

Knowing sea turtles: local communities informing conservation in Koh Rong Archipelago, Cambodia

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មូលនិយមរង្វេប

អណ្តើកសមុទ្រប្រភេទដែលរងការគំរាមជាសកល ត្រូវបានរកឃើញនៅតំបន់ជុំវិញប្រជុំកោះរុង ដែលស្ថិតនៅតំបន់ឆ្នេរភាគនិរតីនៃប្រទេសកម្ពុជា។ ប្រភេទទាំងនោះគឺ *Chelonia mydas*, *Eretmochelys imbricata* និង *Dermochelys coriacea*។ ដើម្បីសិក្សាថាតើសហគមន៍នៅជុំវិញប្រជុំកោះរុងមានអន្តរកម្មជាមួយប្រភេទទាំងនេះយ៉ាងដូចម្តេចនោះ យើងបានធ្វើការសិក្សាទៅលើការយល់ដឹងរបស់គាត់អំពីអណ្តើកសមុទ្រ និងការប្រើប្រាស់អណ្តើកសមុទ្រទាំងនោះ។ ក្នុងការសិក្សានេះ យើងបានប្រើវិធីសាស្ត្រស្រាវជ្រាវគុណភាពបែបវិទ្យាសាស្ត្រសង្គម និងបានកំណត់ក្របខណ្ឌគោល (frames of reference) សម្រាប់អណ្តើកសមុទ្រ គឺអណ្តើករងគ្រោះ អណ្តើកជាអាហារម្តងម្កាល អណ្តើកក្នុងជំនឿ និងអណ្តើកជាសក្តានុពលទៅអនាគត។ ក្របខណ្ឌគោលទាំងនេះត្រូវបានពន្យល់បង្ហាញនៅគ្រប់ភូមិ និងក្នុងចំណោមក្រុមជំរុំភាគច្រើនក្នុងសហគមន៍។ ការសិក្សារបស់យើងក៏បានរកឃើញផងដែរនូវកត្តាគំរាមកំហែងដល់ការរស់នៅរបស់អណ្តើកសមុទ្រដែលនៅជុំវិញប្រជុំកោះរុង។ កត្តាគំរាមកំហែងញឹកញាប់ជាងគេគឺទូកអូសអ៊ុន សំណាញ់ អ្នកនេសាទជនជាតិវៀតណាម សន្ទូច ការនេសាទខុសច្បាប់ និងការនេសាទហួសកំរិត។ ការយល់ដឹងពីរបៀបដែលសហគមន៍យល់ចំពោះអណ្តើកសមុទ្រនិងធ្វើអន្តរកម្មជាមួយអណ្តើកសមុទ្រ និងរបៀបដែលពួកគេយល់ដឹងពីកត្តាគំរាមកំហែងដល់ការរស់នៅរបស់វា ផ្តល់នូវការយល់ដឹងត្រឹមត្រូវយ៉ាងសំខាន់សម្រាប់ការអភិរក្សធម្មជាតិ និងកម្មវិធីអប់រំ។

Abstract

Three globally threatened species of sea turtle have been recorded in the waters around the Koh Rong Archipelago off Cambodia's southwest coast: the green turtle *Chelonia mydas*, the hawksbill *Eretmochelys imbricata* and the leatherback *Dermochelys coriacea*. To learn how human communities around the Koh Rong Archipelago interact with these turtle species, we investigated their perceptions and use of sea turtles. Our study used qualitative social science research methods and identified four frames of reference for the sea turtle: turtles as victims, turtles as occasional food, turtles as spiritual beings, and turtles as a promise for the future. These frames of reference were expressed in all villages and among most demographic groups. Our study also identified several perceived threats to sea turtle survival around the Koh Rong Archipelago. The most frequently cited threats were trawling boats, nets, Vietnamese fishermen, hooks, illegal fishing and overfishing. Understanding how local people interpret and interact with sea turtles and perceive threats to their survival provides important insights for nature conservation and education programmes, which our study aims to inform.

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Keywords

Cambodia, community-based conservation, Koh Rong, qualitative research, sea turtle, social study.

