



**Survey of Small-Scale Fishing Gear and Practices
Contributing to Sea Turtle Mortalities
along the Coast of Rayong Province, Eastern Gulf of Thailand**

**Isara Chanrachkij, Nakaret Yasook, Suppachai Anantapongsuk,
Prasert Petrasatien, and Worawit Wanchana**

**TRAINING DEPARTMENT
SOUTHEAST ASIAN FISHERIES DEVELOPMENT CENTER**

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Abstract

A preliminary survey on small-scale fishing gears and practices that contribute to the negative impacts to sea turtles mortality was carried out in the coastal fishing communities of Rayong Province from 1 to 4 December 2009 with financial support from the Japanese Thrust Fund Program through SEAFDEC/TD. Carried out through the collaborative efforts of SEAFDEC/TD*, SEAFDEC/MFRDMD** and EMDEC-DOF***, the survey aimed to investigate the type of fishing gears and practices that incidentally catch sea turtles. The research methodology comprised a review of secondary data, interview with small-scale fishers and actual observation of the activities around the relevant fishing communities.

The results of the survey revealed that two types of fishing activities, such as the large mesh bottom gillnet and sting ray longline have possibly contributed to sea turtle mortalities in the survey area. This result is consistent with the past research works conducted by Thai scientists which showed that both gears also caused sea turtle mortalities in the Andaman Sea.

Considering the need for immediate actions or the appropriate fisheries measures for the conservation and management of sea turtles in the survey area, further comprehensive study such as those on the distribution and abundance of sea turtles in the coastal area of Rayong Province, biology and distribution of sting rays, fishers' attitude on sea turtles conservation, and actual fishing trials/experiments or actual observation of both fishing activities, should be carried out.

Keywords: By-catch, Reduction of impact from fishing, Small-scale fishing, Sea turtle mortality, Coast of Rayong Province

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Introduction

Sea turtles' population has dramatically declined over the last decade or so and by-catch of the sea turtles is one of the public conservation issues being addressed in Thailand, which started sea turtles' conservation measures since the 19th century. In 1947, a Ministerial Decree was legislated authorizing the Department of Fisheries (DOF) of Thailand to implement Article 32 (7) which prohibits sea turtle fisheries and imposes a fine and/or imprisonment for offenders. Urged by the global awareness campaign and considering the situation of sea turtles population in Thailand, the country's entrusted responsible state agencies stepped forward to legislate the Ministerial Decree on Wild Animal Reservation and Protection Act, B.E. 2535 (1992) in order to strengthen and protect all endangered species including sea turtles. This Act, which directly includes conservation of all sea turtles that are proclaimed and specified by the Ministerial Regulations, provides that all offenders or those who catch/fish/hunt sea turtles and their eggs for commercial purposes without any permission, should be punished with a prescribed fine and/or imprisonment by the authorized state agency, a provision which is also stipulated in Fisheries Regulation, B.E. 2490 (1947). Recently, sea turtles have been classified as one of the endangered species based on the IUCN Red List of Threatened Species accessed by the Convention on International Trade in Endangered Species (CITES), which the Thai Government had ratified in 1983.

In spite of the particular regulations to protect sea turtles, stranding of sea turtles carcasses had been observed along the coasts of the Gulf of Thailand as well as in the Andaman Sea. Many Thai scientists pointed out that mortality of sea turtles could be due to a number of causes, *e.g.* collision with sea vessels, swallowing of plastic bags and other trash, irresponsible fishing activities, etc. During the Regional Workshop on the Impact of Fishing in Coastal and Marine Environment in the Southeast Asian Waters organized by the Training Department of the Southeast Asian Fisheries Development Center (SEAFDEC/TD) from 12 to 15 January 2009, the regional experts revealed that some fishing activities, *e.g.* gillnet, trawl, longline, etc., have posed risks of sea turtle mortalities. In addition, scientists of SEAFDEC also recognized for over a decade, that trawl is one of the fishing gear categories that have been proven to cause sea turtle mortalities. The DOF of Thailand has therefore collaborated with SEAFDEC/TD, and encouraged trawl fishers to mitigate sea turtle mortality risks. Given such mission, the Thai Turtle Free Device (TTFD) had been invented, tried and assembled with trawl nets as a tool to release sea turtles from trawl nets.

Nonetheless, even if the trawl fishers have not fully assembled TTFD with their trawl nets yet, other techniques for mitigating sea turtles mortality by trawl fishing within the aspect of fishing technology, has already been promoted.

Moreover, in the promotion of responsible small-scale fishing gears and practices, the impacts of sea turtles mortality have been considered as well. Although information on stranding occurrences of sea turtles in the Indian Ocean due to some fishing gears *e.g.* gillnet, trawl, bamboo strake trap, etc., are also being reported, there had been lower stranding record of sea turtles along the coast of the Gulf of Thailand. This could be due to the presence of a sea turtle conservation center at Man-nai Island in the eastern part of the Gulf of Thailand. However, fishers operating various fishing gears and practices along the coast of the Gulf also confirmed that statistical information on stranding occurrences is quite scattered and difficult to compile. Un-official information gathered from various sources mainly through interviews with fishers, fisheries officers, NGOs and other concerned stakeholders, indicated that large mesh bottom gillnet (or sting ray gillnet) and sting ray longline had been the culprit of sea turtle mortalities in the coasts of Rayong Province and its adjacent areas. This could be due to the fact that the fishing grounds for such fishing gears are also located around the sea turtle conservation center, posing high potentials to increase the mortality risks of sea turtles. In the absence of results of relevant fishing experiments as of the present time, a preliminary survey and study to collect secondary data from the aforementioned fishing gears have been conducted as an initial process for ascertaining the future direction for mitigating sea turtle mortalities considering that sea turtles have been reported as by-catch of such fishing gears.

Objective

The main objective of this survey is to study the construction of the fishing gears and the practices adopted by small-scale fishers along the coastal areas of Rayong Province, Thailand where sea turtles have been found to occur as by-catch.

Terms and Definition

Sea Turtle refers to turtle species such as the Hawksbill turtle (*Eretmochelys imbricate*), Olive Ridley turtle (*Lepidochelys olivaceae*), Leatherback turtle (*Demochelys coriacea*), Green Turtle (*Chelonia mydas*), and Loggerhead turtle (*Caretta caretta*)

Small-scale fisher refers to a person who does fishing by employing family labor in principle, and operating fishing vessels less than 10 m in length over all (LOA) and engine smaller than 30 HP, in fishing grounds less than 5 km from the shore.

Fishing gear refers to the gear which targets the sting rays, and in this report, two (2) types of fishing gears have been identified, *i.e.* large mesh bottom gillnet and bottom longline.

Fishing practice refers to the operation of the fishing gears that target certain groups of sting rays.

Coast of Rayong Province refers to the coastal area located from Maung Rayong District to Moo 4, 8 and 9 Nern-klor Sub-District, Klang District, Rayong Province of Thailand.

Materials and Methods

The methodology employed to survey the fishing gear and practices along the coast of Rayong Province, Eastern Gulf of Thailand is qualitative research, where the data related to the fishing gear type and construction, and fishing operations by small-scale fishers with sea turtles as incidental catch, were gathered. Rapid Rural Appraisal (RRA) comprising three (3) methods was applied to gather the information from the survey (Figure 1).

- 1) **Primary data collection method through in-depth interview.** The face-to-face interview using unstructured questionnaire focused on the details of the fishing gear which had possible impact on sea turtle mortalities. Since the targeted fishing gears had already been recognized, some details related to the fishing practices, fishing seasons, fishing grounds and cost of gear were also gathered during the interview with master fishermen, fishermen and fishing boat owners. Data on the cost of fishing gear was collected from fishing gear stores in Rayong Province and from fishing gear owners.
- 2) **Direct and actual observation without participation.** This approach was adopted to examine the construction and design of the target fishing gears. The materials used for constructing the fishing gear and other fishing techniques were also recorded, which were gathered through actual observation of the target fishing gears in the fishing villages as well as those found in fishing boats.
- 3) **Review of secondary data.** The review focused on the existing fishing gears and methods in Thailand, considering that the targeted fishing gears had already been recognized. For this report, information on the fishing gears that target the rays and related species were sourced from the Report of Fishing Gear and Method of Thailand published by the Department of Fisheries of Thailand (1935, 1969 and 1997) and SEAFDEC/TD (1986 and 2004).

Survey Area

The survey area is located along the coastline of Rayong Province in the eastern part of the Gulf of Thailand. Specifically, six (6) main fishing communities, namely: 1) Ao Makhampom fishing port, 2) Crab Bank of Ban Moo 4, 8 and 9 at Nern-klor Sub District, 3) Laem Rung-raung Fishing community, 4) Hard Mae Rumphueng Beach fishing communities, 5) Suan Son beach, and 6) EMDEC* fishing pier, were involved in the survey.

Moreover, the Hard Mae Rumphueng Beach fishing communities had been separated into four (4) areas, *i.e.* 1) Hin Dum, 2) Hin Khoa, 3) Ban Klong Kra-Chor, and 4) Par Khun (or Ek-ka-nek) community. The location of the fishing communities in the survey area is shown in Figure 2.



Figure 1. SEAFDEC/TD and EMDEC fishing gear technologists collaborate in interviewing local fishers along the coast of Rayong Province on the impact of fishing gear to the mortalities of sea turtles (Photos by Isara Chanrachkij on 2 and 3 December 2009)

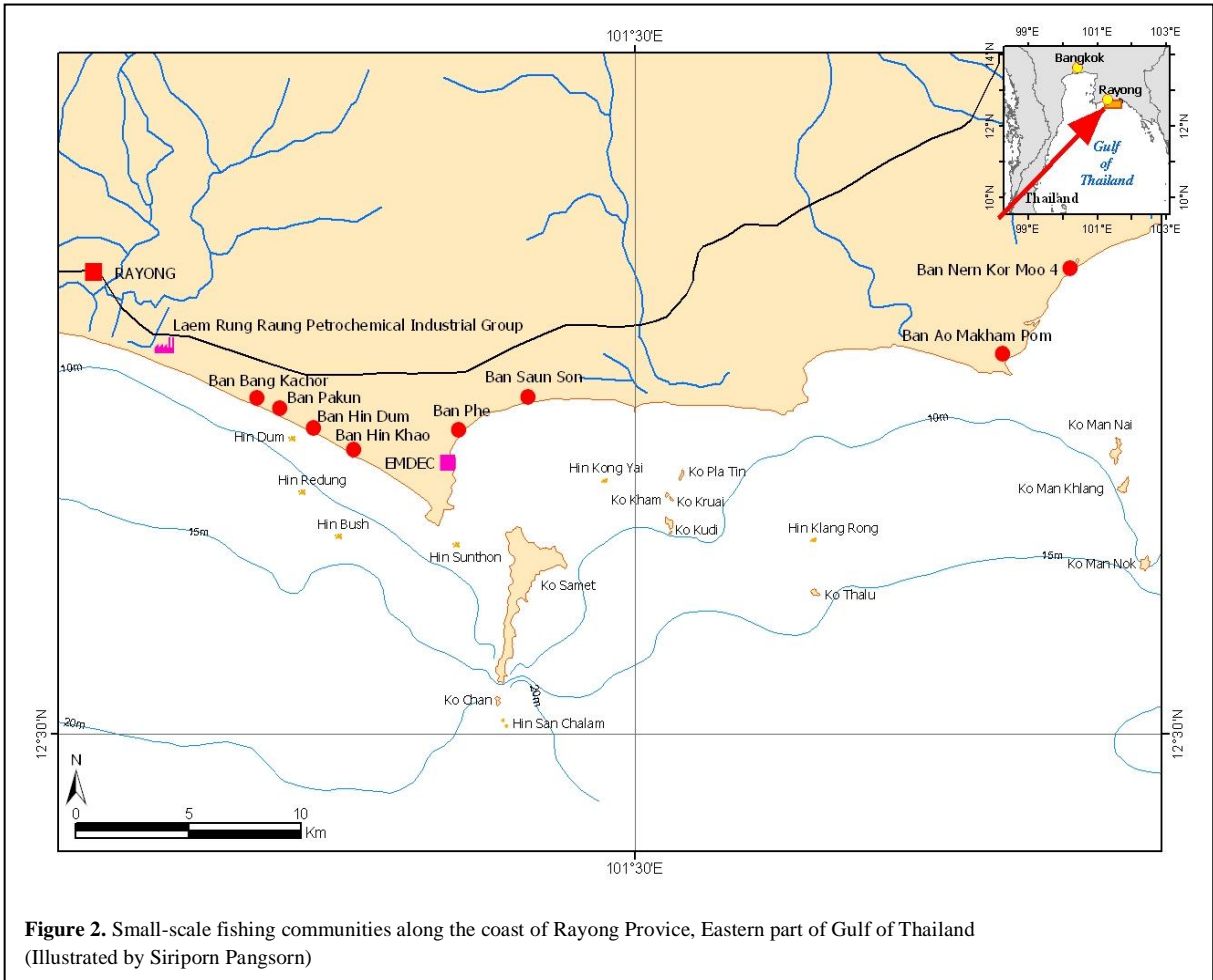


Figure 2. Small-scale fishing communities along the coast of Rayong Province, Eastern part of Gulf of Thailand (Illustrated by Siriporn Pangsorn)

Literature Review

Sea Turtles Classification in Thailand

Syed Abdulla (2009) reported that there are five (5) dominant sea turtle species in Thailand, namely: Hawksbill turtle (*Eretmochelys imbricate*), Olive Ridley turtle (*Lepidochelys olivaceae*), Leatherback turtle (*Demochelys coriacea*), Green Turtle (*Chelonia mydas*), and Loggerhead turtle (*Caretta caretta*). Sea turtles have been legally protected in Thailand since 1947. A Ministerial Decree for the implementation of Article 32 (7) within the Thai Fisheries Law of 1947, prohibited turtle fisheries with a fine and/or imprisonment for offenders. However, turtle eggs collection is still allowed under a concession system, supervised by the Department of Fisheries. Due to the threats facing the survival of sea turtles, the Hawksbill Turtle and Leatherback Turtle had been included in the list of Critically Endangered Marine Species, while the Green Turtle and Loggerhead Turtle are in the list of Endangered Marine Species, and the Olive Ridley Turtle in the list of Vulnerable Marine Species, under the IUCN Red List of Threatened Species (<http://www.iucnredlist.org/apps/redlist/search> accessed on 28 December 2009).

Somchai Monanunsap and Kongkiet Kittiwattanawong (2009) reported that from 1991 to 2006, more than 500 occurrences of sea turtles stranding had been observed in the Gulf of Thailand and the Andaman Sea, of which 330 sea turtles were stranded in the Andaman Sea and 194 in the Gulf of Thailand. Fifty-eight percent of the stranded sea turtles were found dead while 42% were still alive. Various kinds of gillnet (58%) were found dominant in accidentally catching sea turtles, while other fishing gear also had sea turtles as incidental catch such as trawl (8%), bottom longline (8%), bamboo stake trap (8%), squid trap (6%), purse seine (5%), and others (7%). Hawksbill Turtles had the highest cases of stranding occurrences (187 individuals) followed by the Green Turtles with 142 individuals.

Definition of By-catch and Incidental Catch

For the definition of small-scale fishing or artisanal fishing, focus could be made on the target fishing gear considered in the survey. **Prof. Matsuoka** of the **Kagoshima University of Japan (1997)**, defined by-catch during the Regional Workshop for Responsible Fishing Technologies organized by SEAFDEC/TD in 1997, as: *the incidental catch or what is discarded at sea or those utilized but dealt with minimally. As widely stated, producing by-catch is not necessarily a negative practice as there are many fisheries which are still feasible with by-catch in addition to the principal species targeted.* Based on the multi-species composition of the fisheries resources particularly the coastal/demersal stocks in tropical areas, SEAFDEC fishing gear experts defined by-catch differently from that of Matsuoka's. Considering that target catch is not a useful term applied to all fisheries in the region, the term by-catch used for the Southeast Asian regional industrial fisheries is defined by SEAFDEC Fishing Gear Experts as: *A general term for the component of the catch, which is anticipated to be caught during an industrial fishing operation, in addition to the target catch.*

However, they also defined the terms *incidental catch* that may contribute to the mortality of sea turtles by small-scale fishing activities. In this connection, incidental catch may be

composed of: 1) aquatic animals including mammals, turtles and sea birds; 2) debris including parts of coral reefs; and, 3) juveniles. Moreover, the official definition of incidental catch provided by the SEAFDEC/TD Fishing Gear Experts is: *A general term for the catch, which is not anticipated to be caught during a fishing operation, but are incidentally caught* (SEAFDEC/TD, 2003).

