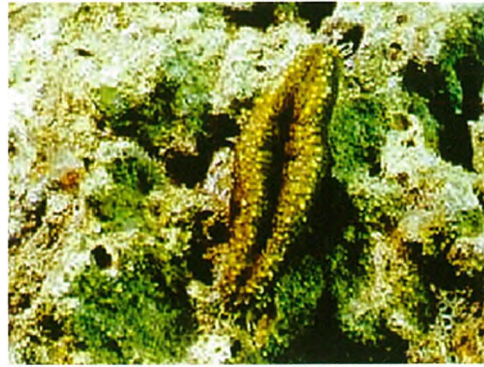
Common Name: -

Local Name: pling sri kheo

Description: Body cylindrical-spindle, light brown with a dark brown longitudinal band and 2 bands of short ciliated dorsal papillae. Around the mouth are 10 blackish purple with black-tip dendritic tentacles. Tube feet scatter along the 3 bands of ventral ambulacrum.

Habitat: lying on sand or attaching on substrates around the outer part of coral reef at 4-6 m depth

Distribution: Indo-West Pacific: East Indies, north Australia, and the Philippines



Size: 60x15 mm, 1.0-1.5 mm-thick body wall

Figure: Sumaitt Putchakarn

Site: Koh Leum Noi, Chonburi Province

FAMILY: Caudinidae

Scientific Name: *Acaudina leucoprocta* (H.L. Clark, 1938)

Common Name: -

Local Name: -

Description: Body dark gray, plump, without papillae and tube feet causing indistinguishable dorsal and ventral parts. Around the mouth are 15 digitate tentacles.

Habitat: burying in muddy sand at about 8 m depth

Distribution: reported in Thailand and north Australia



Size: 70x20 mm, 2.0 mm-thick body wall

Figure: Arom Mucharin

Site: a specimen collected in Marine Science Institute, Bang Saen, Chonburi Province

Scientific Name: *Acaudina* sp. 3

Common Name: -

Local Name: -

Description: Body light pink, plump, with blackish gray pigment densely scattering around the very thin body wall. No papillae and tube feet causing indistinguishable dorsal and ventral parts. Around the mouth are 15 digitate tentacles.

Habitat: lying on or burying in muddy sand around sea grass bed with *Holodule pinifolia* dominated

Distribution: reported in Thailand



Size: 95x35 mm, less than 1.0 mm-thick body wall

Figure: Arom Mucharin

Site: a specimen collected in Marine Science Institute, Bang Saen, Chonburi Province

Scientific Name: *Paracaudina* sp.

Common Name: -

Local Name: -

Description: Body transparently white, plump, with orange pigment scattering around. No papillae and tube feet causing indistinguishable dorsal and ventral parts. Around the mouth are digitate tentacles.

Habitat: lying on or burying in muddy sand around river mouth or sea grass bed including the outer part of coral reef

Distribution: reported in Thailand



Size: 40x15 mm, 1.0 mm-thick body wall

Figure: Arom Mucharin

Site: a specimen collected in Marine Science Institute, Bang Saen, Chonburi Province

FAMILY: Synaptidae

Scientific Name: *Synaptula* sp.1

Common Name: -

Local Name: pling soy khai muke

Description: Body snake-like, blackish gray with a pale white longitudinal band on the very thin body wall. No papillae and tube feet causing indistinguishable dorsal and ventral parts. Around the mouth are 13 dark gray pinnate tentacles.

Habitat: lying on sponges or corals in the coral reef at 2-3 m depth

Distribution: reported in Thailand



Size: 450x15 mm, less than 1.0 mm-thick body wall

Figure: Sumaitt Putchakarn

Site: Koh Khrok, Chonburi Province

Scientific Name: *Synaptula* sp.2

Common Name: -

Local Name: pling soy khai muke khao
Synaptula sp.2

Description: Body white, snake-like, with very thin and transparent body wall. No papillae and tube feet causing indistinguishable dorsal and ventral parts. Around the mouth are 10 white pinnate tentacles.

Habitat: lying on sponges or corals in the coral reef at 2-3 m depth

Distribution: reported in Thailand



Size: 7x65 mm, less than 1.0 mm-thick body wall

Figure: Sumaitt Putchakarn

Site: Koh Man Wichai, Chonburi Province

3. Production and Utilization

3.1 Sea Cucumber Fisheries

Sea cucumbers have been harvested in Thailand by the simple method by hand up to fishing gear operation as followed:

- Picking by hand during low tide from intertidal area and from shallow water.
- Snorkeling at deeper water up to 5-10 m.
- Punching by pointed metal spear mounted on a long pole. This has been popular amongst sea gypsy fishermen targeting high value species such as *Thelenota ananus*, *Actinopyga echinites*, and *Holothuria nobilis*, in deeper water.
- Two sea cucumber trawlers in Trang Province of southern Thailand were recorded. They were 8-10 m long with 5-10 hp engines. The trawl was 2.5 inch mesh-size polyethylene of 5-6 m length and 3 cm codend mesh-size. Day-time operation was done at the coastal area near sea grass bed.