Introduction

Sea turtles are globally widespread and have varying uses, roles and relationships in different coastal communities around the world (Lück, 2008). From being a main income and food source (Garland & Carthy, 2010; Parsons, 2000) to having ancestral and cultural significance (Rudrud, 2010; Morgan, 2007), marine turtles are experienced and inhere a range of interpretations by the people who interact with them. Threats to marine turtles around the world today are primarily anthropogenic. These include over-harvesting of eggs (Settle, 1995; Parsons, 2000), fishing activities that catch juvenile and adult turtles in nets during migration (Wallace *et al.*, 2010; Lewison *et al.*, 2004; Oravetz, 1999), oceanic pollution (Bugoni *et al.*, 2001; van der Merwe 2010) and degradation of nesting habitats (National Research Council, 1990; Lutz & Musick, 2003; Gilman *et al.*, 2010).

Until recently, knowledge of sea turtles in Cambodia was limited. In 1999 and 2000, an initial study was conducted by Ing (1999, 2000), wherein three species were identified in the waters off Cambodia's coast. These were the green turtle *Chelonia mydas*, the hawksbill *Eretmochelys imbricata* and the leatherback *Dermochelys coriacea*. In the Koh Rong Archipelago, however, there have been no recent leatherback recordings. All three species are globally threatened, with the hawksbill and the leatherback listed as Critically Endangered by IUCN (Sarti Martinez, 2000; Seminoff, 2004; Mortimer & Donnelly, 2008). The social status and use of sea turtles around Cambodia were examined by Ing (1999, 2000), while Fauna & Flora International conducted a rapid assessment of nesting sites along the coastline (Eastoe & Ke, 2011). These studies found that some turtles are eaten but not hunted, that turtles are frequently caught as by-catch, and that they are sometimes considered to bring good luck, such as by performing a merit release (Gilbert *et al.*, 2012). In addition to these studies, numerous sea turtle nesting and feeding locations were identified in 2004, including sites on Koh Rong and Koh Rong Samloem (Ing, 2004).

At the time of this study, several marine conservation and research initiatives were underway in the Koh Rong Archipelago. Two examples included efforts by Marine Conservation Cambodia in M'pei Bi Village and Coral Cay Conservation in Koh Toch Village. In addition, at the time of this study, plans were underway to establish

a Marine Fisheries Management Area around the archipelago.

Considering the existence of other conservation initiatives, the records of sea turtle presence in rapid assessment studies, and the possibility of a Marine Fisheries Management Area, Koh Rong Archipelago was seen as an ideal location to examine the relationship between Cambodians and sea turtles more closely. Initiated by Song Saa Private Island's Conservation and Community team to aid in their possible implementation of a sea turtle conservation project, this study identifies the dietary and economic uses of the turtles and exposes variation between villages in the study area. It also reveals people's socio-cultural sentiments towards, and interpretations of, the sea turtles across the five villages studied.

Methods

Study Sites

The study area consisted of five villages, namely, Prek Svay, Daem Thkov, Koh Toch, M'pei Bi, and Sok San (Table 1) situated on the two main islands and associated small islands of Koh Rong and Koh Rong Samloem (10°46'23.8074"N, 103°10'36.228"E to 10°32'25.6914"N, 103°20'24.5394"E). The largest, Prek Svay Village, was reportedly established on Koh Rong under King Norodom Sihanouk's rule (1953-1970) (Seak *et al.*, 2010). From 1975 to 1979, during the Pol Pot era, the inhabitants were evacuated to the mainland (Seak *et al.*, 2010). The first reported individuals to return to the islands were in 1989 and 1990 (Seak *et al.*, 2010; Ouk *et al.*, 2011).

In 2011 a socio-demographic survey was conducted in three of the four remaining study site communities around the islands: Daem Thkov, Koh Toch, and M'pei Bi (Ouk *et al.*, 2011). Sok San, perhaps because it is not officially a village, was not examined. This survey found that in all four assessed villages, the vast majority of inhabitants were Khmer and Buddhist, with a few representatives from the Cham (Cambodian Muslim) community as well as a few Thai, Chinese and Vietnamese individuals (Ouk *et al.*, 2011). The study also revealed that an average of 46% of the population in all villages were employed in fishing-related activities. Tourism, local commerce, farming, construction and teaching were also listed as occupations of residents. In M'pei Bi, Daem Thkov and

Table 1 Number of individuals and families in the five villages where interviews were conducted in the Koh Rong Archipelago (Prak Saran, pers. comm. 2012).