Definition of Small-scale Fisheries

SEAFDEC (1987) referred to the definition of small-scale fisheries or artisanal fishing of the National Rural Development Coordination Center under the Office of the National Economic and Social Development Board (NESDB), the Prime Minister’s Offices (1987). Thus, small-scale fisheries has been defined as: *fisheries where the personnel who do fishing employ family labor in principle, and operating fishing vessels less than 10 m in length over all (LOA) and engine smaller than 30 HP, in fishing ground less than 5 km from the shore.* **SEAFDEC (2003)** also concluded the classification of small-scale and large-scale fisheries, as shown in Annex1.

Furthermore, since two types of fishing gear, *i.e.* large meshed bottom gillnet and sting ray longline had been recognized as having been involved with the mortality of sea turtles, the specification and construction of these gears had been established using several references.

Sting Ray Bottom Longline

The **Department of Fisheries (1935)** of Thailand defined sting ray bottom longline, locally known as *Bed Roaw Kra-ben* or *Bed-Roaw Hi-Lum*, as: *a longline fishing gear operated in Thai waters, targeting to catch sting rays, guitarfish and groupers.* Categorized into bottom longline, the gear’s fishing operation involves no bait, and it is set at the sea bottom obstructing the migratory path of rays/fishes. This longline gear has been used by fishers along the coast of the Gulf of Thailand, *e.g.* in Trat, Chantaburi, Rayong Samutprakarn and around the islands in the Gulf of Thailand. The gear specifications are given in Table 1.

Table 1. Specifications of the Thai sting ray bottom longline, reported in 1935

Name	Material	Size/Number	Remarks
Mainline	Cotton dyed with bark solution	Length 100-150 m	
Branch line	No information	45 cm	Interval 50 cm
Hook	Iron	Shrank length: 7 cm	Barbless hook

Source: DOF Thailand (1935)

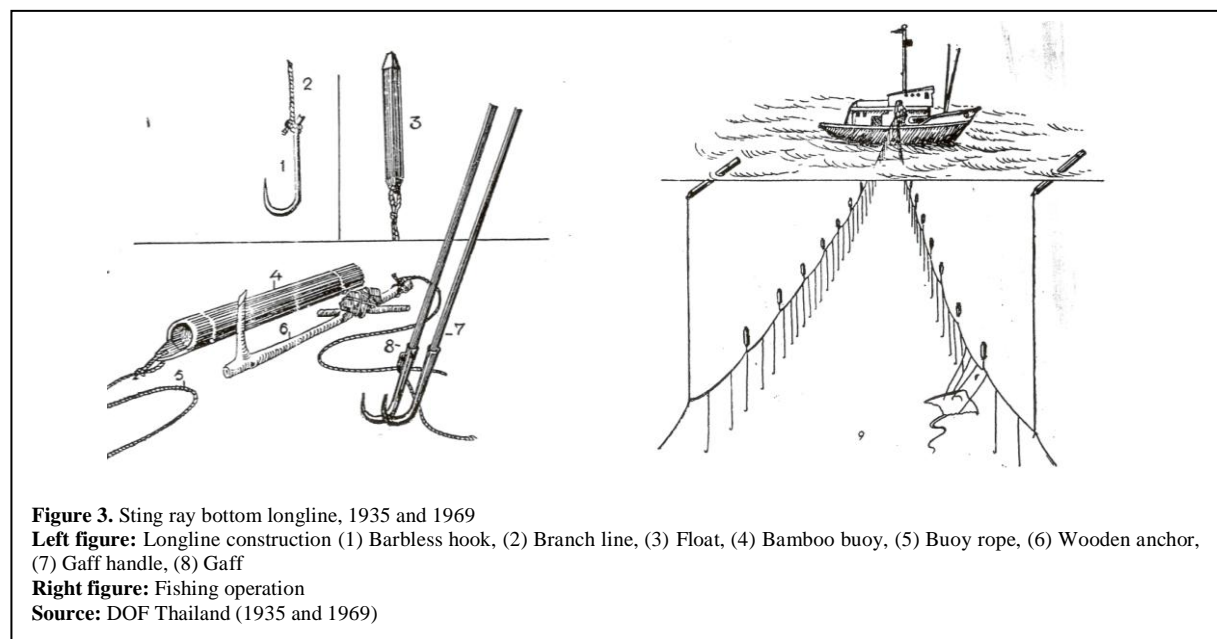
The **Department of Fisheries (1969)** also reported a certain type of fishing gear operated in Thai Waters, *i.e.* bottom longline, targeting the sting rays, guitarfish, pointed sawfish and groupers. The local name of the gear is *Bed Kra-ben*, *Bed Raow Kra-ben*, *Bed Raow Rawai* and *Bed Raow Hai-Lum*. The gear specifications are shown in Table 2 and the description of the gear is shown in Figure 3.

The fishing operation involves no bait, and it is also set at the sea bottom obstructing the migratory path of rays/fishes. At least 10 sets (2450-5000 hooks) are usually set in water depths of 6-30 m, and the fishing operation is done both at day time and night time. During the fishing operation, the condition of the sea current is evaluated to be able to adjust the height of the branch lines accordingly. Reducing the number of branch lines during strong current conditions, could however reduce the fishing efficiency. The fishing season is from October to January, but the highest catch had been observed during May to June. Although there is no information on the distribution of the longline, construction of the fishing gear was investigated at Hau-hin District in Prachaub Kirikarn Province.

Table 2. Specifications of the Thai sting ray bottom longline, reported in 1969

Name	Material	Size/Number	Remarks
Mainline	Cotton-spun yarn	No. 20	10 sets/operation
Branch line	Ramie 2 strands	Dia. 0.35 mm Length: 45 cm	Interval 33 cm
Hook	Brass wire	Shrank: 7 cm Gap: 2 cm	Barbless hook
Float	Wooden	245 hooks/set	Interval 1.37 m
Sinker	Stone	2 pcs.	

Source: DOF Thailand (1969)



The **Department of Fisheries (1997)** reported that the longline fishing gear being operated in Thai Waters, locally called the *Bed-Raow Kra-ben* and *Bed-Raow Rawai*, targets the sting rays, guitarfish and groupers. This longline is categorized as bottom longline. **SEAFDEC (1986 and 2004)** also reported the same longline fishing gear which was investigated in Phuket Province along the coast of the Andaman Sea. Fishing operation involves no bait, and it is set at sea bottom obstructing the migratory path of rays/fishes. A total of 2-10 sets (600-3000 hooks) are usually operated in 4-20 m water depth. The fishing gear specifications are given in Table 3 and the gear is shown in Figure 4.

Longline is set in the evening and hauled the following morning, and could be set along or perpendicular with the coast of an island. During the operation, the condition of the sea current is considered and used as basis for adjusting the height of branch lines accordingly. The heights are reduced with the strong current condition, but then the fishing efficiency could also be reduced. The fishing season is definitely not described. Operation of this longline is distributed along the coasts of the Gulf of Thailand and Andaman Sea, *e.g.* in Trat, Chantaburi, Rayong Samutprakarn, Chumporn Pattani, Phuket and Satun.

Table 3. Specifications of the Thai sting ray bottom longline, reported in 1986, 1997 and 2004

Name	Material	Size/Number	Remark
Mainline	Polyethylene (PE)	Dia. 4 mm	2-10 sets/operation
Branch line	Polyethylene (PE)	2 mm/25-30 cm	Interval 23-33 cm
Hook	Iron	Dia.: 2.3-3 mm Shrank: 5 cm Gap: 1.2-1.7 cm	Barbless hook Total hook: 310-350 hooks/set
Float	Synthetic rubber	Dimension: 13.7×3.8×1.0 cm Total: 75-85 floats	Interval 1.32-1.38 m
Sinker	Stone	2 pcs.	

Source: DOF Thailand (1997) and SEAFDEC (1986 and 2004)

SEAFDEC (1989 and 2002) also reported on the longline fishing gear used in Malaysian waters, targeting sting rays, catfish and groupers. This local longline is called *Rawai* in Malaysian language. The gear has both barbed hook operated with bait and barbless hook operated without bait to catch the aforementioned target species. Both types of longline were also categorized as bottom longline. The first design of the longline without bait or barbless, has been operated in Sarawak waters. Fishing operation is set with 1000-1400 hooks, without bait, and is set at sea bottom obstructing the migratory path of rays/fishes. The specifications of the barbless bottom longline are given in Table 4.

The second design is also operated without bait or barbless. Fishing operation is set with 300-600 hooks with bait and also set at sea bottom. Light buoy is set with the longline to show the fishing operation especially at night time. Longline has also been investigated in Pahang, Terengganu and Sabah States of Malaysia. The fishing gear specifications of the first bottom longline are given in Table 5.

Table 4. Specifications of the sting ray bottom gillnet operated in Sarawak State of Malaysia, reported in 1989 and 2002

Name	Material	Size/Number	Remarks
Mainline	Poly Amide (PA: Nylon)	Dia.: 4 mm	15-20 sets/operation
Branch line	Polyethylene (PE)	Dia.: 3 mm	Interval 35 cm
Hook	Iron	Length: 32 cm Dia.: 3.0 mm Shrank: 6.0 cm	Barbless hook Total hook:
Float	Plastic, Cubic shape	Gap: 1.0 cm Dimension: 60×15×20 mm	146 hooks/set Interval 2.45 m
Sinker	Stone	Total: 20 floats 2 pcs.	

Source: SEAFDEC, 1989 and 2002

Table 5. Specifications of the sting ray bottom longline operated in Pahang, Terengganu and Sabah State of Malaysia, reported in 1989 and 2002

Name	Material	Size/Number	Remarks
Mainline	Polyethylene (PE) mixed Poly vinyl alcohol (PVA)	Dia.: 4.5 mm	Length: 1000-1200 m
Branch line	Polyethylene (PE)	Dia.: 2 mm	Interval length: 2.0-3.2 cm
Hook	Iron	Length: 38 cm Dia.: 3 mm Shrank: 5.5 mm	Barbless hook Total hook:
Buoy	Styrofoam (Sphere shape)	Gap: 20-22 mm Dia.: 30 cm 2 pcs. Total: 125-140 pcs	300 hooks/set Terengganu design
Flag Pole	Bamboo	2 m length with cement sinker at lower point	
Light Buoy		2 sets	
Buoy rope	Polypropylene (PP)	Dia.: 5 mm Length: 30-40 m (Depends on sea depth)	
Sinker (1)	Stones,	5-6 kg/2 pcs.	Ends of Longline
Sinker (2)	Cements	0.6 kg/20-30 pcs.	

Source: SEAFDEC, 1989 and 2002

SEAFDEC (2007) reported on the longline fishing gear in Cambodian waters, targeting the sharks and rays. This local longline is called *Satouch Ro Noun* in Cambodian language. The bottom longline is assembled with barbless hook and is being operated without bait. Its construction, however, varies according to the place of the survey.

The design of the sting ray longline in Kep town on the eastern part of Cambodia has been influenced by the Vietnamese system. However, in Koh Kong Island in western Cambodia, the fishing gear is influenced by the system adopted in Thailand. The fishing gear specifications in Cambodia are given in Table 6 and Table 7, and the gears are shown in Figure 5.

Table 6. Specifications of the sting ray bottom longline operated in Kep Town of Cambodia, reported in 2007

Name	Material	Size/Number	Remarks
Mainline	Poly Amide (PA: Nylon) multifilament	Dia.: 3 mm	10 sets/operation 1,500 hooks
Branch line	Poly Amide (PA: Nylon) Monofilament	Dia.: 2 mm/ 25 cm length	Interval 25 cm
Hook	Iron	Dia.: 3.5 mm Shrank: 5.5 cm Gap: 1.5 cm	Barbless hook Total hook: 150-180 hooks/set
Float	Plastic	Dimension: 75×26×17 mm Total: 37 floats/set	Interval 1.0 m
Sinker	Stone	2 pcs.	

Source: SEAFDEC, 2007

Table 7. Specifications of the sting ray longline operated in Koh Kong Island of Cambodia, reported in year 2007.

Name	Material	Size/Number	Remarks
Mainline	Poly Amide (PA: Nylon) multifilament	Dia.: 5 mm Length: 180 m	10 set/operation 1,800 hooks
Branch line	Poly Amide (PA: Nylon) Monofilament braided	Dia.: 3 mm/ Length: 23 cm	Interval: 32 cm
Hook	Iron J-shape	Dia.: 3.5 mm Shrank: 6.3 cm Gap: 1.6 cm	Barbless hook Total hook: 480 hooks/set
Float	Plastic	38×20 mm Buoyancy: 16 gf Total: 20 floats/set	Interval: 2.8 m
Sinker	Stone	2 pcs.	

Source: SEAFDEC, 2007

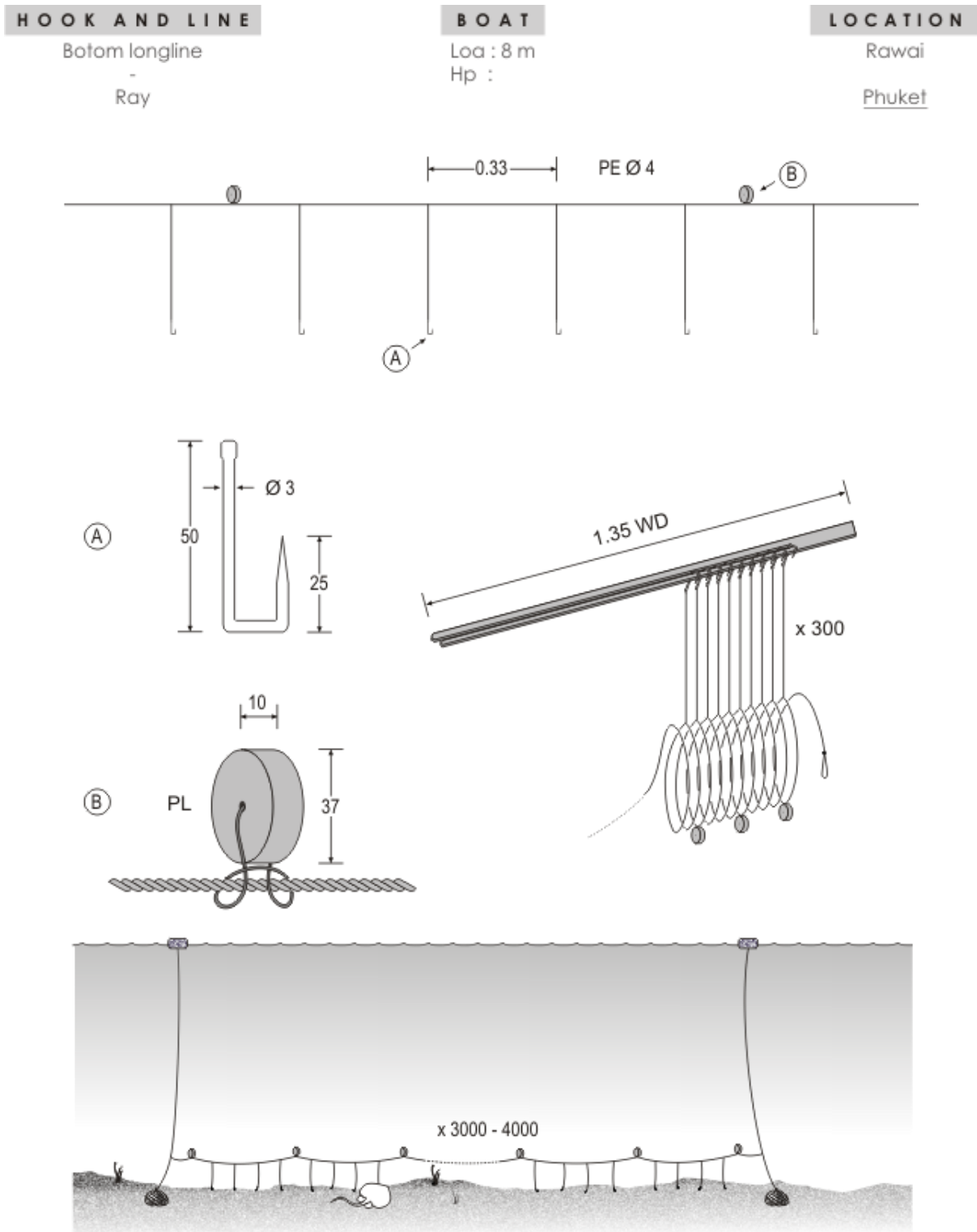


Figure 4. Specifications of the sting ray bottom longline of Phuket, Thailand
(Illustrated by Nakaret Yasook, 2009)

