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## Status and impacts to sea turtles in Vietnam

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### ABSTRACT

Sea turtles face a great danger of extinction because of human impacts, and the number of turtle occurrence is decreasing. By interviewing fishermen, coastal residents and authorities combined with field surveys in some places where turtles regularly lay eggs, such as Con Dao and Ninh Thuan, the results show that 05 species of sea turtles were found in Vietnam: The Green (*Chelonia mydas*), Hawksbill (*Eretmochelys imbricata*), Olive Ridley (*Lepidochelys olivacea*), Loggerhead (*Caretta caretta*) and Leatherback (*Dermochelys coriacea*). Among them, Green turtles are the most abundant and distributed in all surveyed localities; Hawksbill and Olive Ridley were smaller in number; and Loggerhead and Leatherback were the two species with the least number. Only 03 species remaining to breed on the beaches: Green, Olive Ridley, and Leatherback. The Hawksbill turtles used to lay eggs in the past but have been no longer recorded. Con Dao is a home for the largest number of breeding Green turtles. The reasons for the decline of turtles in Vietnam were the collection of eggs and nesting turtles, fisheries bycatch, development of coastal infrastructure and waste pollution, habitat degradation, and illegal trade in sea turtle products.

**Keywords:** Sea turtle, decline, threats, breeding grounds.

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## INTRODUCTION

Sea turtles, a class of reptiles known as Reptilia reptiles, are one of the oldest groups of creatures on Earth, originating around 300 million years ago during the dinosaur domination period [1]. While most reptiles are now extinct, sea turtles and sea snakes have survived. Currently, there are 67 species of sea reptiles worldwide, including 60 sea snakes and 7 sea turtles [2]. Sea turtles, with their unique characteristics, include the Green turtle (*Chelonia mydas*), Hawksbill (*Eretmochelys imbricata*), Olive Ridley (*Lepidochelys olivacea*), Kemp's ridley sea turtle (*Lepidochelys kempii*), Loggerhead (*Caretta caretta*), Flatback turtle (*Natator depressus*), and Leatherback (*Dermochelys coriacea*). These fascinating creatures are found in warm seas across most of the world's oceans. Notably, the Flatback turtles are only found in the East and Northeast of Australia [3], and the Kemp's ridley sea turtles are exclusive to the Gulf of Mexico and Atlantic Ocean [4].

In Vietnam, published research on sea turtles is limited, with much of it yet to be published. The study of sea turtles has been going since 1995 in Con Dao National Park (Ba Ria-Vung Tau) and Nui Chua (Ninh Thuan), as well as in some coastal areas [5]. Initial findings have revealed a significant decline in sea turtle population in Vietnam regarding the number of turtles per species and the number of their breeding grounds. As a result, sea turtles have been included in the list of banned aquatic species for exploitation and in the Vietnam Red List [6]. In 2004, the Ministry of Agriculture and Rural Development has announced the "National Action Plan for Sea Turtle Conservation in Vietnam until 2010" and the "Action Plan for Sea Turtle Conservation in Vietnam over 2016–2025" in 2015. These plans proposed a series of actions to protect and restore sea turtles in Vietnam, with the involvement of fisheries and biodiversity specialized authorities, such as The National Directorate of Aquatic Resources Exploitation and Protection (Ministry of Agriculture and Rural Development), Conservation Agency (Ministry of Natural Resources and Environment), research

institutes, and universities nationwide. These efforts give us hope for the future of sea turtles in Vietnam.

Sea turtles in Vietnam are on the brink of extinction for many reasons, but most importantly, human activities [5, 7]. Their favorite islands for habitation, foraging, and breeding of sea turtles have been degraded by overfishing, destructive exploitation, and tourism development, causing loss of breeding grounds and foraging areas.

## RESEARCH METHODS AND MATERIALS

Because sea turtles are currently few and rare, sea turtle research had to combine two methods: interviews and field surveys. The surveys were conducted from 2018 to 2019.

### Interviews

Interview survey was carried out in the coastal provinces where sea turtles were previously recorded, including Quang Ninh, Hai Phong, Quang Tri, Thua Thien-Hue, Quang Nam, Quang Ngai, Binh Dinh, Phu Yen, Khanh Hoa, Ninh Thuan, Binh Thuan, Ba Ria-Vung Tau (Con Dao), Kien Giang. The interviewed subjects were:

The official in charge of the environment and the protection of aquatic resources at the provincial, district and commune levels, etc.