| Island/ Village | No. of people | No. of families | No. of responses |
|-------------------------|---------------|-----------------|------------------|
| <i>KOH RONG</i> | | | |
| Daem Thkov Village | 384 | 90 | 10 |
| Prek Svay Village | 679 | 154 | 17 |
| Koh Toch Village | 318 | 82 | 7 |
| Souk San Village | 303 | 82 | 9 |
| <i>KOH RONG SAMLOEM</i> | | | |
| M'pei Bi Village | 404 | 94 | 8 |

Prek Svay villages, literacy was found to be over 70% while Koh Toch Village had a literacy rate of 49.6%. Age composition was similar in M'pei Bi, Koh Toch and Daem Thkov villages, showing a very young population with an average of 41% under 18 years old and 28% between 19 and 30 years. Prek Svay had a significantly older population, with 60% over the age of 30 (Seak *et al.*, 2010; Ouk *et al.*, 2011).

Data collection

This study utilised several different qualitative social science research methods, including semi-structured interviews, participatory mapping, ethnographic participant observation and a focus group (Neuman, 1997). Only the results from the semi-structured interviews are discussed in this paper. The lead author carried out field research in March and April 2012, which included 51 semi-structured interviews with people from the five villages across the two largest islands.

For the semi-structured interviews, a translator and the lead researcher, using convenience sampling, approached individuals who were available to talk while they walked around the villages, usually between 0700–1700 h, with occasional evening interviews from 1800–2000 h. We explained the study to prospective participants and if they were interested in participating, we discussed the project thoroughly and asked for their verbal consent. To achieve a representative sample, we aimed to interview a variety of different ages and an even number of women and men. We approached individuals who appeared to be doing a variety of activities, but were also frequently guided to individuals who had personal experiences with sea turtles.



Fig. 1 Map of Koh Rong Archipelago showing the locations of the five villages. Villages with Community Fisheries are marked with an asterisk.

The interviewees ranged from individuals to small groups, but usually resulted in one individual answering the majority of the questions. It was that individual's demographic information that was recorded. The interviews lasted between 30 and 60 minutes and questions revolved around their knowledge of sea turtles. Specifically: how they thought of and felt about sea turtles, and what role sea turtles had in their life, or their community's life – whether spiritual, dietary or economic. Because the first author and translator were not associated with any government agency, it appeared that participants were mostly honest in discussing more controversial aspects of their relationship to turtles, including threats and personal consumption.

Given that it was not possible to verify interviewees' responses, they were taken at face value. One demo-

graphic group that was under-represented in the study was the under-40-year-olds. We suspected that this was because the majority of this age group were either sea fishing, or working somewhere on the mainland, away from their family.

Frames of reference were drawn from the analysis of the interview data, which were coded by collating common themes. A frame of reference draws on the metaphor of a frame that serves to bound, include and exclude. It is a useful analytical tool to identify “coherent sets of beliefs and values [that] provide a frame of reference within which actions and events are interpreted and made meaningful” (Miller, 1984/85, cited in Swaffield 1998, p 496). Of course, these can only be partial representations that reveal “the linkage between attitudes and wider institutional positions” (Swaffield, 1998) because they are always contingent.

Results

Frames of reference

The four frames of reference presented below are: turtles as victims, turtles as occasional food, turtles as spiritual beings, and turtles as a promise for the future (Fig. 2). Each of these frames, or themes, encompassed

the nature of each individual’s thoughts and interactions with turtles and were prevalent throughout the different villages and demographic groups. See Fig. 2 for a breakdown of expressions incorporated into the frames of reference.

Turtles as Victims

The *Turtles as Victims* frame of reference reflects the sentiments that regarded the turtle as a victimised species. It was stated repeatedly that sea turtles have been impacted by a variety of pressures (Fig. 3). Almost all interviewees agreed that there have been changes in the turtle populations over the past 20 years; most stating that there had either been a decrease in numbers or that the turtles have moved away. Perceived reasons for the decline are broken down by village in Fig. 3. One comment summarised the variety of fishing techniques that were perceived to have led to turtle fatalities and subsequent decline: “There has been a rapid decrease due to trawling nets, crab nets, and fishing by local people and the Vietnamese diving fishermen” (statement from a carpenter and former fisherman who has lived in Prek Svay Village since 1994).