H O O K A N D L I N E

Bottom longline
-
Ray, Shark

B O A T

Loa : 15 m
Hp : 33

L O C A T I O N

Kuala Terengganu
Terengganu, Malaysia

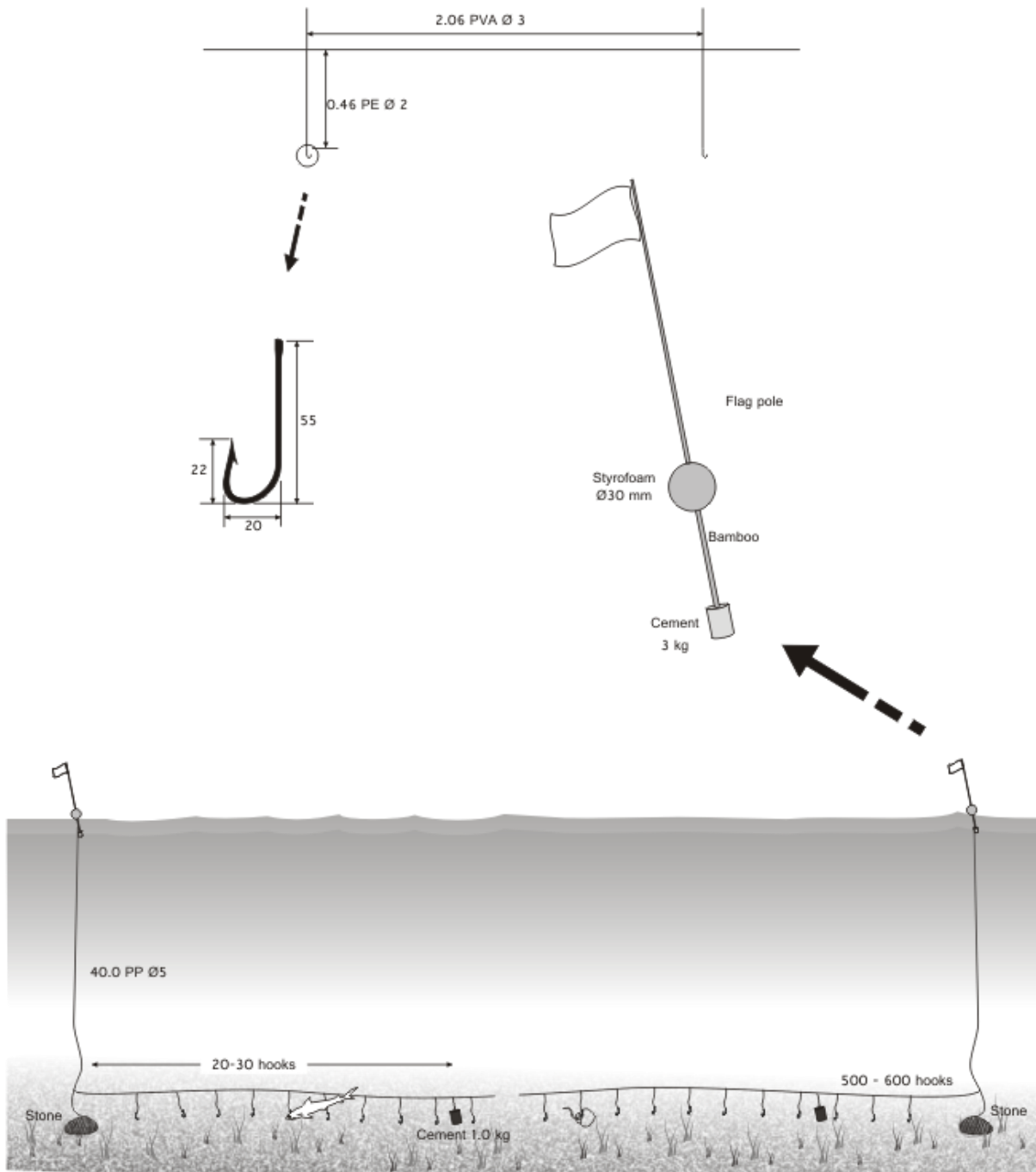


Figure 5. Specifications of the sting ray bottom longline of Terengganu State, Malaysia (Figure modified by Isara Chanrachkij, 2009)

HOOK AND LINE

Bottom longline
-
Sting ray and Shark

BOAT

Loa : 7.2 m
Hp : 8

LOCATION

Maludum
Sarawak, Malaysia

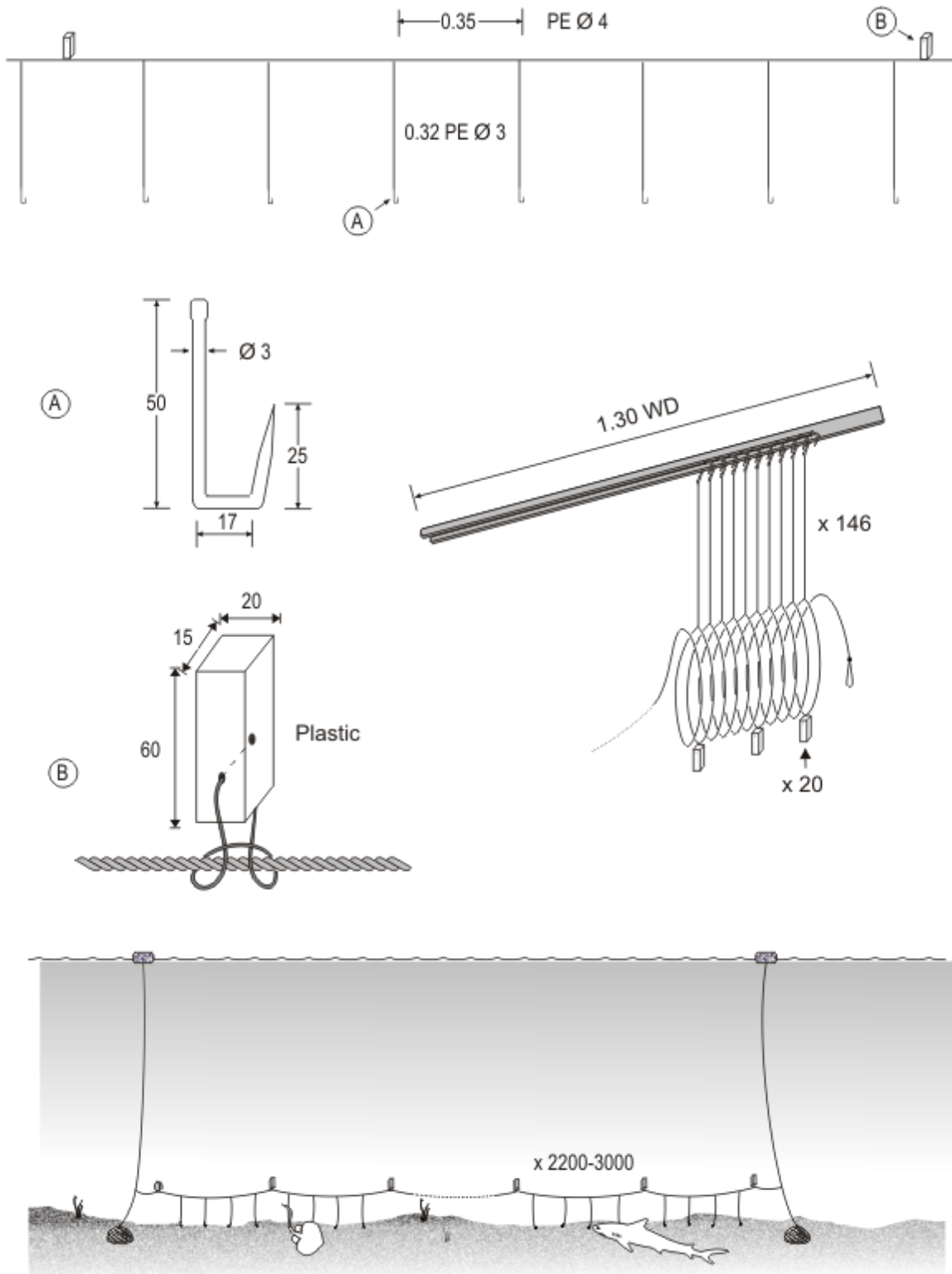


Figure 6. Specifications of the sting ray bottom longline of Sarawak State, Malaysia (Figure modified by Isara Chanrachkij, 2009)

H O O K A N D L I N E

Botom longline
-
Shark, Ray

B O A T

Loa : 5 m
Hp : 13

L O C A T I O N

Ou Krasa Village
KEP

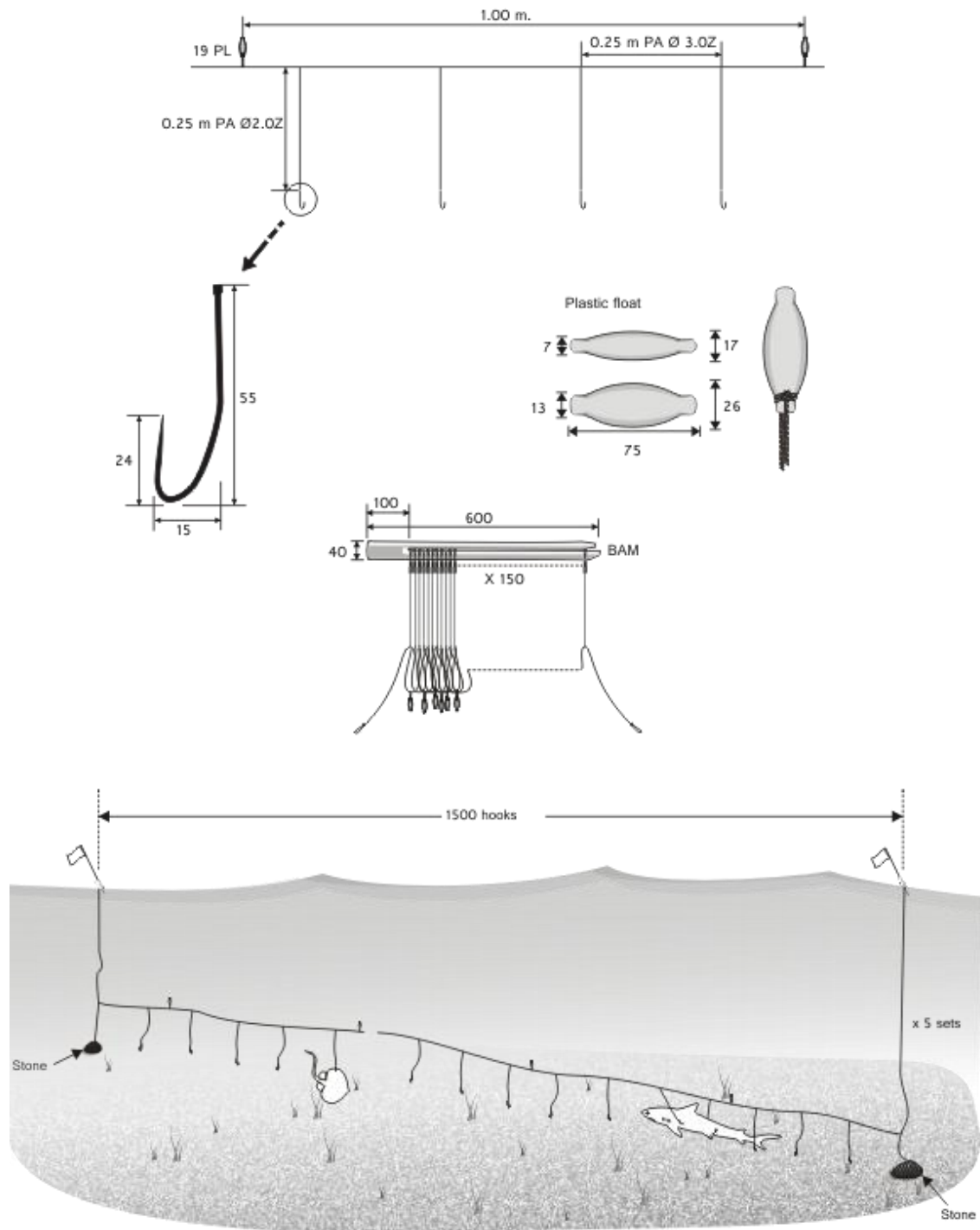


Figure 7. Specifications of the sting ray longline in Kep, Cambodia
Source: SEAFDEC, 2007

H O O K A N D L I N E

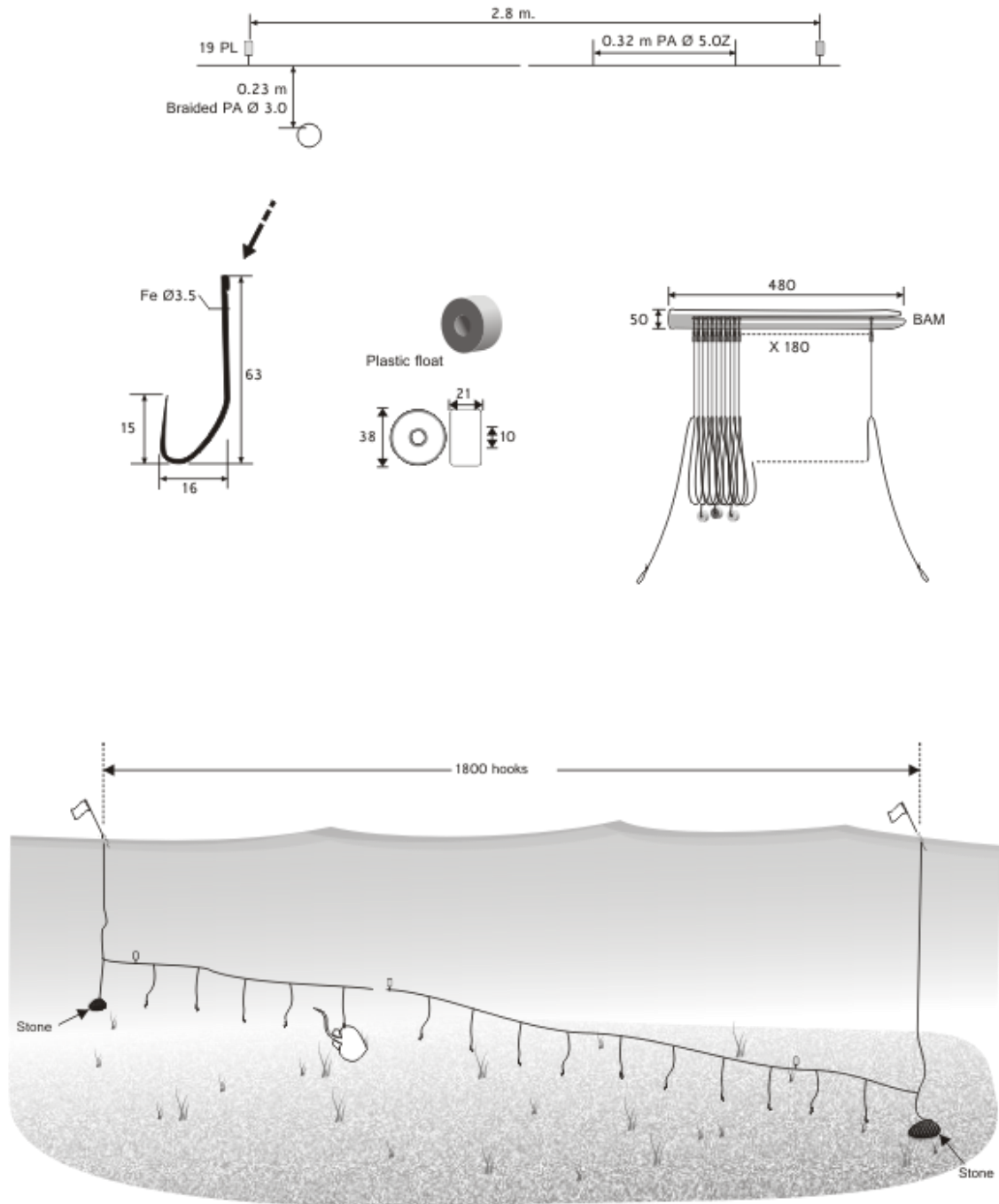
Botom longline
-
Ray

B O A T

Loa : 12m
Hp : 13

L O C A T I O N

Dang Tung
KOH KONG



7

Figure 8. Specifications of the sting ray longline in Koh Kong, Cambodia
Source: SEAFDEC (2007)