Local fishermen prefer to collect sea cucumbers within nearby coastal zones during low tide; others e.g., the sea gypsy in the Andaman Sea, indulge in extensive migrations to offshore islands for 1-7 days trip fisheries. During these trips, sea cucumbers are gutted and brought back to land for further processing. Income from sea cucumber fisheries varies from trip to trip depending on the fishing effort, availability of resources and species collected. Some species are collected during daytime e.g., *Holothuria leucospilota*, while others e.g., *Stichopus variegates*, are available at night.

Sea cucumbers from the by-catch of commercial trawlers are separated and sold at fishing port for further processing.

3.2 Local usage and processing

Normally sea cucumbers are gutted by cutting the head and bottom, cleaned with water and dried. However, there are differences in technique from place to place.

In southern Thailand, processing of *Holothuria scabra* involved gutting and boiling the animals in sea water for 1 hour. The fisherman then buries them in the sand overnight, then taking out and stepping on them for 10 to 20 minutes to squeeze out their color. The sea cucumbers are boiled in

water again for 1 hour, then brushed to remove the spicules, before they are ready for consumption, or dried for storage.

In Phangnga Province, southern Thailand, the sea cucumbers are gutted and cleaned then boiled in seawater with alum (aluminium potassium sulphate) for 2 hours, before they are smoked for 1 day.

In Chonburi Province, eastern Thailand, the sea cucumbers are gutted and cleaned, boiled in their own coelomic fluid for at least 2 hours, then smoked for 10 hours and sun-dried for 2 more days. The water left in this process is put in 20-litre containers and sold as the component of traditional medicine.

Weight ratio of dry sea cucumber to the fresh ones is varied by species e.g., one hundred kilograms of fresh *Holothuria leucospilota* can be 10 kilograms of the smoked one.

The quality of dried sea cucumbers produced in some places appears to be poor. Processing requires basic equipments and the methods are straightforward, but it needs to be carefully undertaken if good quality product is desired.

Processed sea cucumbers are used for soup and traditional salad.

3.3 Marketing

Cooked, boiled, or dried sea cucumbers are sold at local fish markets in the big cities, where restaurants serve them in Chinese soup or salad. The price of processed sea cucumbers varies by species and markets. There are 12 species of sea cucumbers consumed in Thailand, some of them are exported:

Species	Family
1. <i>Holothuria scabra</i>	Holothuriidae
2. <i>Holothuria atra</i>	Holothuriidae
3. <i>Holothuria (Holothuria) argus</i>	Holothuriidae
4. <i>Bohadschia (Holothuria) marmorata</i>	Holothuriidae
5. <i>Holothuria spinifera</i>	Holothuriidae
6. <i>Holothuria leucospilota</i>	Holothuriidae
7. <i>Holothuria nobilis</i>	Holothuriidae
8. <i>Holothuria edulis</i>	Holothuriidae
9. <i>Actinopyga echinites</i>	Holothuriidae
10. <i>Stichopus chloronotus</i>	Stichopodidae
11. <i>Stichopus variegates</i>	Stichopodidae
12. <i>Thelenota ananas</i>	Stichopodidae

The most popular one among Thai is *Holothuria scabra* (white sea cucumber or pling khao), followed by *H. atra* (black sea cucumber or pling dam).

4. Trade

From the latest data reported in 2003, Thailand imported sea cucumbers from 22 countries listed in **table 3**. The major one was Madagascar, followed by Tanzania, China, Hong Kong, and others.

Thailand also exported sea cucumbers to 12 countries mostly to Hong Kong as shown in **table 4**. Apart from the majority in Asian countries, U.S.A.,

Niger, and Australia were included in the exported countries of Thailand.

From overall data in **table 5**, the amounts and values of imported and exported sea cucumbers in Thailand are nearly the same. They were traded mostly in processed form. Quantity and value of traded sea cucumbers increased remarkably since 1999.

In addition, there has been some volume of trade at borders of the country not existing in data base of the concerned organization.