People living near beaches in the area to be surveyed;

Fishermen involved in nearshore and offshore fishing activities;

People directly exploiting sea turtles or bycatch fishermen;

Seafood collectors, seafood wholesalers;

The artisans who work with products from sea turtles.

The interview sheet has 45 questions, including the following content: information about the interviewee (name, age, gender, occupation), fishing season, type of fishing gear, machine capacity, number of sea turtle sightings, where, when, what species, the number of times turtles were caught in nets, the status of turtle meat and egg trade, etc.

The total number of interview sheets collected in the localities was 350, of which the majority (310) were from people fishing in the coastal area and living along the beach. The remaining (40) were the result of interviews with local fisheries management officials. The average age of the interviewees was 50,5 years old (the oldest was 90 years old, and the youngest was 24 years old). 95% of the interviewees were male, the rest were female.

### Field surveys

Based on the results obtained from the interview survey method, sandy beaches in Con Dao (Ba Ria-Vung Tau) and Nui Chua (Ninh Thuan) were selected for the survey. Twice a night, patrol on the sandy beaches to determine the number of turtles to lay eggs, species composition and breeding season of sea turtles, take pictures and mark them on the map.

## RESULTS AND DISCUSSION

### The status of foraging sea turtles in Vietnamese waters

As a coastal nation with many marine foraging ecosystems for sea turtles such as seagrass, coral reefs, rocky reefs, bays, etc., up to now, 5 species of sea turtles living and foraging along the coastal areas and offshore islands have been recorded. The foraging sea turtles in Vietnam include the Green (*Chelonia mydas*), Hawksbill (*Eretmochelys imbricata*), Olive Ridley (*Lepidochelys olivacea*), Loggerhead (*Caretta caretta*) and Leatherback (*Dermochelys coriacea*). Although there has yet to be any quantitative study of the number of each sea turtle species currently foraging and

living in Vietnamese waters, interviews of fishermen in the nearshore and offshore areas show that sea turtle species are still distributed in Vietnam. However, their numbers have decreased significantly compared to before 2002. Out of these 5 species, Green turtles are the most abundant and distributed in all surveyed localities; Hawksbill and Olive Ridley are smaller; and Loggerhead and Leatherback are the two species with the least number. Green turtles are the only herbivorous, distributed in shallow waters with seagrass beds in offshore islands such as Phu Quy (Binh Thuan), Phu Quoc Island (Kien Giang), Con Dao (Ba Ria-Vung Tau), Hoang Sa (Da Nang), Truong Sa (Khanh Hoa), Bach Long Vi (Hai Phong). In addition, foraging Green turtles are also found in coastal lagoons such as Tam Giang - Cau Hai, Thuy Trieu, and others (Table 1, Figure 1).

Other species (except Leatherback) are commonly found in coral reefs and rocky reefs in the Gulf of Tonkin from Quang Ninh to Thanh Hoa, the Central from Quang Tri to Binh Thuan, and the Gulf of Thailand [8]. Leatherback turtles are rarely seen in shallow, nearshore waters but are usually found in deep-water areas with insignificant numbers (frequency: every few years).

Studies tracking the migration trends of Green turtles after breeding in Con Dao, Hong Kong, Thailand, and the Philippines have supported this affirmation. According to data from Con Dao National Park, the Green females, after breeding in Con Dao, have migrated to their foraging habitats in Pahang (Malaysia), Palawan (Philippines), Nautuna (Indonesia), Phu Quy, Truong Sa [9]. Besides, the nesting females at Lamma Island (Hong Kong) and Ko Khram (Thailand) have returned to forage at Bach Long Vi Island (Hai Phong) [10] and Con Dao (Ba Ria-Vung Tau) [11] (Fig. 2).