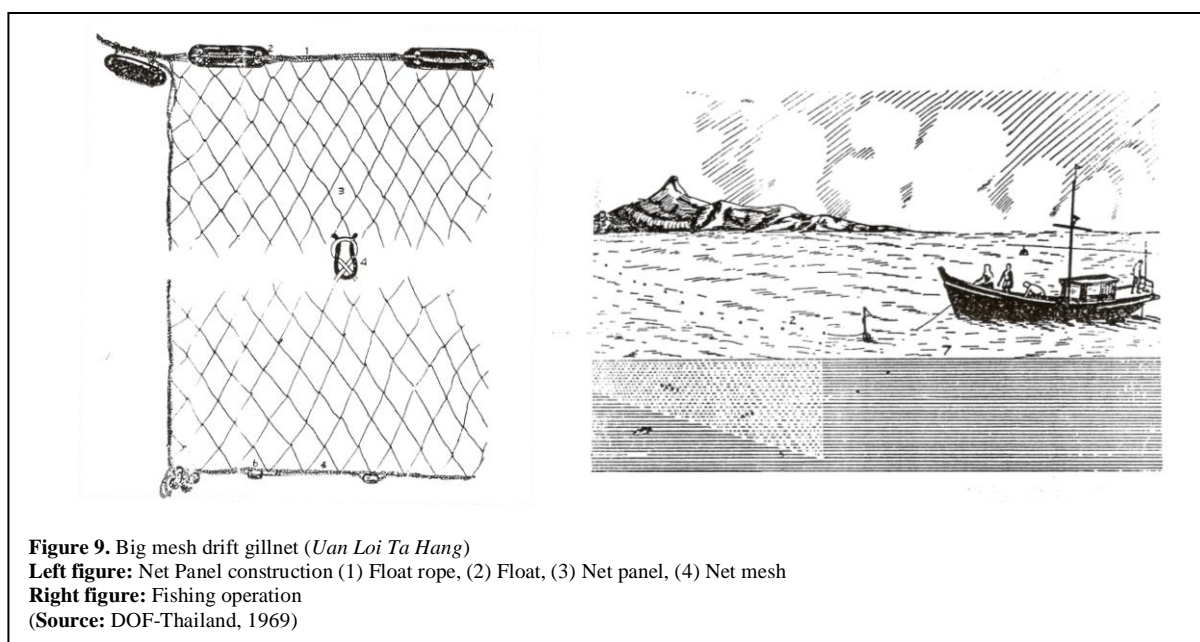
Sting Ray Bottom Gillnet

The **Department of Fisheries (1969)** of Thailand also reported on the big-mesh drift gillnet, which is locally called the *Uan Loi Ta Hang*. This is another fishing gear operating in the Gulf of Thailand that targets big fishes such as sting rays. Big-mesh drift gillnet is categorized as drifting gillnet because there are no cement sinkers or stones fixed at both net ends. Fishing operation is usually conducted at nighttime, at sea depth between 4-10 m, and operated 3-4 times a night. The net is set across the current direction because of the character of the net which drifts with the current. The fishing season observed to have the highest catch is reported to be during March to May. Although there is no information of the longline distribution, construction of the fishing gear was investigated in Hau-hin District of Prachaub Kirikarn Province. The fishing gear specifications are given in Table 8 and gear is shown in Figure 9.

Table 8. Specifications of the Thai big mesh drift gillnet, reported in 1969

Name	Material	Twine Size/Mesh Size	Remarks
Net panel	Cotton-spun yarn	No.20/ 19.5 mm 40 meshes depth	20-25sets/operation
Float rope	Cotton 3 strands Z-twisted	6-7 m length/ piece Total length: 120-125 m	Hanging ratio: no information
Float	Wooden	Dimension: 22×6.5×3.5 cm Total floats: 19 floats	Interval: 30 cm
Sinker and Sinker rope		-None-	

Source: DOF Thailand, 1969



The **Department of Fisheries (1969)** also reported on the bottom drift gillnet that targets sting rays and sharks, called in Thai as the “*Uan Sed*”. This bottom drift gillnet is also categorized as drifting gillnet because there are no cement sinkers or stones fixed at both net ends. Fishing is usually operated at nighttime and during the dark moon period, in sea depths of 10-50 m. Fishing operation is separated into 2 methods, *i.e.* 1) setting the net in a drifting manner where the fishermen set the gillnet across the current direction and tighten the net panel from the fishing boat, where the net panel set without any sinkers and allowed to drift with the vessel, and hauling is done 2 times a night; and 2) the net is set across the current direction and fixed with net anchors, which makes it a bottom set gillnet, and where hauling is done in the early morning. The fishing seasons observed to have the highest catch are during October to April and December to February. There is no information on the longline distribution but construction of the fishing gear was investigated at Ta-cha-lab Sub-District in Chantaburi Province. The fishing gear specifications are given in Table 9 and the gear is shown in Figure 10.

Table 9. Specifications of the Thai bottom drift gillnet, reported in 1969

Name	Material	Twine Size/ Mesh Size	Remarks
Net panel	Hemp	Dia.: 0.3 mm/ 37.0 mm Mesh depth 15	25 sets/operation
Float rope	Manila 3 strands Z-twisted	40 m length/ piece Total length: 1000 m	
Float	Wooden	Dimension: 16×3.0×2.0 cm Total floats: 1665 floats	Interval 60 cm
Sinker and Sinker rope		-No information-	
Buoy	Bamboo	Length: 40 cm 5 pcs/net Total: 125-140 pcs	
Buoy rope	Manila 3 strands Z-twisted	Dia.: 5 mm length 10-40 m (Depends on sea depth)	

Source: DOF Thailand (1969)

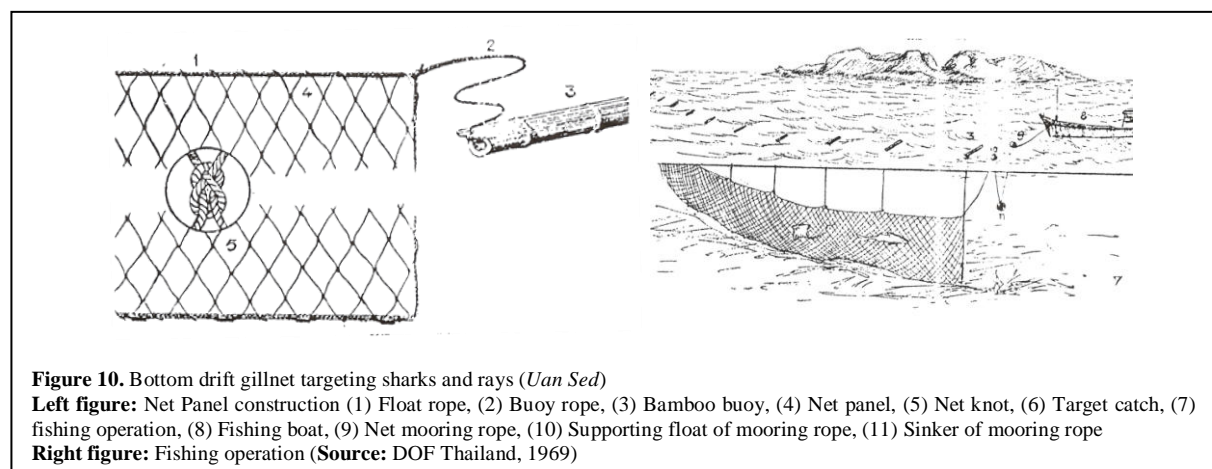


Figure 10. Bottom drift gillnet targeting sharks and rays (*Uan Sed*)
Left figure: Net Panel construction (1) Float rope, (2) Buoy rope, (3) Bamboo buoy, (4) Net panel, (5) Net knot, (6) Target catch, (7) fishing operation, (8) Fishing boat, (9) Net mooring rope, (10) Supporting float of mooring rope, (11) Sinker of mooring rope
Right figure: Fishing operation (Source: DOF Thailand, 1969)

SEAFDEC (2004) has first recorded the operation of a large mesh bottom gillnet (sting ray gillnet) in 2004, during a survey conducted in Pak-na-khon fishing village in Nakhon-Si-Thammarat Province. However, gillnets targeting sting rays had not been described by the **Department of Fisheries (1997)**, as these may have been probably categorized as *Other Gillnets*. The fishing gear specifications are given in Table 10 and the gear is shown in Figure 11.

Table 10. Specifications of the Thai bottom gillnet, reported in 2004

Name	Material	Twine Size/Mesh Size	Remarks
Net panel	Nylon multifilament	210d/9 mesh size 30.0 mm Meshes depth 12 320 meshes in horizontal	
Float rope	Polyethylene (PE) Z twisted	Dia.: 4 mm, 2 pcs. Length: 123 m	Hanging ratio: 0.52
Float	Plastic	38×10 mm Buoyancy: 16 gf	Interval: 425 cm Total: 12 floats
Sinker	Lead	20 mm length Weight: 10 g	Interval: 380 cm Total: 32 sinkers
Sinker rope	Polyethylene (PE) Z twisted	Dia.: 2 and 3 mm, 2 pcs. 123 m length	

Source: SEAFDEC, 2004

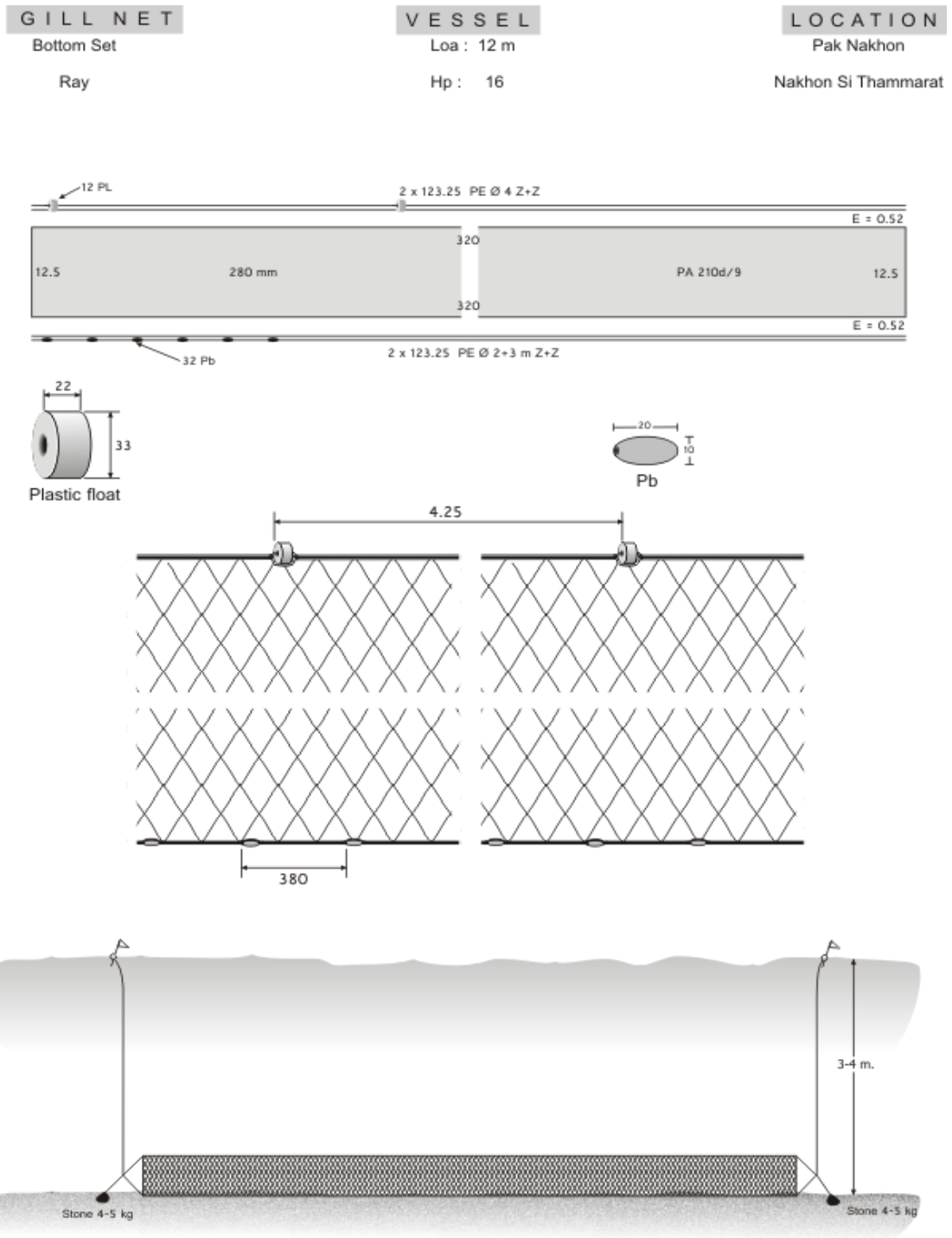


Figure 11. Specifications of sting ray bottom gillnet of Nakhon Si Thammarat, Thailand
 Source: SEAFDEC, 2004

SEAFDEC (1989 and 2002) reported that Malaysian fishers also operated large mesh bottom gillnet for catching sting rays. Local Malaysian fishers construct bottom gillnet with 2 mesh sizes, 30 mm and 51.5 cm. The bottom gillnet webbed with the smaller mesh is operated in Terengganu State while the bigger meshed gillnet is operated in Sabah State. The fishing gear specifications are given in Table 11 and Table 12 and the gear is shown in Figure 12.

It should be noted however that sharks and rays conservative measures under Malaysian Fisheries Act 1985 and amended in 1993, prohibits the use of bottom gillnet with mesh size bigger than 10 inches (Flewwelling and Hosch, 2004).

Table 11. Specifications of bottom gillnet operated in Sarawak State of Malaysia, reported in 1989 and 2002

Name	Material	Twine Size/Mesh Size	Remarks
Net panel	Nylon multifilament	210d/30 Mesh size: 30.0 mm 20 meshes depth 880 meshes length	
Float rope	Polyethylene (PE) Z twisted	Dia.: 3 mm, 2 pcs. Length: 160 m	Hanging ratio: 0.7
Float	Plastic	38 × 20 mm Buoyancy: 16 gf	Interval: 200 cm Total: 80 floats
Sinker	Lead	20 mm length Weight: 10 g	Interval: 50 cm Total: 321 sinkers
Sinker rope	Polyethylene (PE) Z twisted	Dia.: 3 mm, 2 pcs. Length: 160 m	

Source: SEAFDEC, 1989 and 2002

Table 12. Specifications of the bottom gillnet operated in Sabah State of Malaysia, reported in 1989 and 2002

Name	Material	Twine Size/Mesh Size	Remarks
Net panel	Nylon (PA) monofilament	Dia.: 1.53 mm Mesh size: 51.1 mm 7 meshes depth 345 meshes length	
Float rope	Nylon (PA) monofilament	Dia.: 2.6 mm, 1 pc. Length: 124.37 m	Hanging ratio: 0.6
Float	Plastic	30×140×15 mm	Interval: 1.09 cm Total: 116 floats
Sinker	Folded Lead	Dia.: 6.5 length 45 mm Weight: 10 g	Interval: 50 cm Total: 18 sinkers
Sinker rope	Nylon (PA) monofilament	Dia.: 1.56 mm, 1 pc. Length: 124.37 m	