Another point that was raised was the destruction of turtle habitat and the loss of turtle food in the region. It was stated that due to trawling and dynamite fishing in particular, the turtles’ living space has deteriorated,

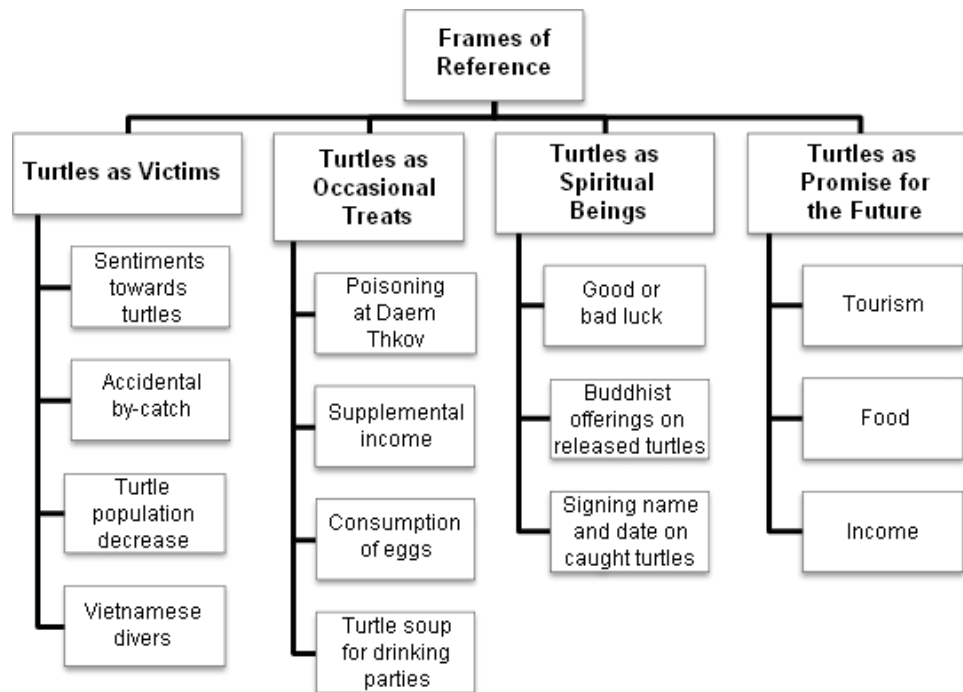


Fig. 2 Representation of several statements encompassed in the frames of reference or themes, in no particular order or hierarchy.

reducing the likelihood of their survival. Villagers from M’pei Bi, Daem Thkov and Koh Toch discussed this most extensively.

One theme that recurred in all the villages was that Vietnamese divers were the main reason for the declining turtle population. They were reported to specifically hunt turtles at night, using dive equipment to find sleeping turtles, as well as using baited hook lines (participants did not identify what the lines were baited with). It was stated that the Vietnamese use the turtles’ shells for traditional medicine and would frequently share the meat with the Cambodian community members. Several interviewees said they had eaten sea turtle meat only with the Vietnamese, claiming that the Vietnamese hunters knew better how to prepare the turtle meat, which was simply eaten and not used for traditional medicine.

This was recalled to happen mostly about 5–10 years ago, and it was perceived that due to developments in community fisheries, as well as local conservation efforts in some villages, the occurrence of Vietnamese hunters has significantly reduced. An example of this was mentioned by a community member who has lived in the village of M’pei Bi since 2008 and stated that concerted efforts to reduce illegal fishing by outsiders, as well as a hard push for no-net fishing practices within the commu-

nity fishery, has led to regrowth of the sea bed and even to some recent sightings of sea turtles.

Turtles as Occasional Food

Almost half of the interviewees had eaten sea turtle meat or eggs at least once (Table 2), and stated that sea turtle meat was an occasional food for drinking parties or other special events. Of the interviewees under the age of 30 years, however, only one had consumed turtle meat. Consumption of sea turtle eggs was mentioned only by interviewees over the age of 50, who referred to eating them before the Pol Pot era.

The habit of eating sea turtle meat reportedly changed after one significant poisoning event that took place in the Daem Thkov Village in December 2001. According to the village chief of Daem Thkov Village, a large hawksbill turtle was gifted to the village and the meat was distributed amongst the villagers, while some was sent to the mainland. The meat was mainly prepared in a soup and shared over a drinking party. This hawksbill allegedly caused sea turtle food poisoning (cheloniotoxicism) among 90% of the village. Five people died: three from the village and two on the mainland. Those that did not die were sick for months and, according to several interviewees, were still not fully recovered as of April 2012, and remained weak and in sub-par health.

