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Climate change perception of the dive tourism industry in Koh Tao island, Thailand

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ABSTRACT

Marine tourism is a major contributor to local economies of both developed and developing countries. However, the warming of the climate system, ocean acidification, coral bleaching, and extreme storm events are putting seaside communities and marine tourism industries at risk. The objective of this study was to identify how well stakeholders in the dive tourism industry of Thailand can adapt to climate change threats. Protection Motivation Theory (PMT) was used to frame stakeholders' perception of climate change threats, their level of vulnerability to climate change and their response efficacy to climate change. Nine semi-structured in-depth interviews were conducted with stakeholders from the dive tourism industry on Koh Tao Island, Thailand. Results revealed misconceptions regarding climate change causes and the temporal and spatial scales of climate change impacts. Perceived environmental changes were based on personal observation, and adaptive responses were generally related to livelihood strategies rather than direct responses to climate change. Therefore, the key policy recommendation is to first focus on engaging the local community in a participative education and communication program to remove misconceptions around climate change that is hindering people's adaptive capacity.

1. Introduction

For decades, tourism in Thailand has been one of the most important income generating industries. In 2007, more than 14.5 million international tourists visited Thailand, a 43 percent increase from 10.1 million in 2003 (National Statistical Office of Thailand, 2010a). The total revenue from tourism in 2007 was US $19 million (National Statistical Office of Thailand, 2010b), which accounted for 6.42 percent of the gross domestic product (GDP) (Office of the National Economic and Social Development Board, 2010). Despite the current unstable political situation in Thailand, the upward income trend from tourism and its percentage share in GDP gives us an obvious indication that Thailand's economy increasingly depends on tourism.

Environmental assets are very important to the tourism industry of Thailand, and to the well-being of local communities. Unfortunately, environmental degradation and destruction of natural resources is threatening local livelihood and tourism. So far, the problems caused by direct human activities, such as deforestation are being acknowledged and partially resolved by increasing the number of protected areas. However, the variable climate pattern, which is an uncontrollable external factor, is likely to play a big role in changing the environmental conditions in the future.

Marine tourism is a major contributor to local economies of both developed and developing countries. The Caribbean derives half of its gross domestic product from the tourism industry (NOAA, 2011). In Southeast Asia, each square kilometer of healthy reef has a potential net benefit from the tourism industry of around $23,100 to $270,000 (Burke, Selig, & Spalding, 2002). In Thailand, a popular SCUBA diving destination called the Similan Islands is estimated to be worth $55 million a year of gross income to the industry (Tapsuwan & Asafu-Adjaye, 2008).

Despite its economic significance, marine resources are extremely vulnerable to climate variation. The warming of the climate system is currently evident from observation of increases in global average air and ocean temperature, widespread melting of snow and ice, and rising global average sea level (IPCC, 2007). The impact of climate change could potentially be detrimental to the dive tourism industry on Koh Tao Island, yet little effort has been

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spent to understand and assess how well the local community—particularly, the diving community—is adapting to climate change. This problem is not only limited to Thailand; other developing or small island countries, which rely on marine tourism as their main source of income, such as the Philippines (see e.g. Cesar, 2000) and the Caribbean (see e.g. Scott, Simpson and Sim (2012) are facing similar challenges). Coastal communities are vulnerable to climate change because they are isolated, have small land mass, have population and infrastructure that are concentrated on the coastline, and have an economy that is dependent on natural resources (IPCC (2012) as cited in Scott et al. (2012)). Nonetheless, historical evidence suggests that communities can adapt to change and improve their resiliency to change in the process (Scott et al., 2012). For instance, communities can retreat inland in response to sea-level rise, and by doing so become more resilient to future changes (Koerth, Vafeidis, Hinkel, & Sterr, 2013).

In this paper, we applied a socio-psychological framework, called Protection Motivation Theory (PMT), to evaluate stakeholders' perceived severity of climate change consequences, perceived probability of climate change risks, perceived effectiveness of adaptive behaviors to cope with climate change, and perceived ability to perform adaptive behaviors successfully. The results are expected to direct us to identify appropriate mitigation and adaptation measures.