Source: SEAFDEC, 1989 and 2002

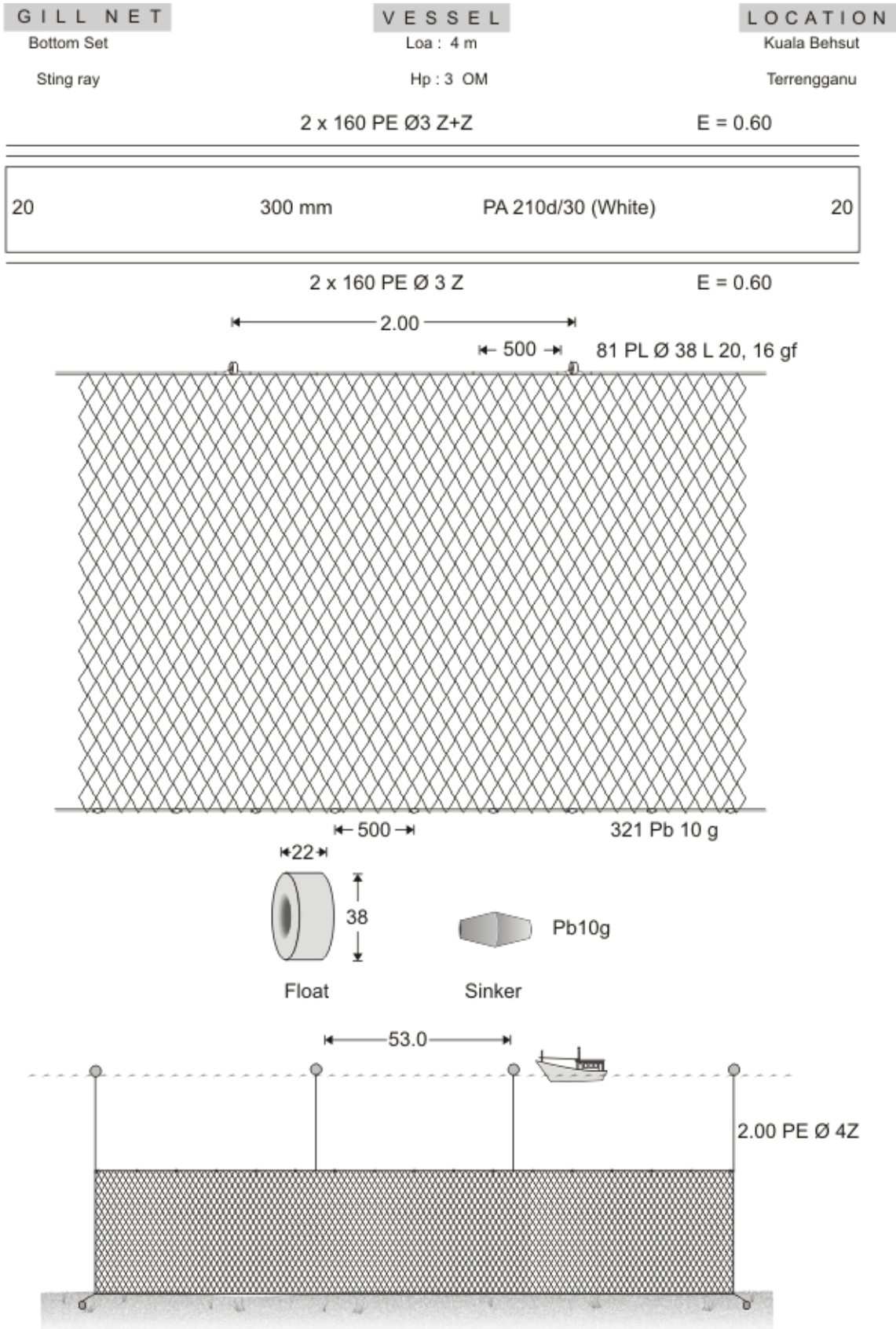


Figure 12. Specifications of sting ray bottom gillnet of Terengganu, Malaysia
 (Figure modified by Isara chanrachkij, 2009)

Results of the Survey

The results of the survey have show few categories of fishing gears operated by small-scale fishers along the coast of Rayong Province, *e.g.* gillnet and traps. The major types of fishing gears found in the area included gillnet, squid trap, fish trap and collapsible crab trap. The two types of fishing gears targeting sting rays which had been revealed to have direct impact on sea turtles mortality around the coast of Rayong Province are: 1) large mesh bottom gillnet or sting ray bottom gillnet, and 2) barbless bottom longline.

Although the aforementioned fishing gears seemed to have been operated around the survey area, only few fishing communities reported to have operated such fishing gears. It was however observed that both fishing gears are operated by artisanal fishers with fishing boats 5-8 m LOA (length over all), equipped with inboard engine 18-24 Hp or outboard (long-tail model) with 5-8 Hp engine. Almost all fishing boats were not equipped with any navigational equipment but are installed with radio transceivers. The details of the fishing gears are described below:

1) Large Mesh Bottom Gillnet (Sting Ray Bottom Gillnet)

Large mesh bottom gillnets were observed in Par Khun (or Ek-ka-nek) of Hard Mae Rumphueng Beach fishing communities as well as in the fishing pier near the Eastern Marine Fisheries Development Center of the Department of Fisheries (EMDEC-DOF), and in Banphe and Ao Makhampom fishing ports.

Mr. Teerayuth Srikhum, a fishing gear technologist of the EMDEC-DOF described the history of the large mesh bottom gillnet used in Trat Province, which has been operated by fishers of Trat Province since the last decade. Since the incidental catch of the gear included dugong, the local fishers and the communities around the coast of Trat Province agreed to stop using this fishing gear. As a result, the sting ray bottom gillnet had already disappeared from fishing grounds around Trat Province (Interview with *Mr. Teerayuth Srikhum* on 15 December 2009).

However *Mr. Bungjing Cha-reon-larp*, a local fisherman at Suan-Son fishing community had a different report. He revealed that the large mesh bottom gillnet around the survey area, had been operated for a few years. The original net was first introduced in Jao-loaw fishing community in Chantaburi Province. He further informed that the gear must have probably been modified from the giant catfish (*Pangasinodon gigas*) gillnet used in the Mekong River in the northeastern part of Thailand (Interview with *Mr. Bungjing Cha-reon-larp* on 2 December 2009).

The results of the survey further showed that the construction of large mesh bottom gillnet and the materials used varied according to the survey sites, *e.g.* net panels of the gear observed at EMDEC fishing pier were not assembled with ground rope so that sinkers were fixed directly with the lowest twine of the mesh. The material of the net panel of the gear observed at Ao Makhampom fishing port is made of cotton with 2 mm diameter.

The information gathered from a certain fishing store located in Rayong downtown area indicated that the fishers are able to purchase large mesh bottom gillnet from such fishing gear store, where they can obtain either the net panel only or the complete set of the fishing gear. The price of the net panel is 370 Baht/piece (100 stretch mesh) while a complete net panel costs about 1100 Baht/piece. The fishing gear specifications are given in Table 13, and the gear is shown in Figure 13 and Figure 14.

Table 13. Specifications of the large mesh bottom gillnet operated in Rayong Province

Name	Material	Twine Size/ Mesh Size	Remarks
Net panel	Nylon multifilament	210d/15 Mesh size: 30.0 mm 15 meshes depth 270 meshes length	5-10 net panels/set
Float rope	Polypropylene (PP) Z twisted	Dia.: 4 mm, 2 pcs. Length: 35 m	Hanging Ratio: 0.43
Float	Plastic	38 × 22 mm Buoyancy: 16 gf	Interval: 220 cm Total: 14 floats
Sinker	Lead	20 mm length Weight: 10 g	Interval: 50 cm Total: 58 sinkers
Sinker rope	Polypropylene (PP) Z twisted	Dia.: 3 mm, 1 pc. Length: 35 m	

Fishing operation is done manually without any hauling devices, and is done daily in the evening time for around 30 minutes and hauling time is usually in the morning for around two (2) hours. The fishing gear could be operated the whole year from the southwest to the northeast monsoon. However, different fishing seasons had been reported by different fishing communities, *e.g.* marked fishing season for fishermen in Suan-son is during the southwest monsoon, while the fishermen around Hin-Dum in Hard Mae Rumphueng Beach fishing communities described that the marked fishing season is during the northeast monsoon.

The fishing ground of the large mesh bottom gillnet could expand from Ao Rayong Bay to the western part of Ko Man Island, in water depths ranging from 2 to 20 m. The information provided by *Mr. Somkuan Samut-kiri* (3 December 2009), a local fisher of Par Khun (or Ek-ka-nek) community described that the fishing ground of sting rays is far from the fishing village or about 3-5 nm from Ao Rayong. On the other hand, *Mr. Bungjing Cha-reon-larp* (3 December 2009), a local fisherman at Suan-Son fishing community, explained that the fishing ground is around the artificial reefs and off Hin Sun-Cha-larm Rock beyond Ko Samet Island (Interview with *Mr. Bungjing Cha-reon-larp* on 3 December 2009).

The results also indicated that the fishermen in Ao Makhampom fishing community had been operating the large mesh bottom gillnet around Ko Man Archipelago, however, they have already been requested by the Department of Marine and Coastal Resources (DMCR) Office in Paknam Pra-sae, to stop operating around the Ko Man Archipelago because some sting ray

bottom gillnets have been found to also entangle the sea turtles. Moreover, the fishers at the EMDEC fishing pier and Hin-Dum have already stopped operating the large mesh bottom gillnet for the same reason. Thus, only the fishers at Par Khun (or Ek-ka-nek) community have continued to operate this bottom gillnet. From the direct observation, 22 sets of nets were found in the aforesaid community, where each set consists of 5-7 net pieces/set. The fishers at Par Khun explained that they are continuously operating the sting ray bottom gillnet because the population of sea turtles around their fishing ground is almost nil and that they never operated their bottom gillnets around the Ko Man Archipelago.



Figure 13. Large mesh bottom gillnet (sting ray bottom gillnet) observed at Par Khun (or Ek-ka-nek) of Hard Mae Rumphueng Beach fishing communities (Photos by Isara Chanrachkij on 3 December 2009)

The target catch of the large mesh bottom gillnet is all sizes of sting rays, and based on the interview with the fishers, various sizes of sting rays are caught by the sting ray bottom gillnet. The capturing mechanism of the large mesh bottom gillnets start with the entangling of the sting rays' caudal spine then the net panels finally entangle the whole fish. Some by-catch could be captured such as marine turtles that swim near the sea bottom.

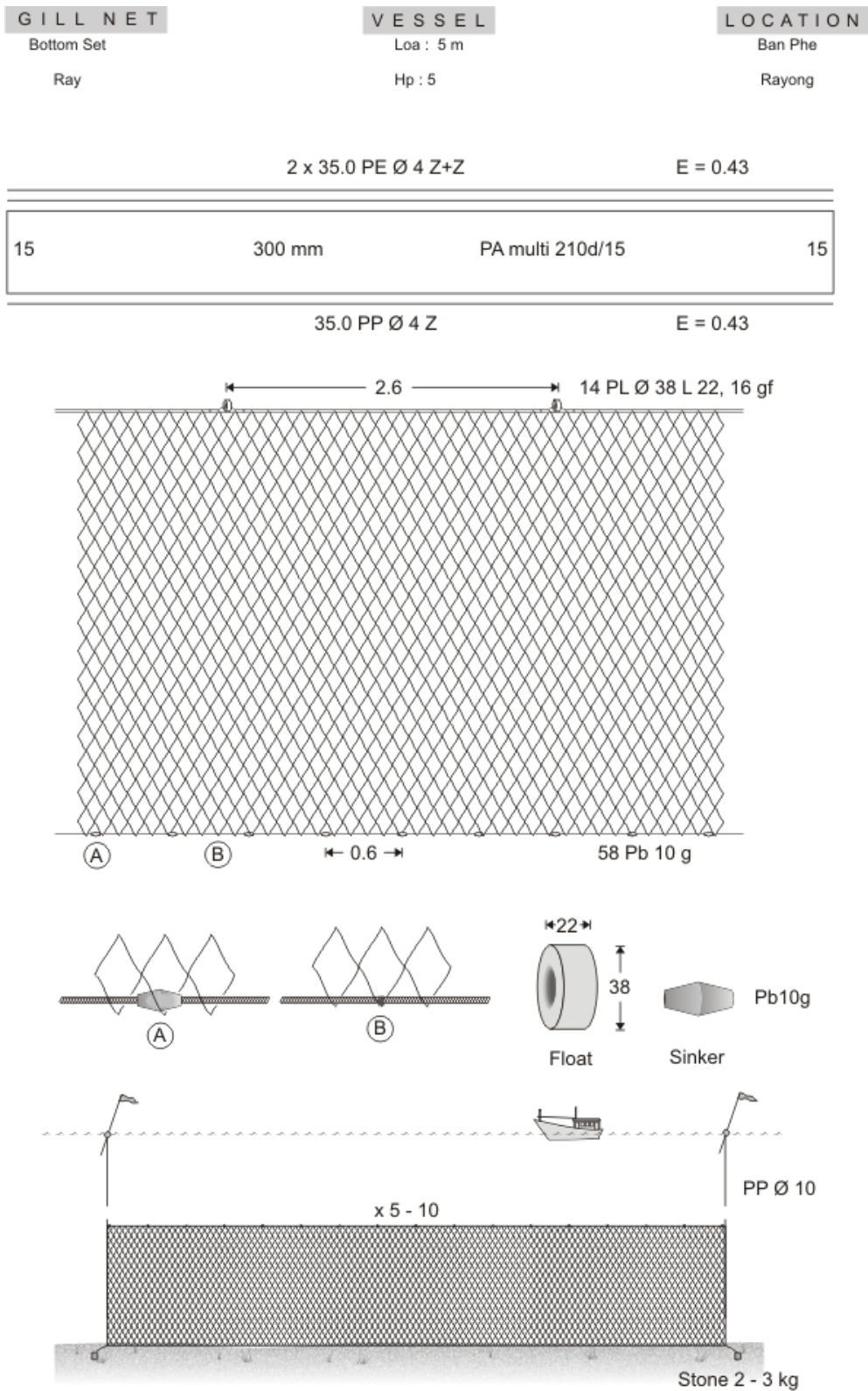


Figure 14. Specifications of large mesh bottom gillnet observed at the vicinity of Ban Phe, Rayong (Illustrated by: Nakaret Yasook, 2009)

2) Sting Ray Bottom Longline

A sample of a sting ray bottom longline was observed at EMDEC fishing pier. There were also some evidences that some fishers continuously operate this type of fishing gear as observed at the Ao Makhampom fishing port (Figure 15).



There was also an evidence that fishers in Ao Rayong operate the sting ray bottom longline as well because the authors observed some hooks of sting ray bottom longline entangled with the bottom gillnet owned by a fisher at Par Khun (or Ek-ka-nek) of Hard Mae Rumphueng Beach fishing communities (Figure 16, top-left). Based on the information from the interview with a fisher at EMDEC fishing pier, the original sting ray bottom longline was introduced from Petchburi and Trat Provinces at the Upper Gulf of Thailand. Fishers are able to purchase the sting ray bottom longline from local fishing gear stores in Trat and Petchburi Provinces. The price of longline is about 800 Baht/set (300 hooks). The specifications of the sting ray bottom longline, observed from EMDEC fishing pier, are given in Table 13, and the gears are shown in Figure 17.

Table 14. Specifications of the sting ray bottom longline operated in Rayong Province

Name	Material	Size/Number	Remarks
Mainline	Polyethylene (PE) Z twisted	Dia.: 4 mm Length: 90 m/set	10-15 set/operation
Branch line	Polyethylene (PE)	380d/60 (Dia.: 2 mm) 30 cm length	Interval: 30 cm
Hook	Iron wire	Dia.: 3.0 mm Shrank: 5.0 cm Gap: 1.6 cm	Barbless hook Total hook: 300 hooks/set
Float	Synthetic rubber	Dimension: 35×10 mm Total: 75 floats	Interval: 1.20 m
Sinker	Stone	2 pcs.	