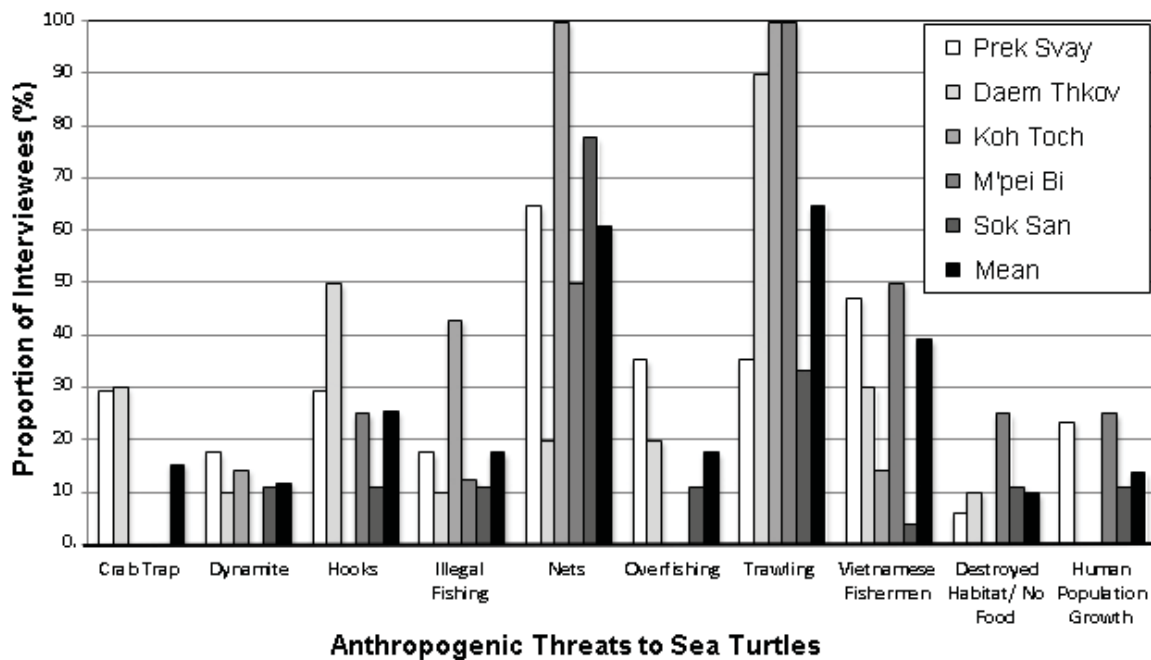


Fig. 3 Proportion of interviewees mentioning each potential threat for sea turtles in each village, and across the whole study site.

The prominence of this story in the interviews was understandably higher in the Daem Thkov Village, where the poisoning was mentioned in all but one interview. This news also travelled around the islands and created a 'scare story'; with 72% of interviewees overall referencing turtle poison (Table 2). This appeared to play a role in community members avoiding eating sea turtle meat at least for a few years, but not entirely, since many interviewees also discussed a technique to test the blood to tell if the turtle was poisonous or not. This might have allowed a few more turtles to be consumed, but many still admitted that they would not trust such a testing technique and were unsure which turtles were poisonous.

Even though sea turtles did not appear to be a common food item for the families living on Koh Rong and Koh Rong Samloem, they were mentioned as something that can be eaten occasionally, especially at times when fishing catches are smaller. *"The people eat it [sea turtle] here, but not often. They catch them by accident and eat them sometimes"* (community fisheries leader who has lived in Koh Toch Village since 1995).

When asked *who* was culturally allowed to consume sea turtle, almost everyone agreed that there were no restrictions. In terms of what species could be eaten though, several interviewees mentioned that only the green turtle should be eaten because they are the ones that they believe do not contain poison.

