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Sustainable Tourism and Marine Health in the Andaman Coast of Thailand

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ABSTRACT OF THESIS submitted by:
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Considering the unplanned exponentially growing tourism industry and the vulnerability of coastal and marine ecosystems, especially Southeast Asian countries, with a particular attention to Thailand, this research aims to answer the question: What are the barriers and opportunities towards a sustainable tourism path in Southwestern Thailand from a marine ecological perspective? For this matter, this study used a multi method approach, using quantitative and qualitative e-interviews, secondary raw data from a civic science organization and a brief analysis of the policy framework. The results showed that, according to the experienced divers' perspectives, increased ecological marine damage has been observed in relation to tourism activities. The main threats posed by the tourism industry identified by the respondents were related to direct mechanical damage from non-environmental aware tourists and indirect damage such as waste disposal and sewage discharge. Still under the findings realm, it has been reported that Thailand does have a fair policy framework regarding environmental conservation and sustainable tourism practices; however, they suffer with lack of enforcement and sometimes of resources. Acknowledging these challenges to sustainable tourism goals, some solutions have been proposed, such as limiting number of tourists and better law enforcement. Additionally, opportunities related to COVID-19 travel restrictions and already existing regulation suggest the possibility of increasing the environmental education and awareness for both local community and tourists and involvement of local residents in monitoring best tourists' practices through an adaptive co-management approach, which would also act enhancing Marine National Parks protection.

Keywords: Barriers and opportunities, policy framework, law enforcement, environmental education and awareness, local community, Marine National Parks.

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"TEM MAIS CHÃO NOS MEUS OLHOS DO QUE CANSAÇO EM MINHAS PERNAS, MAIS ESPERANÇA NOS MEUS PASSOS DO QUE TRISTEZA NOS MEU OMBROS, MAIS ESTRADA E AMOR NO MEU CORAÇAO DO QUE MEDO NA MINHA MENTE"
Cora Coralina.

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1. Introduction

The tourism sector has experienced a global growth of almost four times during the past 30 years and according to The United Nations World Tourism Organization (UNWTO 2017), it accounts for almost 10% of the global GDP. New regions and patterns of tourism have emerged, and the Asian Pacific region has led this sector's growth with an increase of 9% in international arrivals (UNWTO 2017). More specifically, Thailand stands out occupying the third place in the global ranking by international tourism receipts (UNWTO 2017).

While acknowledging the significant role tourism plays in Thailand's economy, since it corresponds to 16% of the GDP (World Bank Group 2020), it is interesting to highlight that the great majority of the overseas tourists visit the country because of its marine ecosystems (Worachananant 2008). Thailand is located close to the coral triangle area, which makes it a country characterized by the most biodiverse coral reefs in its coastal zone (Roberts et al. 2002). There are countless stakeholders directly or indirectly involved with these ecosystems. Maintenance of marine health is intrinsically related to air quality and mitigation of climate change and it is included in the Sustainable Development Goals of The United Nations (2015). When these reefs are healthy, they promote various ecosystem services and benefits such as protection from the impacts of waves, fishing resources, besides the opportunity of promoting tourism related activities (Mafruhah et al. 2020).

For this matter, there is increasing concern with the impacts that the tourism industry in Thailand has been causing on the marine ecosystems. Poorly managed tourism affects coral reefs through direct damage - anchorage, diving, snorkeling, fishing – as well as through indirect damage - wastewater and garbage pollution - (Yeemin et al.

2006). On the other hand, tourism may play a critical role in promoting not only economic growth, more importantly, a sustainable one, by integrating environmental and sustainability into policy and decision-making in the tourism sector (UNEP and UNWTO 2005). Although there are works on the marine environmental damage directly caused by tourists in Thailand (Worachananant 2008; Yeemin et al. 2006), little is discussed about the other related damages, nor the social-environmental approach is used.

Numerous solutions involving natural resources help address societal challenges related to human well-being and environmental protection and restoration simultaneously (IUCN 2016). This way, not only the complexity of the social ecological system is accounted, but also its resistance, resilience and carrying capacities. This sustainable tourism approach equally fits “The Association of Southeast Asian Nations (ASEAN) Tourism Strategic Plan 2016-2026”, in which the Member States define as Strategic Direction 2 - “To ensure that ASEAN tourism is sustainable and inclusive” (ASEAN 2015).