Table 1. The number of sea turtles discovered in the islands in 2016–2017

Region	Con Co	Cu Lao Cham	Phu Quy	Ly Son
Green	9	11	10	10
Hawksbill	1	1	0	0
Olive Ridley	0	1	0	0
Loggerhead	1	0	1	0
Leatherback	0	0	0	0
TOTAL	11	13	11	10

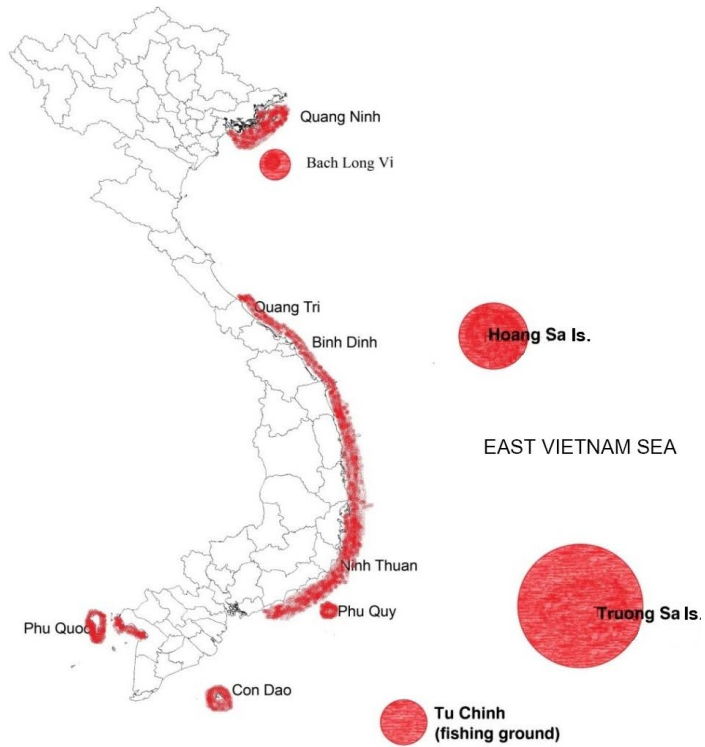


Figure 1. Distribution map of Sea turtles feeding and living in Vietnam

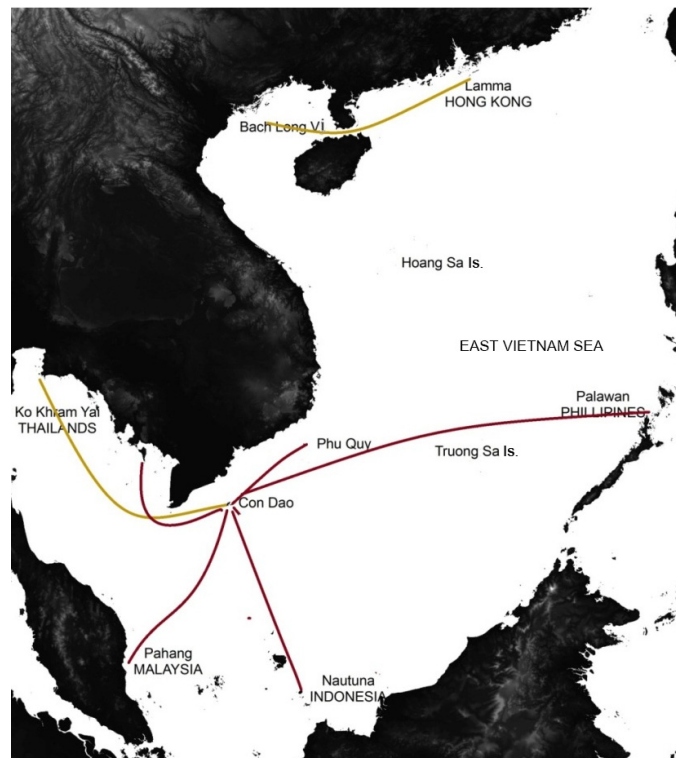


Figure 2. Migratory pathway of sea turtles in Vietnam

### The status of breeding sea turtles in Vietnam

According to previous studies, there are 4 species of sea turtles breeding in Vietnam, including the Green (*Chelonia mydas*), Hawksbill (*Eretmochelys imbricata*), Olive Ridley (*Lepidochelys olivacea*) and Leatherback (*Dermochelys coriacea*). According to the survey and tracking results

of sea turtles breeding at localities in this study, only 2 species regularly laying eggs, Green and Olive Ridley, and the irregular one is Leatherback. The Hawksbill turtles have not even been found to lay eggs in the past 10 years. Hence, all sea turtles are listed in the Red Data Book, which lists rare and endangered species of fauna and flora native to Vietnam (Table 2).