Turtles as Spiritual Beings

All participants in this study identified themselves as Buddhist. Although several interviewees said that they do not believe that sea turtles are spiritual animals, even some of those individuals mentioned that they would adorn a sea turtle with Buddhist offerings before letting it go. Many interviewees said that if a sea turtle is caught, a fisherman will write their name and the date on the shell to let other fishermen know that the turtle is theirs. Overall, 61% of interviewees said they believed the sea turtle was spiritual, or could bring good or bad luck (Table 2). *"The people [who catch the turtle] mark on the sea turtle to mark it for their own. And when another person catches it, they cannot take them. The mark shows that the turtle belongs to someone"* (a carpenter, former fisherman and soldier, who has lived on the islands since 1994).

Turtles as a Promise for the Future

When discussing the future of the sea turtle in the Koh Rong Archipelago, several recurring ideas exposed themselves, all of which surrounded an optimistic view of the future. A possible increase in turtle populations meant positive things for the communities. According to the

interviewees, turtle population growth could mean three main prospects: tourism, food and income. Although it was clear from the interviews that the turtles themselves were not directly related to the villagers' current livelihoods, people saw the growth of sea turtle populations being positively linked to economic development possibilities for their communities.

One major aspect of the *Turtles as a Promise for the Future* frame of reference was tourism. Many interviewees said that an increase of turtles in the waters of the archipelago would lead directly to an increase in tourism. According to the participants, this would be a positive development for the community, contributing to income generation and development. Some individuals also predicted tourists coming to see the turtles would help to discourage their consumption.

Despite the confidence that tourism would discourage the consumption and exploitation of the turtles, some community members still believed that the turtles would be susceptible to capture and sale. Several individuals said that if there was an increase in turtles in the region, a market in Cambodia would be developed for them and they would be purposefully caught for it. It was stated that this used to happen in Kampong Saom Province. *"Maybe some people will eat them, and some will sell them. Even though there is a law, maybe they will do it illegally, if there is a market to sell them to"* (saleswoman who has lived in Daem Thkov Village since 1990).

Village and demographic findings

Occupationally, 47% of our interviewees were fishermen/women, 15% were salespeople, 12% were village chiefs or fisheries committee leaders, 4% were construction workers, 4% housewives and 4% farmers. The remaining interviewees were said to have been working in a variety of fields such as chef, police officer, thatch maker, soldier, international organisations and tourism. Occupation did not appear to be an influential factor because all the frames of reference were represented in the different fields. Personal beliefs about sea turtles were mixed within the occupational groups as well, with some fishermen and salespeople believing the turtle was spiritual and some not, as well as some having consumed them and some who had never tried.

Some notable findings in Prek Svay Village were that 76% of individuals interviewed mentioned the poisoning event of 2001, and 58% of males and 60% of females interviewed in Prek Svay had eaten sea turtles. In Daem Thkov Village, 90% of the individuals interviewed reported that the turtle was spiritual (Table 2). 100% of interviewees from Koh Toch Village mentioned trawling and nets as

Table 2 Proportion of interviewees from each village, gender and age group that mentioned turtles being spiritual, having eaten turtle and knowing about turtle poison during semi-structured interviews, where *n* is the number of interviewees.

| | <i>n</i> | Turtles are spiritual (%) | | Have eaten turtle (%) | | Mentioned poison (%) | |
|---------------------------|-----------|---------------------------|-----------|-----------------------|-----------|----------------------|-----------|
| | | Male | Female | Male | Female | Male | Female |
| Daem Thkov Village | | | | | | | |
| 18–30 years | 2 | 100 | 100 | 0 | 0 | 100 | 0 |
| 30–50 years | 6 | 66 | 100 | 33 | 66 | 100 | 100 |
| >50 years | 2 | 100 | – | 50 | – | 100 | – |
| Total | 10 | | 90 | | 40 | | 90 |
| Prek Svay Village | | | | | | | |
| 18–30 years | 3 | 100 | 0 | 50 | 0 | 50 | 100 |
| 30–50 years | 7 | 40 | 50 | 60 | 20 | 80 | 50 |
| >50 years | 7 | 60 | 50 | 60 | 100 | 80 | 100 |
| Total | 17 | | 53 | | 59 | | 76 |
| Koh Toch Village | | | | | | | |
| 18–30 years | 0 | – | – | – | – | – | – |
| 30–50 years | 4 | 66 | 0 | 66 | 0 | 66 | 100 |
| >50 years | 3 | 50 | 0 | 50 | 0 | 50 | 0 |
| Total | 7 | | 43 | | 43 | | 57 |
| Souk San Village | | | | | | | |
| 18–30 years | 1 | 100 | – | 0 | – | 0 | – |
| 30–50 years | 6 | 75 | 50 | 25 | 50 | 75 | 50 |
| >50 years | 2 | 50 | – | 100 | – | 50 | – |
| Total | 9 | | 66 | | 44 | | 55 |
| M'pei Bi Village | | | | | | | |
| 18–30 years | 0 | – | – | – | – | – | – |
| 30–50 years | 4 | 25 | – | 50 | – | 75 | – |
| >50 years | 4 | 66 | 100 | 66 | 0 | 100 | 0 |
| Total | 8 | | 50 | | 50 | | 75 |
| All five villages | | | | | | | |
| 18–30 years | 6 | 50 | 50 | 0 | 0 | 25 | 0 |
| 30–50 years | 27 | 42 | 50 | 32 | 37 | 58 | 62 |
| >50 years | 18 | 82 | 66 | 82 | 66 | 91 | 66 |
| Grand Total | 51 | | 61 | | 49 | | 72 |