2. Case study site: Koh Tao Island, Thailand

Koh Tao Island is located in the Gulf of Thailand. The island is relatively small, covering an area of 21 square kilometers. The island is exclusively state property and officially managed by the Treasury Department under the Ministry of Finance. Some of the newer occupants are leasing the land from the government but most of the older inhabitants received their land use rights by inheritance. According to 2006 statistics, the estimated hidden population (i.e. people who reside permanently on the island but are not registered with the district office) was approximate 10,000 individuals and around 536,000 tourists visit the island each year (Koh Tao Subdistrict Administrative Organization, 2006). However, a 2008 census suggests that the number of local residents on the island was only 1554 (Department of Provincial Administration, 2008). Because of the booming tourism industry, more people are unofficially residing on the island.

The island contains more than 25 SCUBA diving sites and 50 dive schools and operators (see Fig. 1). Around 70 accommodation services (e.g. hotels, campsites, bed and breakfasts) are established on the island (Tourism Authority of Thailand, 2010).

Climate predictions suggest that average rainfall for Koh Tao Island is likely to increase by 26% due to the increased frequency of heavier rainfall in the next 30 years (Southeast Asia START Regional Center, 2009). Increased monsoonal weather will reduce the number of 'safe diving' days per year. Sea level is predicted to rise by 20 cm as compared to 2008 and monsoonal sea level rise will add another 2–3 cm to the rising level (Southeast Asia START Regional Center, 2009). Sea level rise will lead to vast coastal erosion of the island's flat beaches.

3. Methodology

3.1. Protection motivation theory (PMT)

Originally proposed by Rogers (1975), PMT has been used to examine a wide range of behaviors in response to environmental threats such as earthquake preparedness (Mulilis & Lippa, 1990), bushfire response (Martin, Martin, & Kent, 2009), and flood

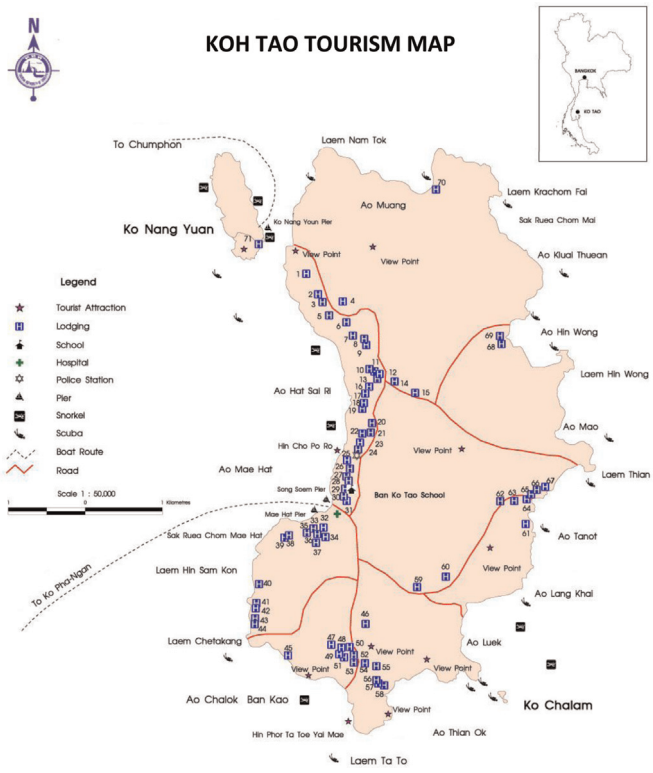

Fig. 1. Map of Koh Tao Island (Tourism Authority of Thailand, 2010).

preparedness (Grothmann & Patt, 2005). According to PMT, an increase in one's perceived vulnerability to an external threat combined with the perception of one's efficacy to mitigate the threat will motivate the individual to carry out adaptive behavioral responses. These cognitive processes are divided into two sub-processes, threat appraisal and coping appraisal. The threat appraisal process evaluates the factors that increase (i.e. benefits) or decrease (i.e. severity and vulnerability) the probability of making maladaptive responses, while the coping appraisal process evaluates factors that increase (i.e. self-efficacy and response efficacy) or decrease (i.e. costs) the probability of making the adaptive responses.