While 2020 and 2021 are acting as atypical years due to the global pandemic, they have pushed the tourism sector to severe impacts with the nearly suspension of international arrivals and consequently the considerable shrinking in the country’s economy. Conversely, it is an outstanding opportunity to understand ecological issues related to tourism, as well as respective mitigation measures or solutions. It is not only possible to assess now how coral reefs behaved without any tourist impact, but also to come up with policy and management suggestions through the lens of sustainable tourism.

This way, this work aims to address the question “What are the barriers and opportunities towards a sustainable tourism path in Southwestern Thailand from a marine ecological perspective?”

In order to achieve this aim, primarily it is necessary to answer the following questions, which compose the study’s objectives:

1. What is the Marine ecosystems’ conservation status in SouthWestern Thailand?

2. What are the key drivers of tourism related ecosystem damages in the marine environment in SouthWestern Thailand?

3. How do changes in tourism patterns observed in Western Thailand relate to these damages?

In order to address these questions a multi method qualitative and quantitative research was conducted, counting on interviews with SCUBA divers, which are an important stakeholder in the tourism-environment-community framework. Additionally, a brief analysis of Thailand’s policies, together with the use of secondary raw data in form of geospatial visualization made the achievement of these objectives possible.

Initially, there is a characterization of the study area, from environmental, socio-cultural and economic perspectives. This is necessary to understand the specific features that compose Thailand and more specifically the Andaman Coast of Thailand. Main environmental events and legislations also help establish the background knowledge needed to appreciate the present work. In the next chapter, the theoretical framework necessary for this study leads to the understanding of fundamental concepts such as sustainable tourism, carrying capacity, over tourism, ecosystem based tourism and community based tourism. It also establishes tourism related impacts, ecologically,

socially and economically, and how it applies to the study area of this research. In a summary, it gives both conceptual and current discussions concerning sustainable tourism, tourism impacts, and other related terms considering the holistic characteristic of the central theory.

In the methods chapter, there is a description of the two types of e-interviews used in this study and the adaptations adopted due to COVID-19 travel restrictions. It also explains the brief analysis of the policy framework and details the secondary raw data provided by Reef Check Foundation and the methodology used to collect this information. At last, this chapter also addresses some limitations of this study, but at the same time, it justifies the methods approach chosen.

The results are presented together with the discussion, due to the logic adopted in this study, where a qualitative coding analysis is the main methodology used. To establish a coherent course of thought, three chapters compose the whole content of results and analysis. First, a drawn of the respondents' profile makes it possible to understand from which perspective we are assessing information. In addition to this, the first results and discussion chapter addresses the status of the marine environment, by using the e-questionnaire, the online interview with a specialist and the secondary raw data from Reef Check Foundation. The next chapter discusses tourism-related impacts in the Andaman Coast of Thailand, together with assessing patterns in tourism over the past couple of decades and their outcomes in the habitats. At last, there is a discussion of the challenges and opportunities to a sustainable tourism path from an environmental perspective, by considering COVID-19 effects, community involvement in the policy framework and management, and possible suggestions from the interviewed SCUBA divers.

At the end, some final considerations are discussed in the conclusion chapter, followed by some possible future works and how this research fits into the present context. This study is of particular importance to decision making responsible organs, institutions and private sector, so it could largely enrich the discussion surrounding tourism related ecological impacts and the path to sustainable tourism.

2. Study Area

The first contents chapter begins with an analysis of the study area of the present research. Thailand has many particularities such as environmental features, cultural context and historical marks that should be addressed in order to understand the whole study with more detail. First, Thailand and more specifically The Andaman Coast of Thailand, is described from an environmental perspective, including a visualization of the region's Marine Protected Areas. Next, a socio-economic perspective introduces the tourism industry and the respective associated changes in the community that comes with it. At last, a brief analysis of the policy framework illustrates the most important regulations and policies in relation to tourism and the environment ongoing in the study area.