reasons for declining sea turtle populations. In M'pei Bi Village, 50% of interviewees mentioned Vietnamese fishermen as a main threat to sea turtles, the highest of all the villages (Fig. 3).

While length of stay did not appear to be a prominent factor, all participants who had lived in the villages for less than 10 years explained the decrease in turtle populations as being due to trawling, but their thoughts on spirituality and consumption tended to be mixed.

Discussion

Given that this was a social study focused on eliciting sentiments and interpretations, it should be noted that

the results aggregate individual's statements about sea turtles that have been taken at face value. Furthermore, our questions are likely to have invoked emotions, recent life activities and experiences and personal interest. As such, there is scope for unavoidable bias, which can occur in any study (Holroyd, 2012). In addition, the results need to be interpreted within the specific cultural context of the villages and do not necessarily reflect the actual dietary and economic uses of sea turtles in Cambodia as a whole. A countrywide study of these aspects can be found in Eastoe & Ke (2011). These issues notwithstanding, this study illuminates the frequency of thoughts and impressions, especially those that were important enough to be expressed (Arts & Buizer, 2009). They provide insights

into how people might act and what their priorities are when it comes to sea turtles and their conservation in a developing country.

Socio-cultural explanations and explorations

Undoubtedly, local circumstances and socio-cultural experiences within each village underpin the findings of this study. To explain these aspects, and the perceived threats, examples from several of the villages are set out below.

In the largest village, Prek Svay, where 17 individuals were interviewed, a higher consumption rate of sea turtle meat was expressed. This could be because 76% of interviewees were over the age of 40, implying they may have had greater exposure to the practice of eating turtles. Also, 41% of the interviewees had resided on the island for over 20 years, making them more likely to have encountered turtles when they were more abundant.

Daem Thkov, the village that experienced the sea turtle poisoning event in 2001, had the lowest percentage of interviewees that had consumed sea turtle. This is likely to be related to the fear of food poisoning from consuming sea turtle meat. This event clearly had an impact on the community's relationship to the turtle, but it was also easy to see how an event like this could fade in time. We experienced this when interviewing one woman who had only lived in the village for six years; during her interview she did not mention or appear to know about the poisoning. 90% of interviewees from Daem Thkov Village also stated that they thought sea turtles were spiritual. This could also be related to the traumatic poisoning. The experience of such a powerful event, such as that caused by the hawksbill, could leave a lingering sentiment that the sea turtle itself is mystical. Individuals who have not had that interaction with the turtle might not hold those beliefs, such as the woman who was not aware of the poisoning.

As mentioned above, all interviewees from Koh Toch Village described trawling and nets as two main reasons for a perceived decline in turtle population. We suspected this could be related to how frequently these methods are used in this village for fishing; therefore being something community members are aware of as having an impact on sea life. Koh Toch, while having diversified its income streams through the development of bungalows and guesthouses, was still primarily a fishing village at the time of this study (Ouk *et al.*, 2011). It has a fisheries committee, but not yet any restrictions on fishing techniques, which is likely to mean that these lucrative fishing practices were probably still being utilised. This village also previously hosted Coral Cay Conserva-

tion, which conducted research on the local reefs, and this organisation could also have influenced what local people knew about fishing practices that destroy habitat and cause by-catch.