3.2. Sampling and data collection

We identified five main stakeholder groups affiliated with the dive tourism industry on Koh Tao Island. These stakeholders include dive tour operators, resorts and restaurant owners, government agencies, local communities and non-government organizations (NGOs). Each stakeholder plays an important role in supporting the livelihood of the island and the dive tourism industry. To account for heterogeneity in the SCUBA diving industry, three types of dive tour operators were selected: (1) dive tour operators who also operate dive boats, (2) dive tour operators who also run a dive school, and (3) dive tour operators who also own a resort (i.e. accommodation). We applied 'the key informant technique' (see e.g. Marshall, 1996) to select a representative from each stakeholder group. Representatives were selected based on their level of influence and seniority. The opinions of these people have significant influence on the economic, social, environmental and political activities on the island.

According to the literature on sampling and recruiting in-depth interview participants (see MacDougall and Fudge (2001) for a synthesis of methods used by qualitative studies), one of the best recruitment methods is to "recruit through existing organizations

and networks, enlisting the assistance of a contact person to gain entry" (MacDougall & Fudge, 2001). Following this recommendation, an initial list of key participants was suggested by the Program Officer of IUCN Thailand, who has been involved in marine conservation projects on Koh Tao Island for a number of years. In order to best avoid any sampling biases associated with having only one expert recommending a list of participants, the list was then refined after consulting with a climate change expert from Southeast Asian SysTem for Analysis, Research and Training Research Center (SEA START RC) to incorporate non-SCUBA diving industry representatives as well. The final list of participants included four representatives from the SCUBA diving and hospitality industry, two representatives from the government, two NGO representatives and one community representative.

The small number of stakeholders on the island limits the number of the sample size. However, the advantage of applying 'the key informant technique' is that good quality data can be obtained in a relatively short period of time because key informants generally have a deeper insight into their environment (Marshall, 1996). Interviewing other community members would be more time consuming and expensive in comparison (Marshall, 1996). Nonetheless, we acknowledge that with a small sample size, the findings are not representative of the population; instead, they represent the 'voice' of a part of the population (Hernandez, 2002). In any case, for qualitative data collection, a reliable method for ensuring representation is through reaching saturation—the point in which "emerging concepts have been fully explored and no new insights are being generated" (Bryman, 2008). Koh Tao Island is a very small community, where residents have the opportunity to talk to each other often, which possibly led to some shared level of attitudes, beliefs and ideas. For this reason, we were able to reach saturation with a small sample size.

Face-to-face in-depth interviews were chosen over group interviews because it allowed the participants to express their opinion around the topic more openly and spontaneously, and not feel intimated by other dominant participants. Eight out of the nine personal interviews were conducted on Koh Tao Island in June and July 2010. One interview was carried out in Bangkok as the interviewee was not on the island during the field visit. Among the nine participants, eight were Thai and one was a native English speaker. The interviews were conducted in Thai for Thai participants and in English for the native English speaker. The interviewer was fluent in both English and Thai. The small sample size made it possible for the interviews to be conducted by only one interviewer. The questions were firstly developed in English, guided by the PMT framework, and were then translated into Thai. The questions were worded carefully in order to ensure they were not too technical, and the personal interview style enabled the interviewer to sense when interviewees had difficulties understanding some questions and were able to respond to any questions that arose. The interviews were digitally recorded and short notes were also taken during the interviews. The responses from the Thai interviews were translated into English by the interviewer for analysis.

3.3. Interview question design

Before each interview, participants were informed of the research topic and the research objectives. The first section of the interview consisted of 'warm-up' questions to get participants talking. The questions were about familiar topics, such as current issue on the island and the dive industry. Responses from these questions were not part of the analysis. The second section contained questions ascertaining participants' knowledge and perception of climate change issues. The third section consisted of questions regarding the participants' current responses to climate change, their willingness to adapt and their perception of their ability to cope with climate change. The final section asked participants to reveal what they would like to tell policy makers or other stakeholders regarding climate change.