Table 3 Thailand's Sea Cucumber Imported Countries

Rank	Country	Quantity (kg)	Value (baht)	Latest Year Recorded	Product Form
1	Madagascar	46,999	4,370,660	2003	processed
2	Tanzania	18,932	1,728,066	2003	processed
3	China	12,438	1,320,590	2003	processed
4	Hong Kong	10,103	1,620,621	2003	processed
5	Papua New Guinea	5,226	4,795,917	2003	processed
6	The Philippines	5,160	504,885	2003	processed
7	U.S.A.	4,499	4,708,233	2000	processed
8	Monaco	4,411	404,601	2003	processed
9	Korea	3,160	922,386	2001	processed
10	Maldova	3,000	210,142	2000	processed
11	Malaysia	2,298	852,506	2003	processed
12	Switzerland	1,500	90,258	1999	processed
13	India	1,160	38,280	1996	processed
14	Indonesia	1,019	122,905	2003	processed
15	Singapore	726	61,431	2003	processed
16	Myanmar	700	28,000	2003	processed
17	Vietnam	288	28,800	1995	processed
18	New Zealand	250	223,381	2003	processed
19	Japan	200	54,472	2002	processed
20	Australia	150	18,851	2003	processed
21	Norway	129	66,890	2000	processed
22	Fiji	5	1,628	2003	processed

Table 4 Thailand's Sea Cucumber Exported Countries

Rank	Country	Quantity (kg)	Value (baht)	Latest Year Recorded	Product Form
1	Hong Kong	120,045	11,350,128	2003	processed
2	Japan	30,000	1,095,000	1997	alive/fresh/ frozen
3	China	18,900	245,303	1999	processed
4	U.S.A.	5,880	849,744	1997	processed
5	Vietnam	3,810	511,145	2001	processed
6	Singapore	1,423	472,650	2003	alive/fresh/ frozen/ processed
7	Niger	1,235	344,902	1996	processed
8	Korea	790	189,172	2001	processed
9	Taiwan	762	121,043	2002	alive/fresh/ frozen/ processed
10	Australia	200	84,779	1996	processed
11	Malaysia	120	47,170	2000	alive/fresh/ frozen
12	India	31	45,992	1997	alive/fresh/ frozen

Table 5 Import-Export of Sea Cucumbers in Thailand

Year	Alive/Fresh/Frozen		Processed		Total	
	Quantity (kg)	Value (baht)	Quantity (kg)	Value (baht)	Quantity (kg)	Value (baht)
IMPORT						
1993	69	14,659	10,705	919,011	10,774	933,670
1994	52	10,604	14,837	1,380,636	14,889	1,391,240
1995	2	2,405	31,839	2,552,356	31,841	2,554,761
1996	1,380	100,530	23,402	2,187,422	24,782	2,287,952
1997			71,391	13,470,810	71,391	13,470,810
1998	96	43,370	78,422	11,618,021	78,518	11,661,391
1999	660	381,048	150,362	31,168,130	151,022	31,549,178
2000	3,817	1,291,742	129,002	19,833,265	132,819	21,125,007
2001			115,416	22,374,305	115,416	22,374,305
2002			116,444	20,264,425	116,444	20,264,425
2003			108,417	16,054,042	108,417	16,054,042
EXPORT						
1993			60	12,931	60	12,931
1994	105	13,119	50	4,000	155	17,119
1995	204	20,016	4,000	489,582	4,204	509,598
1996			8,155	1,429,689	8,155	1,429,689
1997	30,031	1,140,992	10,413	2,732,935	40,444	3,873,927
1998	16	4,696	86,858	6,628,994	86,874	6,633,690
1999	19,765	244,606	205,151	11,872,920	224,916	12,117,526
2000	282	68,758	242,256	34,196,797	242,538	34,265,555
2001	58	11,640	120,982	19,022,848	121,040	19,034,488
2002	360	72,000	101,291	11,795,642	101,651	11,867,642
2003	20	7,172	121,448	11,815,606	121,468	11,822,778

5. Conclusion

Thailand has a high diversity of sea cucumbers recorded at 102 species in 8 families mainly Holothuriidae, lots of which are under genus-systematization. From those in Thai waters, 9 species of Holothuriidae and 3 species of Stichopodidae are reported as food. The most commercially important species is *Holothuria scabra* or sand fish, followed by *H. atra* or lolly fish. Most of sea cucumbers are coastal fauna, many of which prefer hiding around coral reef or sea grass bed. Sea cucumbers are exploited for long times in Thailand along the coastal area and islands. The common fishing methods are hand picking during low tide or snorkeling at deeper water. Processing is confined in local places with traditional techniques usually gutted, cleaned, boiled, and dried or smoked. For restaurant demand, Thailand imports processed sea cucumbers from many parts of the world, totally 22 countries of which Madagascar was the majority. At

the same time the sea cucumbers are also exported from the country mainly to Hong Kong followed by the 8 countries in Asia and 3 other countries. Recently, the quantities and values of their import and export were not markedly different. The actual species traded are not recorded.

Although there have been exploitation and trade of sea cucumbers in the country for long times, the fisheries is not significantly commercial. Their fisheries, marketing and trade are not recorded in national fisheries statistics; their stock assessment and recruitment are not yet studied as well. Nevertheless, due to their common habitats locating in and around coral reefs, reef flats and sea grass bed, strong harvesting of the animals would certainly disturb or resulted in destruction of these significantly-important coastal-ecosystems. Thus, intensive monitoring on sea cucumber exploitation and trade should be carried out for conservation and long term sustainable exploitation purposes.