M'pei Bi Village participants also frequently stated trawling, as well as Vietnamese hunters, as a main reason for the perceived decline in turtle populations. This could be because the fisheries committee is relatively strong in this village and has effectively enforced a no-net policy in the bay, as well as had success in pushing out illegal fishermen (according to a community member who has lived in the village since 2008). This awareness of sustainable fishing practices is likely to be due to the influence of Marine Conservation Cambodia and the dive shop, EcoSea (both foreigner-run operations located in the village), which could have enabled interviewees to be more knowledgeable of risks to sea life. M'pei Bi was also the only village that had recently seen two sea turtles, perhaps allowing individuals to make the connection that regrowth of the seabed, following more sustainable fishing practices, may have provided an attractive site for turtles seeking food and shelter (Lutz & Musick, 2003).

Sok San is the only community without a specified fisheries committee because at the time of this study they were not officially a village. On paper, they are part of Prek Svay Village (according to a community member and village chief who has lived in Sok San since 1998). Interestingly, Sok San was also the only village not to frequently discuss illegal fishing or Vietnamese divers. This could be related to their location, perhaps not being a destination for outsider fishing; but perhaps also since there is no community fishery, there is technically no such thing as "illegal fishing" in their eyes. These circumstances could explain why this was not discussed.

In the Koh Rong Archipelago today, sea turtles are not a staple food item for local people. It is clear, however, that the inhabitants of Koh Rong and Koh Rong Samloem are not strangers to the consumption and exploitation of sea turtles. The apparent lack of economic, dietary, cultural or spiritual need for the turtle in these communities could be encouraging for conservation efforts. Considering these human communities are not indigenous to the islands, with the majority of inhabitants only having arrived from the mainland within the past 20 years, their relationship to the sea turtle is not deeply entrenched in their culture. Although it can be a strategy for conservation to build on existing cultural affiliations, it can also be a significant challenge when the cultural norms include consumption and exploitation of turtles, as seen in countries like Nicaragua and areas of Polynesia (Rudrud, 2010; Garland, 2010). It appears that this is not the case here.

The communities around Koh Rong Archipelago tend to have a convenience-based relationship with sea turtles. According to the findings of this study, there is an overall perception of turtle population decline and individuals appear amenable to conserving sea turtles to ensure that the next human generation can see them as well. This shows that sympathy and hope are entwined through the sometimes consumptive and often reverent relationship between people and turtles. As can be seen from the perceived threats and reasons for decline expressed by participants, sea turtles in the Koh Rong Archipelago are still likely to be subject to similar threats as those experienced in other parts of the world (National Research Council, 1990; Lutz & Musick, 2003; Gilman *et al.*, 2010) and identified in previous studies around Cambodia's coast (Ing, 1999; Eastoe & Ke, 2011). These challenges are not insurmountable, however, and lessons learned through this study on how the communities interpret the turtles could make a useful contribution to educational and conservation programmes.

Conclusions

In summary, the themes that emerged, as revealed across the four frames of reference, were prevalent in all the villages studied. They exposed sympathies for turtles and the recognition that improved conditions for the turtles could also be beneficial to the human population. This study showed that many individuals were well aware of the possible threats to sea turtles and were also concerned about the impact of intensified fishing practices.

We also found that while many individuals revered the turtle and almost everyone desired the turtles' long-term survival, this did not necessarily mean they would not consume a sea turtle themselves. These findings indicate that multiple frames of reference are held simultaneously and in complex relation to one another. While further research is needed to fully understand these relations, they are important insights for conservation practitioners, who are developing programmes that build on the knowledge and beliefs of these unique communities.

In addition to the frames of reference, specific village circumstances, as discussed in this paper, indicate that needs-tailored conservation programmes are necessary to accommodate the strengths and priorities of individual communities. These concepts of 'bottom-up' approaches and participatory conservation are not new, and recent examinations of how they can be successfully implemented have been described by Lejano *et al.* (2007), Marie *et al.* (2009), Sodhi (2011) and Mulrennan (2012). There is a clear opportunity now (December 2012), with

the planned Marine Fisheries Management Area, and the engagement of local community fisheries, for effective turtle conservation in the Koh Rong Archipelago. By regulating fishing practices through the Marine Fisheries Management Area and community fisheries, the sea bed will ideally begin to regrow, which, if aligned with an effective conservation and education programme for sea turtles, could allow for an increase in the turtle population. According to participants of this study, this could be a win-win for conservation and communities.

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