Particular attention was given to clearly explain to the participants that the interviews were going to be about climate change, and not about the weather or about air quality. The confusion around air pollution, climate change and warming weather (i.e. increased heat) occurs due to a cultural characteristic in Thailand. In the Thai language, the words "climate", "weather" and "air" are identical—*ah-kart*. By saying that the 'climate' is changing, people might think that the air quality has changed, rather than thinking that the temperature is increasing. This type of conflation has been coined 'promiscuous corroboration' by Rudiak-Gould (2012) when he discovered that Marshall Islanders use the word 'climate' to refer to many environmentally related issues, including climate, weather, as well as the environment and the cosmos in general. Therefore, during the interviews, the interviewer emphasized that the conversation would be about *ah-kart* in the context of climate change, and examples of other climate related phrases such as 'global warming' was also provided.

4. Results

4.1. Perceived climate change knowledge

The interviews revealed insights into participants' perception of causes and effects for climate change. Participants pointed out that coal mining and burning fossil fuels were the causes of global warming because the activities themselves produced a lot of *heat* (instead of greenhouse gases that trap the heat from the sun). Many of them related industrial and urban pollution and deforestation as direct causes of climate change. Some said that climate change was caused by polar icecaps melting or nuclear testing, while one participant believed that killing animals caused climate change and that *Mother Nature* was seeking her revenge. Nonetheless, they mutually perceived that climate change was somehow generally connected to anthropogenic environmental destruction.

When asked about the word 'climate change', most participants thought of its impacts. Participants noted the late arrival of the rainy season, the change of wind and storm directions and intensity, and more frequent droughts. Participants also observed warmer air and water temperatures. Only a couple of participants mentioned coral bleaching, species migration, sea level rise and coastal erosion. Two participants believed that earthquakes, tsunamis and underwater volcanic eruptions were due to climate change. No one mentioned ocean acidification.

4.2. Awareness of climate change risks

Every participant believed that climate change was real and happening, although their perceived temporal scales of when climate change began ranged from "a few years ago to hundreds of years since the *Industrial Revolution*". The majority believed that climate change was a gradual process but coincided with human destruction of the environment. A couple of participants indicated that climate change started when the first large scale coral bleaching was observed. However, their observed years varied, ranging from 1989 to 2003. Two other participants accepted that humans could not stop climate change and the only way forward is to reduce climate unfriendly activities and adapt to future changes.

Participants affirmed that up to 70–80% of Koh Tao Island residents were aware of climate change, but believed that villagers

and community leaders may not know the actual causes or understand the future impacts. Concerns regarding potential climate change impacts on the dive tourism industry were mainly related to coral bleaching. Other concerns were related to changing weather conditions and ocean currents. Some had distinct risk awareness over the uncertainty and unpredictability of climate impacts. None of the participants could think of any positive aspect of climate change. Some said that it would be good to let people realize their mistakes so they could prepare better for the consequences of environmental destruction, while some extremists expressed their fatalistic views that climate change might be good to wipe out the entire human race so there will be no more negative impacts on the environment.

4.3. Responses to climate change

Six out of nine participants believed that it is everyone's responsibility to deal with climate change. They believed people should use less plastic, discourage environmental destruction, reduce greenhouse gas emissions, refrain from burning waste, and use public transportation more often. The other three thought that it was the duty of the government to provide solutions. Two participants from the state agency believed that Thailand must first give priority to climate change education and awareness raising programs. The community representative recommended that Thailand develop a National Climate Change Master Plan, and that the plan should not change when politicians end their term. An NGO representative believed that the government must prevent deforestation and penalize offenders.

None of the participants were aware of any climate change related rules and regulations. They only heard about climate change through awareness campaigns from the media but they had not been informed of any regulations or strategies regarding climate change from the government. Some even said that politicians themselves were still unaware of the issues, while some participants stated that the government does not care about solving climate problems.

5. Discussion

Climate change is threatening the livelihood of communities that rely heavily on marine tourism as the main source of income. In Thailand, the SCUBA diving community on Koh Tao Island is increasingly becoming vulnerable to climate change effects. The objective of this study is to assess how well the dive tourism industry can cope with climate change, using PMT as a framework for evaluating stakeholders' perception of climate change threats, their level of vulnerability to climate change and their response efficacy to climate change.