2.1 From the environmental perspective

Thailand, officially The Kingdom of Thailand (Ratchaanachak Thai) is located in the center of Southeast Asia sharing borders with Myanmar, Laos, Cambodia and Malaysia. Due to Thailand's location, its vast area (513, 115 square kilometers) and its hot and humid climate, the country has a great diversity of ecosystems, both terrestrial and marine (ONEP 2009). It has a coastal area of 2,631 Km in length (located between latitudes 61° and 13°N) and 936 islands distributed in the Gulf of Thailand (Eastern region) and in the Andaman Sea (Southwestern region) (ONEP 2009). Furthermore, beach forests, mangrove forests, estuarine ecosystems, beach areas featuring rock, mud and sand, seagrass banks and coral reefs compose the coastal ecology (ONEP 2009).

Within this diversity, Thailand's marine ecosystems stand out for being amongst the most diverse and abundant ecosystems in the whole world, with approximately 240 Km^2 of coral reefs, besides its great area of seagrass beds (ONEP 2019). These coral reefs are classified into four different categories according to its associated oceanographic conditions: The inner part of the Gulf of Thailand; the west coast of the Gulf of Thailand; the east coast of the Gulf of Thailand; and the coastline of the Andaman Sea (Yeemin *et al*. 2006).

Thailand's coastline of the Andaman Sea has a varied seafloor topography, a large tidal range (2-5m), a vastly dynamic oceanography and it is the richest in number of species, with 645 species of corals (Brown 2007; ONEP 2019). Coral reefs are essential to ocean health, because it is the foundation to which millions of species depend on to survive, directly or indirectly (Knowlton 2001). This region shelters areas suitable for the growth of species from the family Acroporidae, such as *Acropora echinata* and the stag horn coral (*Acropora* spp), which are important for the formation of the coral reef structure, besides being extremely fragile (ONEP 2009; Riegl and Cook 1995). Corals extend from low water to a depth of 30 meters, mainly found fringing islands, mostly on their eastern part, and they form one of the most productive marine systems known, acting as shelter and foundation for both benthic and pelagic species (Phongsuwan *et al.* 2013). This way, Thailand's Andaman Sea is inhabited by approximately 4000 species of marine invertebrates (United Nations 2021), 1800 species of fish (Satapoomin 2011), 27 species of sharks, a variety of sea turtles (all endangered or threatened), dugongs, dolphins, sperm and blue whales, etc. (ONEP 2009). The complex geological history of the Andaman Sea, characterized by many habitat disturbances, is probably the reason for an increased species diversity over

time, which led to the present-day biodiversity of Southwestern Thailand in the present (Brown 2007).