Table 2. List of sea turtle species in Vietnam and their status

Name	Scientific name	Decline (compared to 1960)	IUCN Red List (2019)	Vietnam Red List (2007)
Loggerhead	<i>Caretta caretta</i>	Declined	VU	CR
Green	<i>Chelonia mydas</i>	75% declined	EN	EN
Hawksbill	<i>Eretmochelys imbricata</i>	90% declined	CR	EN
Olive Ridley	<i>Lepidochelys olivacea</i>	90% declined	VU	EN
Leatherback	<i>Dermochelys coriacea</i>	99% declined	CR	CR

### Green turtle (*Chelonia mydas* (Linnaeus, 1758))

This turtle is the most abundant species in Vietnamese waters, including foraging and breeding populations. Through interviews and field surveys, all localities once had turtles that lay eggs and forage in coastal areas. Now, the number of Green breeding at beaches on the entire coastal area is about 300 turtles/year (ranging from 147–422 turtles/year), accounting for 98% of the total sea turtles breeding in Vietnam (Figure 3).

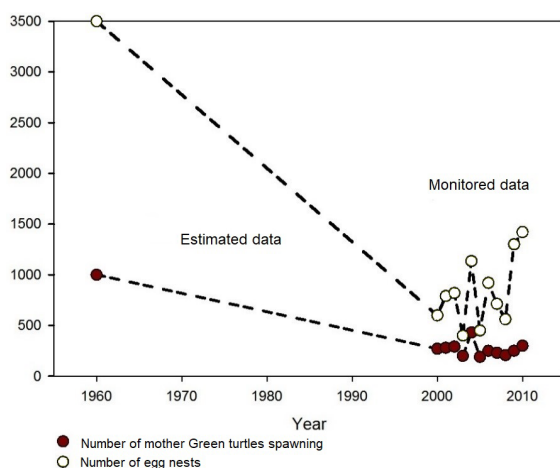


Figure 3. Number of Green turtle spawning on sandy beaches annually [6, 8]

Hamann estimated that the number of Green breeding across Vietnam in the 1960s was approximately 1000 turtles yearly. By 2002, the number of breeding Green has declined to about 270 turtles per year, gathering mainly on breeding grounds in Con Dao, some islands in the Gulf of Tonkin, the central provinces from Da Nang to Ninh Thuan, and some islands in the Gulf of Thailand. Thus, the number of Green breeding in Vietnam has increased compared to 2002. However, the number of Green breeding grounds has decreased significantly compared to the past. In the 1960s, Green turtles laid eggs on almost all coastal beaches and islands. By 2002, breeding grounds has declined to only 9 sites [5]. Green turtles only lay eggs in 7 areas of which 2 areas are indicated in this study (Fig. 4).

Among the current breeding grounds, Con Dao (Ba Ria-Vung Tau province) has the highest number of breeding Green turtles, with an annual number of  $516 \pm 149$  turtles/year [12] at 14 grounds (80% of which are centralized in 5 grounds, namely Hon Tai, Bai Duong, Cat Lon, Hon Cau, and Hon Tre). Nui Chua National Park (Ninh Thuan province) has the second largest number of breeding Green turtles, averaging 8 turtles/year (ranging from 5–8) in 3 main grounds (Bai Thit, Bai Dai and Bai Mong Tay). In the north, Green turtles still lay eggs in Bai Tu

Long (Quan Lan and Hon Nut Dat) and Co To (Phung Hoang, Thanh Lan); the number of Green turtles breeding in this area is not stable

and ranges between 10 and 15 turtles during a breeding season, much lower than the previous estimation (100 turtles/season) [5].



Figure 4. The main breeding grounds of the Green turtle (*Chelonia mydas*) in Vietnam

Table 3. The number of sea turtles breeding in Vietnam according to observed data at breeding grounds

Seq.	Site	Green	Hawksbill	Olive Ridley	Leatherback
1	Bai Tu Long	10	0	1	0
2	Quang Tri	10	0	2	0
3	Binh Dinh	8	0	0	0
4	Khanh Hoa	4	0	0	1
5	Ninh Thuan	8	0	0	0
6	Con Dao	516	0	0	0
	Total	556	0	3	1

According to the interview results of residents, the central provinces such as Quang