5.1. Misconception of climate change and climate change vulnerability

One of the key findings from the interviews was that the respondents' understanding of the actual causes of climate change varied and was at times distorted. Participants were still conflating air pollution, climate change and the weather. Despite the interviewer's efforts to emphasize that the interviews were going to be about climate change, participants were still using these three words interchangeably during the interviews. Hence, participants from this survey were also displaying 'promiscuous corroboration' (Rudiak-Gould, 2012) like in the case of the Marshall Island interviewees. We believe that for this reason, none of the participants were able to articulate the causes clearly and most admitted they lacked an understanding of the real causes and physical processes of climate change. Participants had inconsistent and incomplete understanding of the physical mechanisms underlying global climate change. Consequently, they fail to see how incidences, such as coral bleaching, could occur as a result of air quality (i.e. rather than climate) change. Without a clear distinction between these three words misconceptions of the causes and effects of climate change were inevitable.

The literature on social vulnerability to climate change (see e.g. Adger, 1999; Füssel, 2007) indicates that weak social, political, economic, institutional and geographical factors exacerbate the vulnerability level of communities to climate change. Participants believed that the dive industry is vulnerable to climate change because their businesses depend on 'risky resources' i.e. resources at risk from climate change. However, participants did not mention other causal factors of vulnerability that were identified in the literature, such as poverty, aging infrastructure, and lack of insurance.

Misconceptions and confusion over the causes of climate change can lead to incorrect adaptation and mitigation responses. In the case of Koh Tao Island, misconceptions around climate change had led to inaction i.e. avoiding any adaptive actions because people believed that the problem was too big to solve alone. Marshall, Marshall, Abdulla, Rouphael and Ali (2009) suggested that climate change impacts to the tourism industry can be minimized if stakeholders in the industry understand their vulnerability to climate change and take appropriate actions to adapt.

5.2. Diversity of perceived climate change temporal and spatial scales

Participants associated climate change closely with their livelihood, and learnt about climate change impacts directly through observation and personal experiences. Similarly, Green (2005) observed that villagers on the island of Koh Samui, Thailand, are highly familiar with their surroundings and are acutely aware of environmental conditions through long-term residency. However, this learnt knowledge led to some incorrect perceptions of climate change, which influenced their perceived climate change risk levels. This finding is consistent with Brody, Zehran, Vedlitz, & Grover (2008) who concluded that the relationship between actual and perceived risk is driven by specific types of physical conditions and experiences. Similar results from research by Bhusal (2009) in Nepal, and Maddison (2007) in Africa, examining the perceptions of local people also suggested that climate change adaptation measures are event specific based on local knowledge and innovations, rather than measures to cope with climate change impacts in general. Leiserowitz's (2006) research findings also support this statement. He suggested that people in developing countries may have observed, attempted to explain, and adapt to changes in their local climate, albeit without the conceptual framework and findings of climate change science.

Participants also demonstrated distorted perceptions with regards to the temporal and spatial scales of climate change. They believed that climate change was happening but that it was a long term and global problem beyond their control (see Mateucci & Lund-Durlacher (2008) for similar findings). As a result, our study on Koh Tao Island produced little evidence for any active climate change mitigation and adaptation projects on the island. Participants believed that they still have time to deal with the issues later since it was not happening yet, or that other people will deal with the problem first. So despite believing that climate change impacts will be severe, they perceived that their community was not vulnerable to the changes for the time being.

5.3. Recommendation for political implication in mitigation and adaptation

The following recommendations are based on the empirical results of this study, while also taking the national and

international economic, social and political context into consideration.

5.3.1. Effectiveness of education and communication

Fundamental misconceptions found in this study suggest that communication about climate change should be scrutinized more closely. Even though most participants were well-educated and worked in a field that is vulnerable to climate change, the confusion and conflation around the word *ah-kart* and climate change was still very salient. As a result, participants were still confused about the causes of climate change (e.g. one participant thought nuclear testing caused climate change). Unfortunately, this type of problem exists in many cultures where "the English word 'climate' has no corresponding translation into the vernacular", as pointed out by Hulme (2015). For instance, Dumaru (2010) reported that in Fiji the word *draki* is used to describe both climate and weather.

The plethora of current climate change communication programs by the Thai government and NGOs were successful at raising awareness but failed to correct the misconceptions around climate change, and how to prepare and adapt. Although the private sector and NGOs were more proactive at raising awareness levels, people trust information from the government, scientific and academic sectors more. Therefore, the government, in conjunction with scientific and academic sectors should be in charge of communication programs, or at least oversee communication programs by the private sector and NGOs to increase public confidence in the information provided. We recommend addressing the issue around the word *ah-kart* and climate change to the general public as a first step to climate change communication by explaining how climate change is similar to temperature change (i.e. weather change), but different from air quality change.