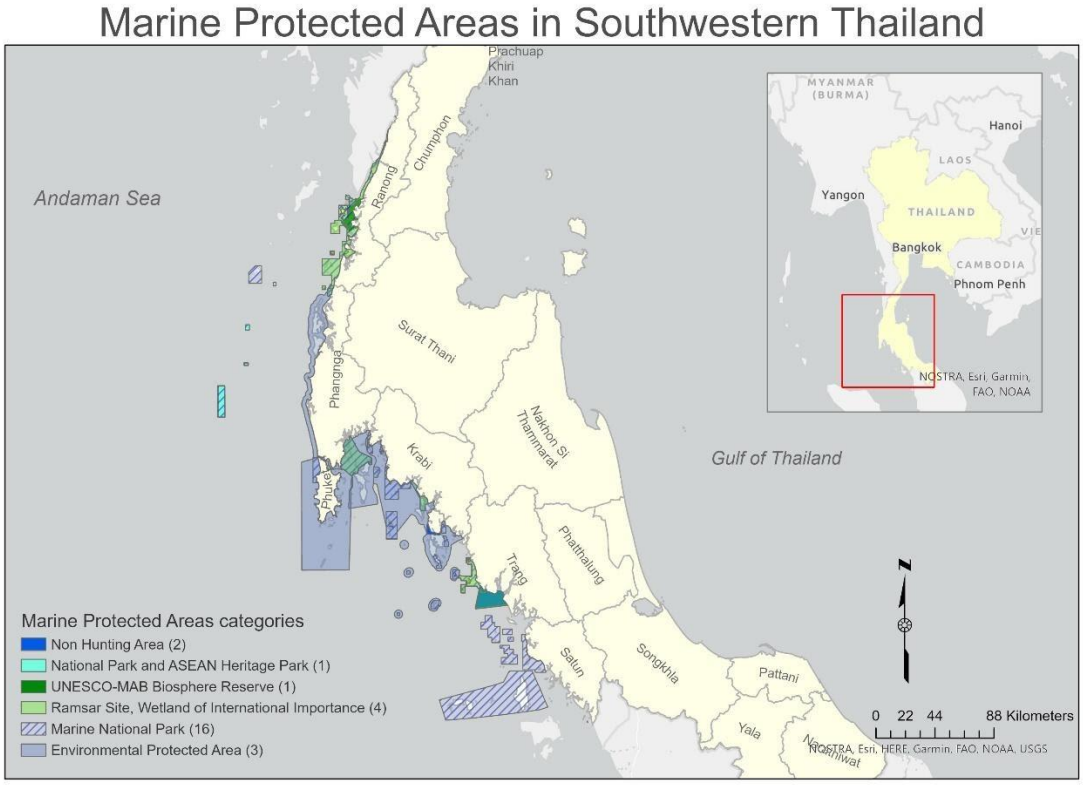
Besides their obvious ecological importance on a global scale, this marine ecosystem plays a critical role in coastal communities. The coral reefs help ease the erosive impacts of waves in the coastal zone, which is particularly important in Southwestern Thailand in light of the monsoon season affecting the waves and storms' regime (Worachananant 2008). Moreover, the marine ecosystem provides resources for fishing and artisanal communities, opportunities for tourism development, besides acting as a buffer in the context of climate change which, on the other hand, has been a serious threat to the coral reefs (Nitivattananon and Srinonil 2019).

Until early 2010, coral reefs in the Andaman Sea had considerably managed to maintain their general health status. However, the coral bleaching event of 2010 and increasing human pressures have altered this situation. In 2010, the intense La Nina event led to increased water temperatures resulting in an intense coral bleaching event that affected many reefs within the Southeast Asian region (Tun *et al.* 2010).The bleaching severely impacted coral reefs of Surin Islands, Adang-Rawi Islands, Similan Islands and Rok Island and had little impact in the Phi Phi islands. Nonetheless, the excessive tourism industry has highly damaged the latter. Thus, coral reefs in the Andaman Sea are classified as: good condition (11.8%); damaged (5,9%); and severely damaged (47,1%) (ONEP 2019).

Accordingly, the conservation status of reefs has changed over the years due to both natural and human impacts. This way, the implementation of Marine Protected Areas has been essential. Figure 1 shows the distribution of marine biological parks in Southwestern Thailand (UNEP-WCMC and IUCN 2021). In spite of this, there is still

lack of implementation effectiveness and monitoring, mostly due to lack of community engagement, awareness and overlapping jurisdictions (Phongsuwan *et al.* 2013).

Figure 1 – Map of Marine Protected Areas in the Southwestern Thailand



Source: Author.

2.2 From the Social-Economic Perspective

Thailand has a population of almost 70 million people distributed along its 77 provinces and divided into regions North, Northeast, Central, East and South (The World Bank 2019). The population is mostly rural (68%), but there are also cities such as Bangkok, Songhkla, Suratthani, Chiang Mai, Chiang Rai, Phuket and Khon Khaen, which concentrate a considerable part of the population, together with their growing and unplanned urbanization (Patit Paban 2010). The urbanization process gained importance mainly in the post-war period, along with industrialization (Patit Paban

2010). However, after 1960, the tourism industry in Thailand increased by more than 300% and, before the travel restrictions imposed by COVID-19, the country received almost 40 million visitors per year (The World Bank 2018). Consequently, the tourism sector accounted for almost 16% of the country's GDP, causing a direct impact on urbanization patterns (Nitivattananon and Srinonil 2019).

More than 80% of international tourists used to travel to Thailand with the main purpose of visiting the country's seas, so it is only expected that coastal areas have gone through a fast and excessive urbanization process due to the exponential growth of the tourism industry (Worachananant et al. 2008; Nitivattananon and Srinonil 2019). It is possible to observe a change in patterns in the economic activities as well, since small scale and local fisheries have gradually converted their fishing boats into tour ones (Yeemin *et al.* 2006).