Tri, Da Nang, Quang Nam, Quang Ngai, and Binh Dinh used to have extensive breeding

grounds with hundreds of breeding turtles one night. Now the number has significantly decreased, particularly in crowded tourist areas such as Son Tra Peninsula (Da Nang), Bai Dai (Cam Lam, Khanh Hoa), Tam Quan Bac (Phu Yen), and others. Since 2005, almost no sea turtles have been found to lay eggs. Some scattered turtles are found in other localities a year, making the total number of turtles breeding in the area decline to about 20 turtles in a breeding season (of which Quang Tri has about 10 turtles throughout the entire 70 km of beach, Binh Dinh has about 10 turtles in Hai Giang and Hon Kho, Khanh Hoa has 2–4 turtles). In addition, sea turtles have disappeared in some previous breeding grounds, such as in Bach Long Vi (Hai Phong), Phu Yen, Binh Dinh, and Phu Quoc Island (Kien Giang).

**Hawksbill turtle (*Eretmochelys imbricata* (Linnaeus, 1766))**

Hawksbill turtles are one of the most common species in Vietnam; before the 2000s, they laid eggs on the sandy beaches of coastal and offshore islands such as Cat Ba (Hai Phong), Quan Lan, Nut Dat (Quang Ninh), Con Dao (Ba Ria-Vung Tau), etc. At Ong Dung beach of Con Dao, about 03 females and 10 clutches were discovered yearly. Likewise, on some sandy beaches of small islands in Cat Ba, breeding Hawksbill turtles were found; they were even kept in small bays for shells export. However, for many reasons, mainly overfishing, the number of Hawksbill turtles in Vietnam has declined significantly and is even on the brink of extinction [6]. During tracking time from 2008 to 2018, we no longer recorded any turtles breeding at beaches. The interview results show no sign of this species laying eggs in areas such as Con Dao and Cat Ba since the 2000s.

**Leatherback turtles (*Dermochelys coriacea* (Vandelli, 1761))**

In Vietnamese culture, especially fishermen, the Leatherback turtles have spiritual significance, embody the sea gods, and bring luck to the fishermen. Therefore,

fishermen do not catch, kill, or eat Leatherback turtles. However, the number of these species has declined remarkably, and they are almost extinct in Vietnam. According to a Hamann [5] report, in the 1960s, the number of Leatherback turtles laying eggs in Vietnamese waters was about 500 per year, down to 10 turtles/year in 2002. From 2008 to 2018, we recorded only one individual Leatherback laying eggs on Cat Dai beach in Cam Lam district (Khanh Hoa Province) in June 2013. In other localities where turtles had laid eggs before, such as Quang Ngai, Binh Dinh, and Phu Yen, there is no trace of nesting turtles.

**Olive Ridley turtles (*Lepidochelys olivacea* (Eschscholtz, 1829))**

Olive Ridley turtles have been very popular on Vietnamese beaches for decades. However, this is also an exploited species for food. By 2002, the number of Olive Ridley turtles had declined to less than 40 turtles in one breeding season and the remaining areas where Olive Ridley turtles lay eggs were Quan Lan Island (Quang Ninh) and Son Tra Peninsula (Da Nang) [5]. There is no sign of this species in Son Tra Peninsula area, especially after the construction of a road surrounding the island and a series of resorts and hotels on the main sands of the peninsular, such as Nam beach, Tre beach, etc. The Olive Ridley turtles are only found in some uninhabited beaches, such as Nut Dat Island (Quang Ninh) and beaches in Quang Tri Province, with very small numbers.

**The causes of sea turtle decline**

Sea turtles have a long lifespan (from 60 to 100 years) and a very complex life cycle; each stage requires different habitats, such as sand grounds, seagrass beds, coral reefs, rocky reefs, and deep-water regions. Although the number of egg nests and the number of eggs in a nest is significant, the mortality rate is very high in the hatchling stage (up to 60%) [13], so it is estimated that only 1/1,000 of the hatchlings can survive to adult stage [14]. Therefore, if adult turtles are eradicated and their eggs are taken completely, that sea turtle will be extinct

after a few decades. In Vietnam, sea turtles have only been included in the list of species prohibited from exploitation in the 1990s, and at present, the protection of sea turtles in many localities has many limitations. This has contributed to a narrow sea turtle population in Vietnam in terms of the number of species and the number of individuals in each species. The main causes leading to this situation are listed as follows:

### ***Unintentional catching***

According to interview results, the customs and beliefs of most fishermen, especially from the Central and Northern provinces, sea turtles are creatures to be abstained from. In the past, when fishermen incidentally caught sea turtles, they often released them back into the sea. Sea turtles were not a target to exploit, but only by-products from being caught in nets and dead. The deadliest occupations for the sea turtles are (1) bottom trawling, (2) purse seining, and (3) tuna fishing [6]. Bottom trawling is usually in shallow coastal water areas, especially seagrass beds, while purse seining and long-line fishing are in deep offshore water areas. As a result, Green turtles are often incidentally caught by bottom trawling, while other species are often caught by purse seining and long-line fishing. In 14 survey trips conducted by the Research Institute of Marine Fisheries on tuna fishing boats in Truong Sa area and Tu Chinh beach, up to 8 sea turtles were caught, including 4 individuals of the Olive Ridley, 2 individuals of the Hawksbill, 1 individual of the Green and 1 individual of the Leatherback. The total number of tuna fishing boats in Vietnam is about 5998 boats [8], concentrated in localities such as Da Nang, Quang Nam, Quang Ngai, Binh Dinh, Phu Yen, Khanh Hoa, Vung Tau, Kien Giang. In a sea-going season, each boat usually operates 3–4 trips; therefore, the total number of sea turtles that can be captured incidentally is at least 1,000 turtles/per year. However, it is necessary to study the number of boats surveyed more carefully over many seasons to determine the exact number of incidental captured sea turtles in Vietnam.

### ***Collection of eggs and nesting turtles***

Sea turtles have not been protected in Vietnam for a long time, while people living in coastal areas (especially non-fishermen) consider sea turtles a critical alternative food. Through the results of interviewing people, almost 100% of the nesting turtles and their eggs if detected, are captured and killed for food. Sea turtle meat can be consumed in the family, in the village or sold in the market. Recently, due to the rise of public awareness, partly because the number of sea turtles has been reduced, they are no longer publicly caught; however, nesting turtles and eggs are still illegally captured and collected in many localities.

### ***Development of coastal infrastructure and waste pollution***

In addition to the natural impacts leading to coastal erosion such as storms, waves, etc. activities, such as sand mining, tourism development, marine waste and massive coastal development are the leading causes of negative impacts on sea turtle breeding grounds [15, 16]. Although there are no data on the effects of sand mining in Minh Chau and Quan Lan Islands (Quang Ninh) or titanium mining in the coastal sand beaches of Quang Tri, Binh Dinh, etc., on the reproduction of sea turtles, if the sand mining area expands to the beaches where turtles are still laying eggs, it will undoubtedly affect the stability of these breeding grounds. Likewise, the current expansion of shrimp farming on the sand in the central provinces has significantly reduced the area of breeding grounds for sea turtles.

The number of fishing and tourist boats along the Viet Nam coastline has increased rapidly in the last two decades [17, 18]. During fishing, fishing gear may be thrown away (also called “ghost nets”). These are Gillnetting panels trapped in rocky or coral reefs that continue to slaughter entangled sea turtles and other marine life. These netting panels can be harmful for decades after they stay on the seabed. Although there are no complete statistics, the annual country’s number of lost



gill nets is estimated to reach hundreds of kilometers. In addition, there has been increased marine noise and pollution levels (e.g.) oil/fuel residue, rubbish (including nylon bags, discarded net and other foreign material). These factors have negatively affected sea turtles and other species because of their ingestion, entanglement, injury, obstruction or degrading the foraging or nesting habitats, and they have likely contributed in some way to the demise of marine turtles in Vietnam. Marine rubbish threaten not only sea turtles but also the health of marine ecosystems and related industries such as tourism and fishing. If the short-term problem is addressed, Vietnam's valuable coastal and marine ecosystems will be under serious threat of becoming irreparably damaged.

#### ***Degradation of sea turtle habitats***

Coral reefs in Vietnam have long suffered from explosive and cyanide fishing, and seagrass and mangrove habitats have experienced decades of clearing, harvesting, sedimentation, and other anthropogenic impacts over the past decades [19, 20]. In recent years by various Government and non-government organizations have made a considerable effort to stop these destructive fishing techniques, and to promote the wise use of marine and coastal habitats. However, these ecosystems take a long time to restore to their original state. The deterioration in the quality of corals and seagrasses in the foraging habitat will cause sea turtles to deteriorate their reproductive quality because of insufficient energy for the next breeding cycle: time between two breeding seasons will increase, the number of eggs and hatchlings will be reduced, and quality of eggs and hatchlings will be impaired.