This knowledge transfer program, however, may have to start from within government organizations, especially at local administrative levels. Brody et al. (2008) suggested that "increased education programs and communication to the public about the precise causes and consequences of climate change at geographically precise levels may help the public become more sensitive to a broader range of physical vulnerability characteristics". Once local government representatives have the correct knowledge of climate change, they can design policy measures that are relevant to the local area that are effective at dealing with climate change issues. Eventually, their policy measures will trickle down to other sectors of the community including the dive tourism industry.

5.3.2. Public participation in climate change policy

Science communication should not be a one-way process, but a collaborative process in which knowledge is exchanged. Brody et al. (2008) mentioned that public officials may benefit by more effectively engaging the public in the policy-making process if an individual's perception of risk depends on the belief that one can influence climate change outcomes. Sememza et al., (2008) also concluded in their research that "Government policy must eliminate economic, structural, and social barriers to change and advance accessible and economical alternatives. Individual-level mitigation can be a policy option under favorable contextual conditions, but must be accompanied by mitigation efforts by the industry, commerce, and government." However, the lack of awareness among the participants of Thailand's draft National Master Plan on Climate Change 2012–2050[1] suggests a flaw in the government's efforts to involve local communities in climate change decision making. The best approach forward is therefore for government officials and climate change experts to learn more from island residents as they are the ones experiencing climate change effects first hand. Conversely, the dive tourism industry could be more proactive in engaging with local and national government representatives rather than waiting to be approached by government officials for their input. Additionally, climate change policies should have a shelf life that is longer than an election round for effective implementation, as well as for maintaining the level of trust that the community has in the government's commitment to combat climate change.

5.3.3. Enhancing dive industry adaptive capacity

Local adaptive capacity might be enhanced in several ways, for the purpose of minimizing the damages inflicted by climate change and to shorten the response time to climate change impacts. Firstly, the dive tourism industry should consider climate change impacts, especially worst case scenario in their business plans. Secondly, dive schools should diversify their products and services to be climate resilient. More instructions could be offered in classrooms and swimming pools instead of the open water (i.e. in the ocean) to reduce the risk of 'bad weather' interfering with lessons. Thirdly, the network of dive tourism industries should facilitate climate change discussions among dive tour operators within Thailand and around the world, so that exchange of knowledge and experience could occur.

5.3.4. Application of the results in other dive tourism sites

A crucial question is how transferable these findings are to the dive tourism industry outside of Koh Tao Island. Dive tourism in Thailand is not limited to island based sites like Koh Tao Island, as many dive tour operators and seaside communities are scattered along the eastern (Gulf of Thailand) and southern (Andaman Sea) coastlines of Thailand. Their perception of climate change is expected to differ according to their geographical conditions and actual experiences. Therefore, to implement any mitigation or adaptation measures, local conditions and local participation must always be considered. Berk and Fovell (1999) mentioned that their findings are not necessarily generalizeable to other geographical areas because the questionnaire based assessment of climate change may be affected significantly by the climate in which respondents live. Nevertheless, our recommendations with regards to improving the effectiveness of climate change education and communication programs, increasing public participation in climate change policy making and enhancing the adaptive capacity of the dive tourism industry are broad enough to apply to many dive tourism industries around the world.

6. Conclusion

Findings from this research can be used as a starting point by future researchers who desire to explore these issues on a larger scale where more participants are involved. However, this study only examines the attitudes and beliefs of the service providers i.e. the supply side of the industry. An analysis of the demand side i.e. tourists' perception, will provide complementary insights on how climate change will affect tourists behavior and preferences. Future research should attempt to identify observed (i.e. actual) adaptive and maladaptive behaviors to climate change in order to determine the real level of protection motivation in the community.

[1] Thailand's draft National Master Plan on Climate Change 2012–2050 "aims to provide a framework and mechanism for effective response and preparedness to manage climate change challenges in adaptation, mitigation, and capacity building and institutional readiness issues" (UNDP 2012).

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