Coral reefs related activities represent the main type of tourism practiced in coastal areas, and they have been happening intensively especially in Phuket, Trang, Krabi, Koh Hae and Koh Phi Phi (Yeemin *et al.* 2006). Tourists' activities highly depend on the health of marine ecosystems, but poorly managed tourism has led to innumerous impacts on the marine environment, which can threaten this growing industry (Wilkinson et al. 1994). At the same time that tourism has brought countless positive economic impacts such as creation of a variety of income sources and subsequent increase in income and jobs, in addition to poverty alleviation (Sawatsuk *et al.* 2018), it has also damaged marine ecosystems.

According to Thailand's 4th and 6th National Reports on the Implementation of Convention on Biological Diversity (ONEP 2009, ONEP 2019), environmental damages from sewage, garbage, residues from construction, anchoring of tourism

boats, noise pollution, trampling over and flipping the corals, dregs from tourism activities and fish bombing are all tourism induced impacts identified in Southwestern Thailand's marine environments. It is also important to mention that this region is already suffering from climate change-induced impacts, such as coral bleaching events, so it makes it even more important to focus on management of economic activities that may act either conserving or threatening marine ecosystems (Nitivattananon and Srinonil 2019).

The economic impact of COVID-19 in Thailand has been harsh, especially because of the country's openness to trade and exposure as a tourism hub. Despite their successful containment of COVID-19 outbreak, some sectors, such as tourism which is a significant source of employment and foreign exchange revenue for Thailand, has been suffering severe impacts with an estimated 2.5 million job losses in tourism (The World Bank 2020). Furthermore, according to Thailand Economic Monitor (The World Bank Group 2020), services exports declined by close to 30 percent in 2020 due to the collapse in the tourism sector. Although impacts on nature have not been measured yet, during this low tourism period marine ecosystems may have been able to partially start thriving again, where tourism related damages were high before. This sector is already planning its way back by preparing itself for increased automation in the tourism industry and leveraging the formal tourism workforce for sector sustainability post COVID-19 (The World Bank 2020). Therefore, the understanding of how the tourism industry in Thailand may reach growth and resilience, under the sustainable tourism perspective, has become urgent, especially from an environmental sustainability view.

2.3 From the political and governance perspectives

Regarding its political framework, the country was an absolute monarchy until 1932, when a revolution led to the establishment of a constitutional monarchy (Patit Paban 2010). In relation to environmental conservation, the country has a solid legislative framework. In the present constitution, the right to a healthy environment was expanded, and environmental and biodiversity conservation are explicitly cited in both rights and duties of the Thai people, and as a duty of the State, in articles 43, 50 and 57 respectively (National Council for Peace and Order 2017). More specifically, it holds all levels of government, private, public, local stakeholders and non-governmental organizations as responsible for conservation.

Along with the indicated articles, Thailand also counts on several Acts that take accountability for environmental conservation and sustainability, more specifically for marine conservation (Table 1). Markedly when Thailand became a signatory of the Convention of Biological Diversity in 1992 (United Nations 1992), the implementation of internal policies and measures to achieve the commitments increased considerably, in addition to the Aichi Targets[1] adopted by the parties afterwards (UNEP 2010). This way, Thailand has been a participant in international cooperation and regional initiatives. However, legislation and other official documents integrating both environmental conservation and economic development, particularly focusing on tourism, are not so abundant.

[1] A set of 20 global targets under the Strategic Plan for Biodiversity 2011-2020.

Table 1- Main Policies, Acts and Law related to environmental conservation and sustainability in Thailand.

National Park Act (1960)	Ensures protection of national parks areas and forbids collecting and harming natural resources (animals, plants, leaves, etc).
Animal Species Maintenance Act (1966)	Protection and guarantee of maintenance of reserved animals for genetic purposes and forbids castration, killing, and traffic of these animals.
Fishery Act (1947)	Regulation of fishing and raising aquatic animals, as well as forbidding imports specified in the Royal Decree on Forbidding of Importing Specified Aquatic Animals into the Kingdom (1982).
Exporting and Importing Goods to the Kingdom Act (1979)	Controlling of import and export of wildlife, carcasses, aquarium fish and other aquatic animals.
Wildlife Conservation and Protection Act (1992)	Protection of natural habitats and wildlife conservation areas, listing 15 types of rare wildlife.
National Environmental Quality Conservation and Protection (1992)	Provides authority to the Minister of Science, Technology and Environment to regulate specific vulnerable areas, and possibly implement and manage environmental protected areas.