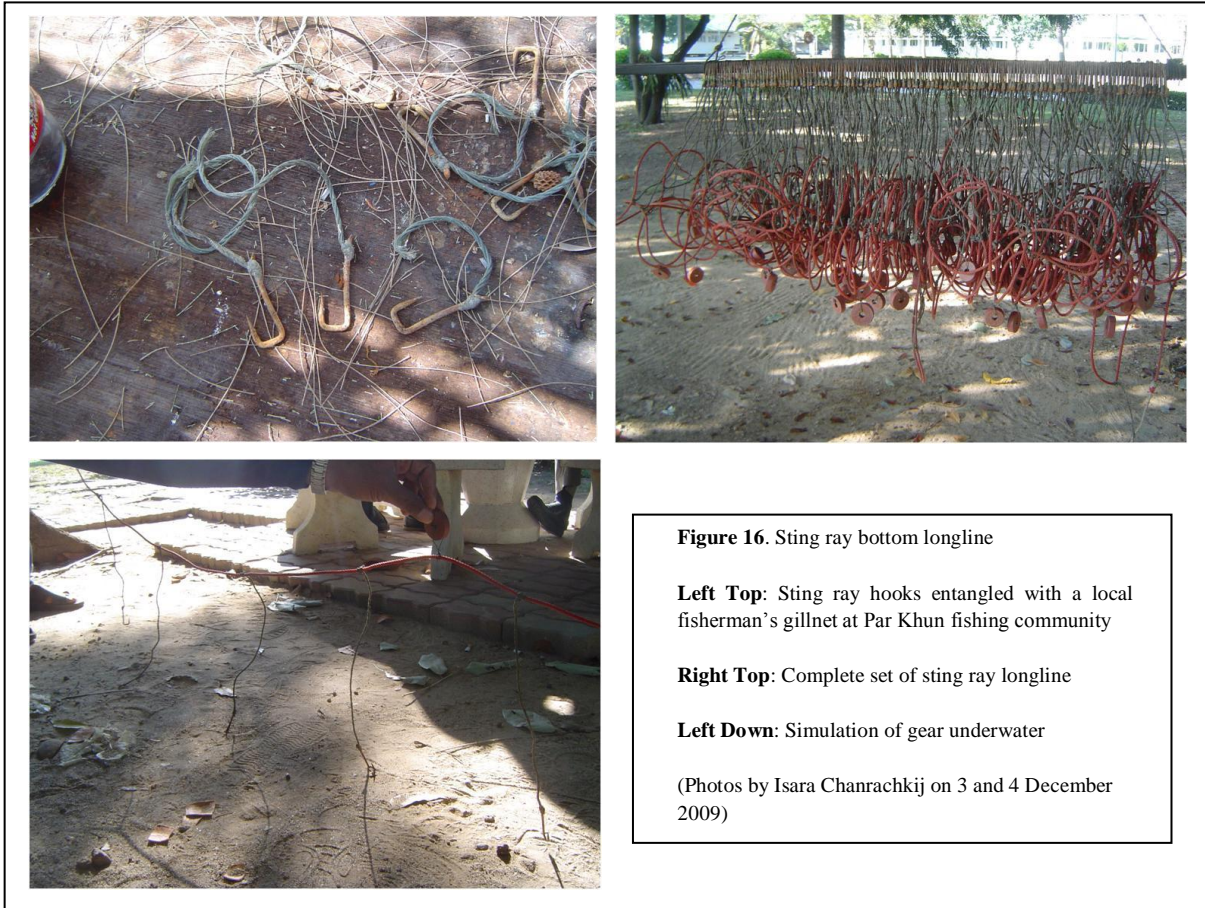


Figure 16. Sting ray bottom longline

Left Top: Sting ray hooks entangled with a local fisherman's gillnet at Par Khun fishing community

Right Top: Complete set of sting ray longline

Left Down: Simulation of gear underwater

(Photos by Isara Chanrachkij on 3 and 4 December 2009)

Fishing operation is done without bait, and the gear is set at the sea bottom obstructing or along the rays/fish migratory pathways. The operation is carried out manually without any line haulers. Fishing is on a daily trip basis with only few fishermen participating. The gear is set in evening time and hauled in the morning of the next day. Although the fishing season has not been definitely described, it is being operated throughout the year. The best fishing season was reported to be during the southwest monsoon from July to August. The main criterion for determining the fishing season is the abundance of sting rays in the fishing ground.

The fishing ground for the sting ray bottom longline expands from Ao Rayong Bay to the western part of the Ko Man Archipelago. The depth of the waters ranged from 7 to 12 m. The information gathered from the local fishermen near the EMDEC pier community indicated that the fishing ground of sting rays is around Ko Samet Island and the artificial reef areas. Some fishermen at Ao Makham Pom fishing community are presumed to be catching sting rays around Ko Man Archipelago using the bottom longline because the authors found 4 big sting rays caught during the survey. Nevertheless, the fishers have already been requested by the Department of Marine and Coastal Resources (DMCR) Office in Paknam Pra-sae in 2009, to stop operating around the Ko Man Archipelago because some sting ray bottom longlines were observed to have entangled some marine turtles.

As a result, fishers near the EMDEC fishing pier and Hin-Dum have already stopped operating their sting ray bottom longlines because of the same reason. A fisherman at the EMDEC fishing pier described that the catching mechanism of sea turtles involves hooking the turtles around the origin of the pectoral flipper. He also noticed that if few branch lines were cut from the mainline, it is possible that sea turtles could be strangled.

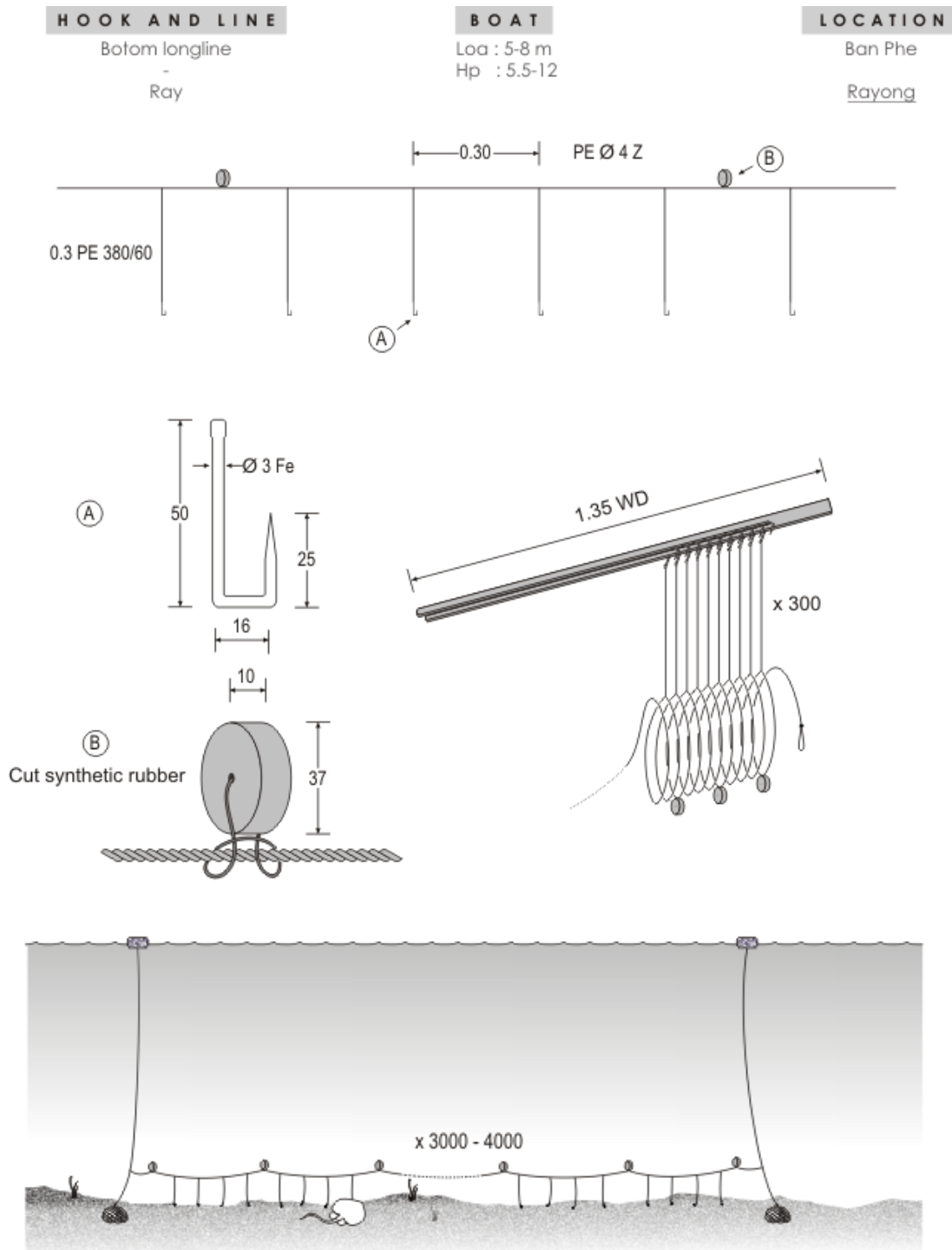


Figure 17. Specifications of sting ray longline observed at the vicinity of Ban Phe, Rayong Province (Illustrated by: Nakaret Yasook, 2009)

Discussions, Conclusion and Recommendations

Two (2) types of small-scale fishing gears could impact with the sea turtles resulting in mortalities, *i.e.* large mesh bottom gillnet (sting ray bottom gillnet), and sting ray bottom longline. Even if big mesh drift gillnet was one of the fishing gears targeting sting rays as reported in 1969, this kind of gillnet has been vanished from the Thai fishing activities based on the results of the fishing gear survey conducted by SEAFDEC in 2004.

Large Mesh Bottom Gillnet (Sting Ray Bottom Gillnet)

The background of the large mesh bottom gillnet operated in the coastal areas of Rayong Province has been clarified to have been originated in Chantaburi and Trat Provinces. However, there is an unclear evidence that the origin of the large mesh bottom gillnet in Thailand came from Malaysia as referred to in the Malaysian fishing gear information, which indicated that there are 2 types of fishing gears targeting sting rays, the same information has been provided by Thai fishermen (SEAFDEC 1989). Construction of the bottom gillnet, mesh size 30 cm, and sting ray bottom longline without bait, was found to be very similar as the fishing gear construction in Thailand. Nonetheless, the interviewed fishermen stated that the large mesh bottom gillnet operating around Rayong Province may have originated from Trat Province by modifying the freshwater gillnet in Mekong River of the northeastern part of Thailand although this has not been proven as true. Considering that some Thai purse seiners operating in Malaysian waters have their fishing bases in Rayong, it is possible that the large mesh bottom gillnet fishing techniques might have been transferred from Malaysia to Thailand particularly in Rayong Province. The fact is sting ray bottom gillnet or large mesh bottom gillnet remains operating in Rayong, Chantaburi, Prachaub Kirikarn and Nakhon Si Thammarat, and Phuket Provinces (SEAFDEC, 2004 and special interview).

Sting Ray Bottom Longline

Sting ray bottom longline is also widely operated in the coastal areas of Thailand. There has been a very long history of this fishing gear since the survey conducted in 1935. With very long history, this kind of longline has not been significantly modified from its original design for a long period of time. However, the number of deployed hook in one operation is now different. Such fishing gear is well spread to the neighboring countries of Thailand

In spite of the fact that sting ray is the target species of both fishing gears, some sea turtles are incidentally caught during the fishing operations. From the point of view of economic mobilization, sting ray is one of the fisheries resources which is directly consumed or processed. As a matter of fact, large sting rays could command a very good price of 30-40 Baht/kg. If sting ray fishers can catch 1 or 2 sting rays/trip/day, they can earn an additional income of 900-1200 Baht/trip/day. Such additional income has in fact mobilizes the local fishers to operate the large mesh bottom gillnet as a supplemental fishing gear.

The fishers usually operate such gear while the population of sting rays appears abundant and change to crab or fish bottom gillnet during off sting ray fishing season. However, the Department of Marine and Coastal Resources (DMCR) Office in Paknam Pra-sae has encouraged the fishers to mitigate the impacts of the use of large mesh bottom gillnet in order to avoid the sea turtles by-catch. The DMCR has already convinced some fishers doing

fishing activities in the fishing ground around the Mannai Archipelago and adjacent areas, to stop using the large mesh bottom gillnet.

Even though the measures initiated by the DMCR is not legally binding but almost all fishers have agreed to follow such regulation. During the survey, it was found that only the fishers in Par Khun (or Ek-ka-nek) of Mae Rum Paung Beach fishing community still continuously operate such gear for the simple reason that they have a few catch with all kinds of gillnets, *i.e.* various fish gillnet, crab gillnet and large-meshed bottom gillnet.

Nevertheless, the current situation of the large mesh bottom gillnet and sting ray longline is different, considering that the numbers of sting ray bottom longline fishermen are now much less than sting ray bottom gillnet fishers. Referring to the literature review, bottom longline fishing targeting the sting rays has a very long history with Thai fisheries since 1935. Although the DMCR Office at Paknam Pra-sae has a policy to mitigate the impacts of the sting ray bottom longline and the bottom gillnet on the mortalities of sea turtles starting in year 2010, the result of this campaign encouraged by the DMCR may have been possibly not fully successful. Regarding the less number of fishers, it could be assumed that some information may have been overlooked on the sting ray bottom longline fishing operations. Moreover, the long history of sting ray longline operation in Rayong Province, Thailand could lead some fishers not to cooperate with the implementation of the DMCR measures.

A study was conducted on the distribution and abundance of sea turtles in the coastal areas of Rayong Province. The area was divided into sub-areas, *i.e.* 1) Rayong Bay from Koh Samaesarn Island to Cape of Kao Laem Ya, 2) Around Samet Island and Ao Phe, 3) From Samet Island to Talu Island, 4) Around Talu Island, Kudi Island and Plateen Island, 5) Around Koh Man Archipelago, and 6) Chantaburi Waters. Information from such study could be useful in developing measures prohibiting the fishing operations that make use the sting ray gillnet and longline in the future and could be used as basis for possible zoning of the coastal areas. Otherwise, the prohibition of both fishing gears may lead to their thorough prohibition in all fishing grounds.

Moreover, studies on the classification, biology and distribution of large sting rays targeted by the bottom gillnet and longline should be carried out based on the reports that the targeted sting rays could be very large (10-40 kg/fish). This could be one of the causes of overfishing of a single species, particularly the sting ray parental stocks. Other by-catch especially the group of endangered species *e.g.* sharks, dolphins, dugong, etc., would require close surveillance especially in terms of the frequency and the areas related to the incidental catch. Even though the attitude of fishers around the area surveyed has been positive towards the conservation measure, a study on the attitude of fishers' in the fishing communities around eastern part of the Gulf of Thailand, *i.e.* Chonburi, Rayong, Chantaburi and Trat Provinces, on sea turtles conservation should be carried out in order to recognize the perspectives of the fishers. Based on the information revealed by *Mr. Teerayuth Srikhum*, a fishing gear technologist of the EMDEC-DOF, the prohibition of endangered fishing gears to vulnerable marine species, *i.e.* dugong, sea turtles, and dolphins in Trat Province, has been complied successfully with the local communities. The study shall then be related to the collection of basic information aiming for the awareness building of local fishers on endangered marine species protection.

Actual fishing trials/experiments or direct observation onboard local fishing boats should be carried out in order to understand the capturing mechanism of the aforementioned fishing gears. It is necessary that fishing gear technologists understand the capture mechanism, after

which fishing techniques could be developed and adopted for such fishing gears in order to finally reduce the mortality risk of sea turtles.

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Appendices

Appendix 1: Classification of Small-scale Fisheries and Large-scale Fisheries

Countries	Small-scale Fisheries	Large-scale Fisheries
Brunei Darussalam	Small-scale/Artisanal fisheries: Operating in all zones but concentrating in zone 1.	Industrial Fisheries: 1) Trawlers less than 350 hp operating in zone 2. 2) Purse seiners less than 20m LOA operating in zone 2. 3) Trawlers with 350-550 hp operating in zone 3. 4) Purse Seiners with 20-30 m LOA operating in zone 3. 5) Purse seiners more than 30m LOA operating in zone 4
Cambodia	Coastal Fisheries: Small scale fisheries with/without engine (from 5 hp to 50 hp) operating in zone 1.	Commercial Fisheries: More than 50 hp operating in Zone 2.
Indonesia	Small-scale Fisheries: 1) Outboard engines <10 hp or < 5 GT operating in zone 1. Trawls, purse seines and gill nets are not allowed, except for purse seines with a head rope < 120 m. 2) Inboard engines < 50 hp or <25 GT operating in zone 2. Trawl and purse seines are not allowed, except purse seines with a head rope < 300 m.	Industrial Fisheries : 1) Inboard engine <200 hp or 100 GT operating in zone 3, Purse seining is not allowed except those with a head rope < 600 m. 2) All fishing boats and fishing gear operating in zone 4.
Malaysia	Traditional Fisheries: Small-scale fisheries using traditional fishing gears (i.e. other than trawls and purse seine) with boats less than 10 GT operating in all zones concentrating in zone 1.	Commercial Fisheries: Medium and large scales fisheries using commercial fishing gears such as trawls and purse seines. a) With boats less than 40 GT operating in zone 2. b) With boats from 40 GT to 70 GT operating in zone 3. c) With boats above 70 GT operating in zone 4.
Myanmar	Coastal Fisheries: boats of less than 30 feet or using less than a 12 hp engine operating in zone 1	Industrial Fisheries: Boats more than 30 feet long or using more than 12 hp engines operating in zone 2
Philippines	Municipal Fisheries: Small scale fisheries with boats of less than 3 GT that are allowed to operate in zones 1 and 2.	Commercial Fisheries : a) Small-scale commercial fisheries: from 3.1 to 20 GT boats operating in zone 2; can also operate within 10.1 to 15 km (within zone 1) if authority

Appendix 1: Classifications of Small-scale Fisheries and Large-scale Fisheries (continued)

Countries	Small-scale Fisheries	Large-scale Fisheries
		<p>is granted by the concerned Local Government Unit (LGU).</p> <p>b) Medium-scale commercial fisheries: from 20.1 to 150 GT operating in zone 2; can also operate within 10.1 to 15 km (within zone 1) if authority is granted by the concerned Local Government Unit (LGU).</p> <p>c) Large-scale commercial fisheries: more than 150 GT operating in zone 2.</p>
Thailand	Small-scale Fisheries: With boats of less than 5 GT operating in zone 1.	Large-scale Fisheries: With boats of more than 5GT operating in zone 2.
Countries	Small-scale Fisheries	Large-scale Fisheries
Vietnam	Small-scale Fisheries: Boats with no engine and with engine but less than 40 hp.	Large-scale Fisheries: Boats with engine more than 40 hp.