#### ***Decline of sea turtle breeding grounds***

Nesting beaches are often untouched and mainly located offshore or far from developed tourism regions. However, beaches in Son Tra Peninsula (Da Nang City) and a series of beaches in Quan Lan - Minh Chau (Quang

Ninh), and Cam Lam (Khanh Hoa), have been developed for tourism or are planned to develop tourism. If these beaches are developed, sea turtle nesting grounds will face risks from various factors such as the improvement of beaches, the influence of light, noise, and the increasing number of tourists. After the completion of the road around the Da Nang Peninsula and the resorts that have sprung up on most of the beaches, the Olive Ridley turtles have entirely disappeared in recent times.

#### ***Issues of illegal trade in Sea turtle products***

While much of the Olive Ridley, the Leatherback, and the Loggerhead are killed directly or indirectly for food, many Green and Hawksbill turtles are illegally traded for producing jewelry, handicrafts, and stuffed mounts. It is difficult to determine the exact number of sea turtles killed each year and the rate at which these products are consumed, as these are illegal activities in Vietnam. In addition, there are illegal trade activities such as (1) the organized wholesale (retail) of sea turtle products, (2) the illegal import of turtle shells from other countries at the black markets, and (3) a significant amount of turtle shell products has been sold to foreign traders right at sea on international waters. Most sea turtles caught by Vietnamese fishermen are in foreign waters such as the Philippines, Malaysia, Indonesia, Thailand, and Australia.

According to Traffic ASEAN's report [9], fishermen exploiting shells (from September 2001 to February 2002), about 22,000 products from Hawksbill turtles were sold nationwide. The survey also indicated an organized international trade and a wide range of products from Hawksbill turtles. The products from Hawksbill turtles were circulated on the sea, transported in large quantities abroad, and sold to domestic/international tourists as souvenirs. However, wholesale-export activities for sea turtle products on a large scale that used to occur frequently are no longer available, and the scale of the retail market for Sea turtle products has decreased significantly: the number of products sold has decreased

from about 22,000 down to about 5,800 products made from sea turtles, during 2002–2008.

In Vietnam, in the period 2006–2012, the competent authorities confiscated 1,336 kg of Hawksbills's shells, 900 kg of Green's shells, and tens of tons of dry sea turtles of all kinds illegally imported into Vietnam via Hai Phong port, Sa Ky Port, Saigon Port and Cat Lo Port. At the end of 2014, the competent authorities discovered 3 sea turtle processing units in Nha Trang and Khanh Hoa, up to more than 7,000 sea turtle individuals with a total weight of more 10 tons (6 fresh tons and 4.4 dry tons). This unit bought fishermen's turtles for 200–800 thousand dong/turtle, then soaked in formol and chemicals to make them into handicrafts [6]. Main consumption places: coastal tourist areas, souvenir shops in big cities such as Hanoi: Sea turtle products are stealthily sold in the old quarters and main shopping places, such as Hang Khay street, which can be an essential distribution place in the city. In Ho Chi Minh City, Sea turtle products are sold in the old town and main shopping areas. The District 1 area has much business, mainly for tourists. In addition, souvenir shops in Ha Long (Quang Ninh), Ly Son (Quang Nam), Nha Trang (Khanh Hoa), Con Dao (Ba Ria-Vung Tau), Ha Tien (Kien Giang) still have sneaky and underground deals with a limited number of craft Sea turtle products.

## CONCLUSION

There are 5 species of sea turtles distributed in Vietnam, including the Green (*Chelonia mydas*), Hawksbill (*Eretmochelys imbricata*), Olive Ridley (*Lepidochelys olivacea*), Loggerhead (*Caretta caretta*) and Leatherback (*Dermochelys coriacea*). Only 3 species remain to breed on the beaches: Green, Olive Ridley, and Leatherback. The Hawksbill turtles used to lay eggs in the past but have been no longer recorded. Con Dao is a home for the largest number of breeding Green turtles, averaging 516 turtles/season.

Sea turtles have been seriously threatened in Vietnam due to non-by-catch or bycatch

activities in their breeding grounds and habitats. Moreover, the area of the beaches where they breed has been narrowed down due to the activities of infrastructure construction, tourism, mineral exploitation, and aquaculture. The ecosystem habitats for sea turtles are also degraded. These have led to a severe decline in sea turtles in Vietnam.

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