Source: (ONEP 2009).

Currently, Thailand counts on the 4th Master Plan for Integrated Biodiversity Management (2015-2021), which is the main active document concerning conservation and development-related issues in the country today (e.g. Pollution, Urbanization and development pressures, resources exploitation) (ONEP 2019). This Plan contains 25 National Targets, of which ten of them relate directly or indirectly with tourism-induced damages on marine ecosystems and sustainable use of resources.

The Office of Natural Resources and Environmental Policy and Planning (ONEP) together with the Ministry of Natural Resources and Environment, the Ministry of Tourism and Sports and the Ministry of Science and Technology, are the agencies responsible for ecosystem's conservation and tourism related impacts (ONEP 2009). Moreover, from 2003, the Designated Areas of Sustainable Tourism Administration has been acting as an arm of the national government directed to tourism planning (Larsen *et al.* 2011).

Added to national and global initiatives, the Association of Southeast Asian Nations Tourism Strategic Plan 2016-2025 (ASEAN 2015) represents one of the most integrative official documents, approaching a sustainable and inclusive tourism development. More specifically, its Strategic Direction 2 (SD2) focuses exclusively on "Ensuring that ASEAN tourism is sustainable and inclusive" (ASEAN 2015), which includes interesting measures and action plans for a post COVID-19 context, for example.

In spite of the existence of all these documents and organs, it is clear that the rule of law realm does not work by itself. Marine environmental impacts related to tourism development continue to catch attention (Phongphanich *et al.* 2013; Nitivattananon and Srinonil 2019), mostly due to lack of monitoring, implementation and stakeholders conflicts, besides the lack of effectiveness of the previously mentioned marine protected areas, especially because they are under overlapping jurisdictions. This is where the importance of the sustainable tourism approach lies, since it integrates the environmental, the social, and the economic aspects through policies and their application, using community engagement, in a way that the former threatening

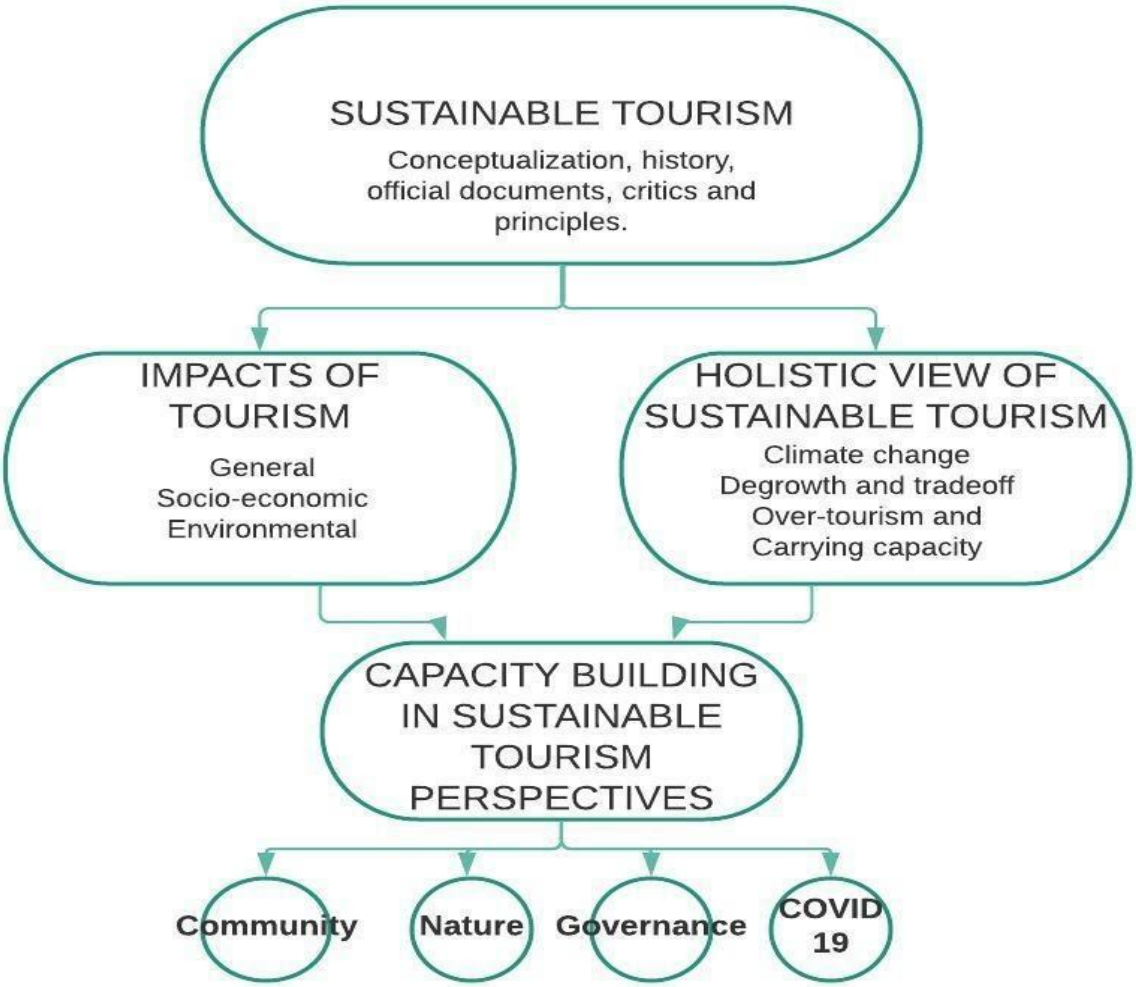
economic activity, starts being a possible opportunity for conservation of both culture and marine ecosystems (Green 2005; Larsen *et al.* 2011).