Source: Regional Guidelines for Responsible Fishing Operations in Southeast Asia SEAFDEC TD, 2003

Appendix 2: Fishing Zones of Countries in Southeast Asia

Countries	Fishing Zone 1	Fishing Zone 2	Fishing Zone 3	Fishing Zone 4
Brunei Darussalam	From shore line out to 3nm.	From 3nm to 20nm.	From 20 nm to 45nm.	From 45nm to EEZ limit.
Cambodia	From shore line out to 20m depth.	From 20m depth to EEZ limit.		
Indonesia	From shore line out to 3nm.	4 nm from the outer limit of first fishing zone or 7nm from shore.	5 nm from the outer limit of second fishing zone or 12 nm from shore.	More than 12nm from shore.
Malaysia	From shore line out to 5 nm.	From 5 nm to 12nm.	From 12 nm to 30nm.	From 30 nm to EEZ limit.
Myanmar	From shore line out to 5 nm in the northern area, 10 nm in southern area.	From outer limit of the first fishing zone to EEZ limit.		
Philippines	From shore line out to 15 km.	From 15km to EEZ limit.		
Thailand	From shore line out to 12nm.	From 12nm to EEZ limit.		
Vietnam	From shore line to 30 m depth in Northern and Southern areas, to 50 m depth in Central area.	From 30 to 50 m depth to the EEZ		

Source: Regional Guidelines for Responsible Fishing Operations in Southeast Asia (SEAFDEC TD, 2003)

Appendix 3: Translation of the Wild Animal Reservation and Protection Act, B.E. 2535 (1992)

Wild Animal Reservation and Protection Act, B.E. 2535 (1992)

Translation

Bhumibhol Adulyadej Rex

Given on the 19th Day of February B.E. 2535

Being the 47th of the present Reign by Royal Command of His Majesty King Bhumibhol Adulyadej, it is hereby proclaimed that:

Whereas it is deemed necessary to improve the Wild Animals Reservation and Protection Act B. E. 2503 (1960)

His Majesty the King by and with the advice and consent of the National Legislative Assembly acting as the National Assembly is graciously pleased to enact an Act as follows:

Section 1: This Act shall be called the “Wild Animal Reservation and Protection Act, B.E. 2535 (1992)”

Section 2: The Act shall come into force as and from the 1st day of March B.E.2535

Section 3: The following Act and Notification are hereby repealed:

- (1) the Wild Animal Reservation and Protection Act B.E. 2503, and
- (2) the Revolutionary Notification No 228 dated 18th October B.E. 2515(1975)

Section 4: In this Act,

“Wild Animals” refers to all kinds of animals including terrestrial, aquatic, and winged animals as well as insects, which by nature are born and live in the forest or water. The term also refers to eggs of those various wild animals, but not the draught animals, which have been registered and issued identification cards in accordance with the law on draught animals as well as those of the propagation of said draught animals.

“Protected Wild Animals” refers to wild animals, which should be protected and are specified in the Ministerial Regulations.

“Reserved Wild Animals” refers to rare wild animals appearing on the list attached to this Act, and those declared to be ones by the Royal Decree.

“Hunting” refers to the act of collecting, trapping, catching, shooting, killing, and any other of harming unwound wild animals living freely, as well as, those of chasing, herding, calling, and enticing them for the earlier mentioned purposes.

“Carcass of wild animals” refers to the body and part of the body of wild animals or meat thereof whether or not it has been grilled, roasted, dried, fermented, or subjected to any other treatment against decay, whether or not it has been detached from the body; and refers also to horn, hide bone, teeth, tusks, hairs, scale, shell, or any parts of the detachment whether or not the wild animal is still alive or dead.

“Breeding” refers to the act of propagating of the wild animals in captivity through natural mating as well as artificial mating and gametes transferring.

“Trading” refers to the act of buying, selling, exchanging, distributing, or changing of ownership for commercial purposes, including possessing or demonstrating for selling purpose.

“Importing” refers to the act of bringing or ordering a product into the country.

“Exporting” refers to the act of taking or sending a product out of the country.

“In transit” means sending a product through a country.

“Wild animal checkpoint” refers to the Checkpoint for wild animals and their carcass.

“Zoological garden” refers to a public garden or park keeping a collection of wild animals for re-creative exhibition, study and research, and for the multiplication of the wild animals.

“Officer” refers to the official appointed by the Minister to carry out duties incurred by this Act.

“Director General” refers to the Director General of the Royal Forest Department, or of the Department of Fisheries specifically assigned to handle aquatic animal affairs.

“Committee” refers to the National Committee on Wild Animal reservation and Protection.

“Minister” refers to Minister authorized to supervise the execution of this Act.

Section 5: The Minister of Agriculture and Cooperatives shall supervise the execution of this Act. He is hereby empowered to appoint officers, to proclaim Ministerial Notification levying fees not exceeding the levels shown in the appendix of this Act, to reduce or waive fees, and to stipulate activities for the orderly conduct of this Act.

CHAPTER ONE

General

Section 6: This assignment of any particular kind of animals to the Protected Wild Animals category shall be done only through the formal proclamation of a Ministerial Regulation with the consent of the Committee.

The Ministerial Regulation proclaimed in accordance with the preceding paragraph shall come into force as from the date fixed therein, but not more than sixty days before the date of its publication in the Government Gazette.

Section 7: Hunters of wild animals who committed the infringement of this Act on account of necessity may be waived of their punishment under the following conditions:

- (1) The infringement is committed to avoid danger, or to save their property or other people’s property.
- (2) The act is reasonably committed, and
- (3) In case the hunted animals are reserved wild animals or protected wild animals: after hunting the animals, the hunter must not move the bodies of the dead or alive animals, and he must notify the officer immediately.

The hunted animals or carcass thereof, in the preceding paragraph shall become state property, and shall be treated by the Royal Forest Department or the Department of Fisheries as the case may be, in accordance with the regulation laid down by the respective Director General with the consent of the Committee.

Section 8: Petitions permissible by this act shall be considered by the authorized officer, who shall make known of his decision to the petitioners within 60 days after receiving the petition.

Failure to act within the stipulated period shall be tantamount to positively acceptance of the petition, and the officer shall accordingly issue the requested permit.

Otherwise specified to the contrary, the permit or certificate issued in accordance with this Act shall remain in effect throughout the period specified therein. In case the permit holder wants an extension, he should apply for one before the expiration of the current permit. After the extension of the permit has been granted, the permit holder is allowed to pursue his permitted activities until they are terminated by the authorized officer.

The extension of the permit, transfer of permit or of a certificate, or issuance of replacement in accordance with this act shall follow the regulation, method and condition specified in the Ministerial Regulation concerned.

CHAPTER TWO

The National Committee on the Wild Animal Reservation

Section 9: The National Committee on the Wild Animal Reservation is hereby established. It shall consist of the Ministers of Agriculture and Cooperation as the Chairman, Permanent Secretaries of Agriculture and Cooperative, of Interior, and of foreign Affairs, Director general of the Department of Local Administration, of Land, of Fisheries, of Livestock Development, of Customer, and of Foreign trade as *ex officio* members; with no less than five and no more than ten distinguished members appointed by the Cabinet, and the Director-General of the royal forest Department serving as member and secretary.

No less than half of the distinguished members in the aforementioned clause shall consist of appointees from representatives of associations or foundations involved in wildlife activities.

Section 10: The Committee members, who are appointed by the Cabinet, shall serve a term of two years. They are entitled to re-appointment after the expiration of their membership.

Section 11: In addition to the expiration of membership on account of Section 10, the Cabinet-appointed Committee members shall cease their membership when they

- (1) Die,
- (2) Resign,
- (3) Are severed of their appointment by the cabinet,
- (4) Are proclaimed by the Court to be legally incompetent, or
- (5) Are sentenced by the final court to serve jail term, the exemption being the light sentence and the negligent cases.

Section 12: While the committee meeting is in session, if the Chairman is absent or is not present in the room, the Committee members shall choose one among themselves to serve as the Acting Chairman.

Simple majority shall make the decision of the Committee.

Each member has one vote. When the votes are equally split, the Chairman cast the decision vote.

Section 13: The quorum of the Committee meeting is set by one-half of the number of Committee members.

Section 14: The Committee may appoint sub-committees to consider or perform any activities as assigned by it.

Section 15: The duties of the Committee are as follows:

- (1) Approving the establishment of a Wildlife Sanctuary in accordance with Section 33, as well as establishment of a Non-hunting Area and a list of species which are protected from hunting in such area in accordance with Section 32.
- (2) Supervising the tasks specified in Section 35.
- (3) Determining management treatments to be conducted in a Wildlife Sanctuary and a Non-hunting Area.
- (4) Approving the declaration of any Royal Decrees, Ministerial Regulations and rules promulgated by virtue of this Act.
- (5) Providing guidance to monitor the implementation of the Act in order to ascertain the effectiveness.
- (6) Performing any other functions as may be assigned by the law.

CHAPTER THREE

Hunting Breeding Possessing and Trading of Wild Animals Carcass and Products Thereof

Section 16: No person shall hunt or attempt to hunt the reserved wild animals or protected wild animals except the act is a part of official activities, which are exempted by the provision of Section 26.

Section 17: The Minister, with the consent of the Committee, is empowered to proclaim, through the issuance of Ministerial Regulation, certain kinds of protected wild animals to be one permissible for breeding operation.

Section 18: No person shall undertake breeding operation of reserved or protected wild animal unless

- (1) The breeding involves protected wild animals specified in Section 17 and is covered by the license issued by the Director General, and
- (2) The breeding is a licensed activity of the entrepreneur who is permitted to undertake public zoological garden business in accordance with Section 29 and has received appropriate license for the purpose from the Director General.

The application for and approval of breeding operation in clause 1 and possession of wild animals for breeding purpose on the part of the licensed entrepreneur in (1) shall be pursued under the standard procedures and conditions stated in the Ministerial Regulation, and the license entrepreneur shall comply with the Ministerial Regulation and the conditions specified in the license.

The license in (1) and (2) shall expire on the date the licensed entrepreneur notifies the Director General of his intention to terminate his zoological enterprise in formal procedure outlined in the Ministerial Regulation

Section 19: No person shall be in possession of reserved wild animal, protected wild Animal, carcasses of reserved or protected wild animals, except the protected wild animals in Section 17 category which were bred in captivity and carcasses thereof, in which case the possessor is required to have a license from the Director General and to observe the rules set by the Ministerial Regulation and condition prescribed in the license.

The application for and granting of license shall be pursued under the standard, procedures and conditions stated in the Ministerial Regulation

Paragraph one and paragraph two shall not apply to:

- (1) Possession of protected wild animals by holder of breeding license in Section 18 (1) who keep the animals for breeding purpose or obtain the animal from breeding in captivity, and carcass of the animals in question, and
- (2) Possession of reserved wild animals, protected wild animals, and carcasses of reserved and protected wild animals for the interest of the license public zoological garden enterprise and management thereof according to Section 29 which are displayed in the licensed public zoological garden.

Section 20: No person shall engage in trading of reserved wild animals, protected wild animals, carcasses of reserved and protected wild animals, and products thereof, except that of protected wild animals specified in Section 17 which have been obtained from breeding in captivity, carcass and product thereof, in which case permission by the Director General is a prerequisite.

The application for and granting of the permission shall be pursued under the standard, procedure and conditions stated in the Ministerial Regulation.

Section 21: No person shall collect, harm, or keep in possession of the nests of reserved and protected wild animals.

The first clause shall not apply to entrepreneurs obtaining license to collect swallow nests and people deriving and privilege thereof, in which case the collectors in question shall observe the rules set by the Director General and announced in the Government Gazette.

Section 22: No person shall fire wild animals during the period from sunset to sunrise.

CHAPTER FOUR

Importation, Exportation, Transitory Movement of Wild Animal and Wild Animal Check Point

Section 23: Subject to the provision of Section 24, no person shall engage in the importation and exportation of wild animals or carcass thereof appearing on the prohibition list of the Minister, transitory movement of reserved and protected wild animals or their carcass without permission from the Director General.

Importation and exportation of protected and reserved wild animals and carcass is prohibited except the animals in question were obtained from breeding in captivity according to Section 8 (1) and the importation or exportation permission has been received from the Director General.

The application for and granting of the permission shall be pursued under the standard, procedure and conditions stated in the Ministerial Regulation.

Section 24: The importation, exportation and transitory movement of wild animals and carcass thereof, which require accompanying permit in accordance with the Convention on international Trade in Endangered Species of Wild Fauna and Flora, are permissible only with permission by the Director-General.

The application for and granting of the permission shall be pursued under the standard, procedure and conditions stated in the Ministerial Regulation.

Section 25: The transitory movement of protected wild animals for business purpose of the license holder in accordance with Section 20 necessitates permission of the Director-General.

The application for and granting of the permission shall be pursued under the standard, procedure and conditions stated in the Ministerial Regulation. Sections 16, 18, 19 and 21

Section 26: Provisions of, and Section 23 shall not apply to activities with the purpose of survey, study, research, on, wildlife protection, breeding, or for the interest of public zoological garden enterprise carried on by the government sector with written permission by the Director-General and under the rules and conditions set by the minister with the consent of the committee.

In case the activities in the earlier clause are performed for the breeding enterprise of the license holder in Section 18 , or for the public zoological garden enterprise of the license holder in Section 29, the change on and payment for expenditures, services, compensation and cost of wild animals shall be pursued in accordance with the procedures set by the Minister with the consent of committee.

Section 27: The Minister is empowered to establish Wild Animal Check-point and set an operation area for each of the checkpoint through pronouncement in the Government Gazette.

Section 28: Whoever intends to moved reserved and protected wild animals, and carcass therefore through the Wild Animal Check-point shall notify the officer in charge of the check-point of his intention by filling the standard form issued by the Director-General and submitting the permit for movement for commercial purpose, import or export permit, or permit for transitory movement of the wild animals as the case may be. Only when the request has been approved in writing, the movement activity may begin.

CHAPTER FIVE

Public Zoological Garden

Section 29: Organizers intending to operate public zoological garden shall seek license for running the enterprise from the Director-General.

The license in the earlier clause shall expire on the late the licensed entrepreneur notifies the Director-General of his intention to terminate his zoological garden enterprise in accordance with Section 32.

The application for and granting of the permission shall be pursued under the standard, procedure and conditions stated in the Ministerial Regulation.

Section 30: After receiving the license and before starting operation of public zoological garden, the entrepreneur shall declare to the officer for examination and registration of the kind and number of reserved wild animals, protected wild animals and carcass of these animals he has in possession or on display in his public zoological garden.

It shall be his duty hereafter to update the figure whenever the change in kind and number occurs.

The reports in the two preceding clauses shall be made in the manner and timing stated in the Ministerial Regulation.

Section 31: In cases it is found that the site of the public zoological gardener the area where the animals are kept contravenes the regulation and condition from specification of the Ministerial regulation which was proclaimed by virtue of Section 29, or has been made unsafe for the people who visit the zoological garden, or has become an uncomfortable living

place for the wild animals, the Director-General shall instruct the zoological garden license holder in writing to rectify the conditions and eliminate the defects.

In case the license holder does not follow the instruction within the specified time given in the written note, the officer is empowered to undertake the amelioration work and charge all expenses incurred to the license holder.

Section 32: In case of the license holder who operates the public zoological garden enterprise according to Section 29, wants to terminate the business, he shall notify the Director-General of his intention in writing, and shall either sell his reserved and protected wild animals as well as their carcasses in his possession to other zoological garden license holders in accordance with Section 29, or sell his protected wild animals defined by Section 17, and the carcass thereof to holders of the license for wild animal breeding in accordance with Section 18 (1) within 180 days from the date he notifies the Director-General.

At the end of the 180 days period mentioned in the first clause all the unsold reserved wild animals, protected wild animals, and carcass thereof shall become state property, and the leaving license holder shall turn all these over to the Royal Forest Department or the Department of Fisheries as the case must be, so that they will be handled in accordance with rules and regulations set up by the Director-General with the consent of the Committee.

CHAPTER SIX

Area and Place under the Prohibition of Wild Animal Hunting

Section 33: When it is deemed appropriate for preservation of wild animal breeds, the cabinet may proclaim through a Royal Decree any specific area to be the wild animal Sanctuary with a map showing the boundary as an appendix. The area shall be called the “Wild Animal Reserved Area.”

The land to be proclaimed as wild animal reserved area shall not be owned or legally possessed according to the Land Act by any person other than public body.

Section 34: An extension or cancellation in whole or in part of the wild animal reserved area shall be made through a Royal Decree. In case the cancellation not for the whole of the wild animal reserved area, a map showing the changing area should be annexed to the Royal Decree.

Section 35: The authorized official shall provide the boundary posts and signs or other marks sufficiently for enabling the public to know the wild animal reserved area.

Section 36: In the wild animal reserved area, no person shall hunt wild animals, whether reserved, protected or any other means; or collect or endanger their nests except for the educational purpose or scientific research and a permit has been obtained from the Director-General with the consent of the Committee.

Section 37: No other person than the authorized officials or other officials on duty shall enter the wild animal reserved area unless the permission has been obtained from the assigned authorized officials.

Person permitted to enter the wild animal reserved area shall comply with conditions specified in the Ministerial Regulation.

Section 38: In the wild animal reserved area, no person shall possess or hold the land, or cut, fell, clear, burn or destroy trees or other vegetation, dig for minerals, excavated ground or rock, pasture animals, change the water course, dry, overflow or pollute water in the waterway, stream, marsh or swamp to become detrimental to wild animals therein.

In cases it is necessary to act in the interest of protection and maintenance of wild animal reserved area, breeding wild animals, research or education, facilitation of conservation program, accommodation, or safe-keeping purposes; the Director-General is empowered to issue written instruction to officials of the Royal forestry Department of the Department of Fisheries, whichever he thinks appropriate to do so in accordance with the rules and regulations he laid down with the consent of the Committee.

Section 39: The handling of plants and plant parts which are felled and clear by the officials in accordance with Section 38 clause 2 shall be done according to the rules and regulations laid down by the Director-General with the consent of the Committee.

Section 40: The officials in charge of the wild animals reserved area is empowered to order the violators of Section 38 clause 1 to leave the wild animal reserved area, or to refrain from doing anything in violation of Section 38 clause 1 in the area

Section 41: No person shall, within the precinct of a monastery or a place provided for religious observance of the public, hunt the wild animal, either reserved or protected or not or collect or endanger its eggs or nests.

Section 42: The Minister may, through the Government Gazette, proclaim any place used for government function, public interest or common public services to be an area freed from hunting of any kind and category of wild animals;

After the Minister proclamation of area where hunting of certain kind and category of wild animals are prohibited, no person shall engage in the following activities in the area:

- (1) Hunting of said kind and category of wild animals,
- (2) Collecting or harming of the nests of said wild animals, and
- (3) Possessing or holding of land, cutting, felling, clearing, burning or destroying trees or other vegetation, mining, raising animals, changing the water course, drying, overflowing or polluting water in the waterway, stream, and marsh to become detrimental to wild animals therein; the exceptions are in case that the Director-General has granted him a written permission and in case that the Director-General has notified a periodic permission to perform the prohibited tasks in the interest of study and research in the particular prohibition area.

In case involving the officers and other government officials, they shall abide by the rules and regulations laid down by the Director-General with the consent of the Committee.

CHAPTER SEVEN

The Officers

Section 43: Then it appears that a license holder has violated this Act, Ministerial Regulation, rules and conditions in the license, or has failed to comply with the instruction which was made by virtue of this Act, the Director-General is empowered to order suspension of the license for a period not exceeding ninety days: the Minister with the consent of the Committee, may order cancellation of such license.

In case of cancellation of the license, if it is the license for possession of reserved and protected wild animals or their carcass, the person whose license has been cancelled, shall sell such reserved and protected wild animals or carcass thereof within a period of thirty days from the day of such cancellation. After the lapse of such period, the unsold wild animals and their carcass shall become state property and shall be handled by the Royal Forest Department or the Department of Fisheries, whichever is more appropriate in the manner

stated in the rules and regulations laid down by the Director-General with the consent of the Committee.

Section 44: In case any person wants the officer or government officials performing duties incurred by this Act to work outside their office hours or normal office premise, whether inside or outside the country, he may present the request to the officer in charge and the officer concerned the same rate of per diem as that receives from the Government as well as traveling expense.

This request for the service Government officials and payment for their per diem and traveling expenses shall be made in accordance with the method and manner and conditions specified in the Ministerial regulation.

Section 45: Regarding the arrest and suppression of the person committing an offence under this act, the authorized officer shall be the administrative or police official under the Criminal Procedure Code.

Section 46: In case it is deemed appropriate that the public should pay for the service or compensation of the officials for the work incurred in wild animals reserved area or an area in which prohibiting hunting of any kind, the Director-General is empowered to set the rates of charge or compensation with consent of the committee.

CHAPTER EIGHT

Penalty

Section 47: Whoever violates Section 16, Section 19, Section 20 Clause 1, or Section 23 Clause 1 shall be punished with imprisonment not exceeding four years or fined not exceeding forty thousand Baht or both.

Section 48: Whoever violates Section 18 and Section 23 Clause 2 or whoever neglects to observe Section 29 shall be punished with imprisonment not exceeding three years or fined not exceeding thirty thousand Baht or both.

Section 49: Whoever possesses protected wild animals bred in captivity or carcass thereof without license according to Section 19 shall be punished with imprisonment not exceeding one year or fined not exceeding ten thousand Baht or both.

Section 50: Whoever trades protected wild animals bred in captivity or carcass thereof without license according to Section 20 shall be punished with imprisonment not exceeding two years or fined not exceeding twenty thousand Baht or both.

Section 51: Whoever violates Section 21, or Section 41 shall be punished with imprisonment of not exceeding one year or fined not exceeding six thousand Baht or both.

Section 52: Whoever does not observe Section 25 or Section 41 shall be fined not exceeding five thousand Baht.

Section 53: Whoever violates Section 36 shall be punished with imprisonment not exceeding five years or fined not exceeding fifty thousand Baht or both.

Section 54: Whoever violates Section 38 or Section 42 Clause 2 shall be punished with imprisonment not exceeding seven years or fined not exceeding one hundred thousand Baht or both.

In case the punished violator Section 38 is found to possess, hold land, utilize or live within the Wild Animal Reserved Area where the crime has been committed, the Court is empowered to order the violator, his employees, labors, agent and followers to leave the area.

The handling of plant and plant parts which has been felled and cleared by the violator of Section 38 Clause 1 shall be done according to the rules and regulations laid down by the Director-General with the consent of the Committee, but these rules and regulations shall in no way allow the passing on of the plants and plant parts to entities other than the Government Units.

Section 55: Whoever assists in concealing, disposing of, taking away, purchasing, holding in pledge or receiving by any other means wild animals carcass, which have been acquired by through commission of an offense under this Act, shall be punished with imprisonment not exceeding one year or fined not exceeding ten thousand Baht or both.

Section 56: Whoever causes the boundary posts, signs and other marks, which have been made by the officers through the provision of this Act, to move away, fade out, damage or become useless shall be punished with imprisonment not exceeding four years or fined not exceeding forty thousand Baht or both.

Section 57: All weapons, equipment, materials, draught animals, vehicles, or any machinery used in the commission of an offense under Section 16, 36, 38, 41, or 42 clause 2 shall be confiscated whether or not the accused has been convicted for such offense.

Section 58: All reserved wild animals, protected wild animals, carcass of such animals, products made of those carcasses, or the nests of the wild animals shall be confiscated, when the person convicted of an offense under this Act has obtained them illegally.

All the confiscated items can become state property and shall be handled by the Royal Forest Department or the Department of Fisheries, as the case may be, in the manner outlined in the rules set by the Director-General with the consent of the committee.

Section 59: In case the violators are legal entity, the Managing Director, the Manager of the Representative of the legal entity involved shall be punished for the violation unless evidence could be submitted in favor of their innocence or nonparticipation in the wrongdoing.

Section 60: The Director-General or the officer appointed by the Director-General is empowered to pass judgment on the infringements of this Act are punishable by fine penalty only. When the accused person has paid the specified amount of fine within thirty days, the case shall be considered as close in accordance with the Criminal Code.

CHAPTER NINE

Transitory Provision

Section 61: Pursuant to the proclamation of the Ministerial Regulation in accordance with Section 6 Clause 1 providing measures for overseeing the additional kinds of protected wild animals and their carcass which were held by certain individual before the date of regulation, the following directives are announced:

- (1) Person in possession of the addition kinds of protected wild animals shall report to the officer the kind and amount of protected wild animals they hold within 90 days from the date of the Ministerial Regulation. After checking by the officer, if the owner or holder of the animals does not want to keep them any further, he shall sell them to the holder of license for the public zoological garden organizer and operator according to Section 29, he shall sell the animals referred to in Section 17 to the holder of license for breeding in captivity in accordance with Section 18 within one hundred and twenty days after the date of reporting to the officer. After the specified period has lapsed, the unsold animals remaining in the area shall become state property and the owner shall turn them over to the Royal Forest Department or the Department of

Fisheries, whichever is more appropriate, in accordance with the rules and regulations laid down by the Director-General with the consent of the Committee. In case the protected wild animals are of the kind specified in Section 17, and the owner or the holder wants to breed them; he shall apply for the license in accordance with Section 18 within thirty days. After his report to the officer, he may take possession of the animals.

In case the owner or the holder of the protected wild animals wants to keep the animals, the officer shall check the animal tending condition. If his animals tending condition is safe enough to entitle him to continue to keep the animals. The license issued by the Director-General shall be granted to him. The license is temporary one covering the length of life of the animals concerned. The license holder shall comply with animal raising instruction therein laid down by the Minister with the consent of the Committee. Whenever there is change in the number of the protected wild animals, the license holder shall notify the officer in charge.

- (2) As for the carcass of the protected wild animals, the owner or holder shall report the kinds and amount of said carcass in his possession to the officer in charge within ninety days from the start of the Ministerial Regulation. After the officer has recorded the figures, the owner or holder is allowed to possess the carcass. In case the carcass is that of the protected wild animal kept for commercial purpose, after record has been taken by the officer, the owner or holder shall sell or dispose of the whole products within the period of three years.

The report and report format and the license for temporary possession of protected wild animals shall be in accordance with the stipulation of the Ministerial Regulation.

Section 62: The Protected Wild Animal Category 1 and 2 in the ministerial Regulation proclaimed by virtue of the Wild Animal Reservation and Protection Act B.E. 2503 shall be considered as Protected Wild Animals in accordance with this Act.

Section 63: The Wild Animal Category 1 and Category 2 in the ministerial Regulation proclaimed by virtue of the Wild Animal Reservation and Protection Act B.E. 2503 shall be considered as Protected Wild Animals in accordance with this Act.

Section 64: All the Ministerial Regulation and the rules and notification proclaimed by virtue of the Wild Animal Reservation and Protection Act B.E. 2503 still operative before or on the convening date of this Act shall continue to apply as long as they do not conflict with provision of this Act., and shall terminate with the proclamation of the Ministerial regulation and the rules and notifications by virtue of this Act.

Section 65: The licenses to hunt reserved Wild animals, to hunt all categories of protected wild animals and carcass thereof, which were issued to pay person on or before the date this Act becomes operative, shall terminate thereafter.

Section 66: Whoever illegally holds in possession of reserved or protected wild animals on or before the date this Act becomes operative shall be waived the punishment of the crime if he surrendered said wild animals to the officer within ninety days from the date this Act becomes operative. The animals in question shall become state property. After recording the kind and number of the animals, the Director-General may allow the animals' keeper to continue keeping their animals, if he considered appropriate which is based largely on the welfare and safety of the animals themselves.

Whoever illegally holds in possession of the carcass of reserved or protected Wild Animals on or before the date this Act becomes operative. After the officer has recorded the figures, the owner or holder is allowed to possess of inheritance,

Section 67: Whoever legally holds in possession of reserved or protected Wild animals or the carcass thereof on or before the date this Act become operative shall report to the officer in charge the kind and amount of reserved or protected wild animals and the kind and amount of their respective carcass within ninety days from the date this Act becomes operative. After the officer has recorded the figures, the following procedures shall be adopted:

- (1) For reserved wild animals, the owner or holder shall sell the animals in question to organizers and operators of public zoological garden who have applied for licenses to operate the enterprise in accordance with Section 69 within one hundred and eighty days from the date of submission of the report. After the specified period has lapsed, the unsold reserved wild animals shall become state property and the owner shall turn them over to the Royal Forest department or the Department of Fisheries, whichever is more appropriate, for further deliberation in accordance with the rules and regulations laid down by the director General with the consent of the Committee.
- (2) For protected wild animals or carcass thereof, provision of Section 61 shall be applied *mutatis mutandis*
- (3) For carcass of reserved animals, the owner or holder may continue to keep the carcass with the condition that he shall not sell, distribute or hand it over to any other person unless he has written permission from the Director-General to do so has inheritance expediency to support the ownership transfer
- (4) For protected wild animals has been held in possession by holders of license for trading of the animals in accordance with the Wild Animal Reservation and Protection Act B.E.2503, after the said license holder has applied for the permission to trade in the protected wild animals according to Section 68 he shall be entitled to continue to trade in the kind of animals specified in Section 17 which have been propagated through breeding in captivity. As for the protected wild animals outside the specification of Section 17, the trade license holder shall sell all these animals within two years from the date he reports to the officer in charge. At the expiration of the period the unsold animals which are not covered by Section 17 specification shall become state property and shall be handed to either the Royal Forest Department or the Department of Fisheries whichever is more appropriate for deliberation, in accordance with the rules and regulation laid down by the Director-General with the consent of the Committee.
- (5) For carcass of the protected wild animals which have been held in possession by holders of for trading of the carcass concerned in accordance with the wild animal reservation and Protection Act B.E. 2503, after the officer has checked and taken record of kind and amount of the carcass concerned held in possession by each holder, the Director-General shall issue a temporary trading permit to the holder. The holder shall sell the all carcass concerned with three years from the date he receives the temporary permit. He shall also make monthly report to the officer in charge starting the monthly sale in the manner prescribed by the Director-General with the consent of the Committee. At the end of the three-year period the unsold carcass shall become state property and shall be handed to either the Royal Forest Department or the Department of Fisheries whichever is more appropriate for deliberation in accordance with the rules and regulation laid down by the Director-General with the consent of

the Committee, unless the carcass is that of the property wild animals specified in Section 17 which are bred in captivity and unless the entrepreneur in question has already applied for trading license of carcass of protected wild animals bred in captivity specified in Section 68. The formal of the report and the manner of reporting shall be in accordance with specification included in the Ministerial Regulation.

Section 68: Entrepreneurs of propagation enterprises, trading of protected wild animals bred in captivity as well as of their carcass and products thereof which exist on or before the date this Act becomes operative, shall apply for respective license issued in accordance with this Act within thirty days from the date the Act is promulgated. After the license has been applied for, the entrepreneur may proceed with his enterprise until he receives an instruction to cease the business from the Director-General.

In case the Director-General does not approve the license application, the provision of Section 43 Clause 2 shall be applied *mutatis mutandis*.

Section 69: Whoever organizes and operates public zoological garden on or before this Act become operative shall apply for license in accordance with this Act within thirty days. After the application has been approved and the officer has checked and found the establishment to be up to the standard prescribed in Section 30 Clause 2 and 3 and Section 31 and the officer has recorded the figures on kind and amount of reserved wild animals, protected wild animals and carcass thereof, the Director-General shall issue license allowing the entrepreneur to organize and operate said public zoological garden.

Section 70: Whatever appending application submitted on or before the date this Act becomes operative shall be considered as revoked unless they are application for conduct of activities which are permissible in accordance with this Act. In such cases, the Director-General shall consider them on a case to case basis.

Countersigned by *Mr. Anan Panyarachun* as Prime Minister

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