3. Literature Review and Theoretical Framework

This chapter begins with the conceptualization of the term sustainable tourism through its history period, followed by listing the main globally official documents concerning this concept. Then, a small discussion concerning popular critics anticipates further characterization of sustainable tourism by defining its principles and its three pillars based on sustainable development: Environmental, socio-cultural and economic. In the second section, both positive and negative impacts of tourism are briefly discussed in a general way, followed by a further approach of socio-economic and environmental impacts related to tourism in the Andaman Coast of Thailand.

The third session concerns topics inserted in the holistic view of sustainable tourism that apply and are relevant to the study area context, which are the relationship between tourism and climate change, degrowth and tradeoff theories and applications, over-tourism and carrying capacity concepts. Finally, the fourth session regards capacity building in the sustainable tourism perspective, concerning community engagement and a community-based approach, ecotourism and nature-based approach, volunteer tourism and changing of tourism patterns, and governance. At last, the conclusion session places the present study in the current geographical and research contexts with a particular note of the present and post-COVID19 challenges and opportunities towards a sustainable tourism path (Figure 2).

Figure 2- Structure of Literature Review.



Source: Author.

3.1 History and Conceptualization of the Term Sustainable Tourism

The primitive idea of sustainable development, which somehow referred to interactions between tourism, tourists, natural world and culture, was born in the 1970's and 1980's, when the post war period allowed a rapid growth in both volume and geographic coverage of tourism, together with the rising notions of environmentalism (Meadows *et al.* 1972; Krippendorf 1987). The term and the concept of "sustainable tourism" have emerged the most on the past couple of decades to affect deeply tourism's research field (Bramwell and Lane 2011). This perception of tourism has its origin in the

sustainable development concept, which became widely popular after the publication of the Brundtland Report – Our common future, by the World Commission on Environment and Development (WCED 1987). According to this document, sustainable development refers to the one “that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED 1987). Likewise, the United Nations Environment Programme (UNEP) and the World Tourism Organization (WTO) (2005) define sustainable tourism as “Tourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry, the environment and host communities”, while also acknowledging the role tourism may play in sustainable development.

Sustainable tourism as a concept was primarily defined and had its roles outlined in the first publication of the Journal of Sustainable Tourism (Bramwell and Lane 1993). Since this release, governments, tourism related industries and tourism researchers have adopted a more balanced view of tourism development, admitting both positive and negative impacts of this activity (Saarinen, J. 2006). World authorities such as the United Nations Educational, Scientific and Cultural Organization (UNESCO), the United Nations World Tourism Organization (UNWTO), the United Nations Environment Program (UNEP) and the European Commission have released several official documents and events concerning sustainable tourism (Pan *et al*. 2018) and Table 2 identifies some of them.

Table 2 - Main Official documents and events concerning sustainable tourism.

Johannesburg Plan (1992)	United Nations	Sustainable Development Agenda 21; sustainable tourism as a plan of implementation.

UNWTO General Assembly (1993)	World Tourism Organization	First perspectives on sustainable tourism.
World Conference on Sustainable Tourism (1995)	United Nations Environment Programme	World charter for sustainable tourism.
Berlin Declaration (1997)	International Conference on Biodiversity and Tourism	Promotes the relationship between biodiversity and tourism.
Commission on Sustainable Development (1999)	World Tourism Organization	Global importance of tourism; A local authority and an NGO perspective on sustainable tourism.
Making tourism more sustainable: A guide for policy makers (2005)	United Nations Environment Programme and World Tourism Organization	Blueprint for the implementation of sustainable tourism.
The Future We Want (Rio+20, 2012)	United Nations	Stated the role of sustainable tourism in transition to a green economy and poverty alleviation.
The 2030 Agenda (2015)	United Nations	Sustainable Development Goals (SDG's); how tourism fits the SDG's.
International Year of Sustainable Tourism (2017)	World Tourism Organization	Tourism as a key to development, prosperity and well-being and statement of the five pillars of sustainable tourism: inclusive and sustainable economic growth; social inclusiveness, employment

		and poverty reduction; resource efficiency, environmental protection and climate change; cultural values, diversity and heritage; mutual understanding, peace and security.

Source: Author.

From 1987 to 2007, there was a broad discussion on the concept of sustainable tourism. Initially, some authors such as Hunter (1995) severely criticized the concept of sustainable tourism, arguing for the need to re-conceptualize it because it ignored planning, management and policy approaches, failing to fit into the sustainable development requirements. In the meanwhile, Liu (2003) claimed that sustainable tourism would still need to grow into an interdisciplinary approach and a systems perspective in order to reach a more scientific level. Furthermore, Bramwell and Lane (2005) criticized the lack of progress in the field of research and the generalization process that it was going through. These critics were essential for the development and evolution of the concept, and despite the debates, discourses and criticisms being a persistent pattern of the sustainable tourism literature, it has been widely embraced by the scientific community, as showed in Butler (1999). Later, Ruhanen *et al.* (2015) shows that research during this period was essential to embed the sustainability issue in a tourism framework and it has advanced and matured through the years.

Throughout this initial period, conceptualization discussions gradually gave place to an empirical perspective, testing new ideas and evaluating them. Clarke (1997) discusses the different approaches to sustainable tourism and the evolution of the practical concept. The works from this generation usually fit into one of the following four categories: the position of polar opposites (Nash 1992; Valentine 1993), the position of a continuum (Butler 1992; De Kadt 1992), the position of movement (EIU 1992;

Middleton and Hawkins 1994) and the position of convergence (Clarke 1997). This framework shows that tourism evolved from an idea of being a possession of a certain type of tourism, usually “small-scale tourism” (Collins, 1999), to the idea that it would actually be a goal that all tourism types must achieve regardless of scale. The latter, became the latest understanding of sustainable tourism as shown in Lu and Nepal (2009) and Lane (2009), which discuss and analyze profoundly this early stage of sustainable tourism research.

Although there have been changes in the understanding of sustainable tourism and its applications, the notion of its main principles, despite evolving, remains similar to the ones in the publication of WWF (1992) and UNEP and WTO (2005). According to these sources, the (adapted) principles are the following:

1. Involvement of all stakeholders, so all the implicated people should have the opportunity to have a say in the development and management of tourism.

2. Opting for the long-term view rather than the short term and giving preference to self-sustaining actions, taking into account carrying capacity.

3. Addressing both local and global needs and impacts equally, especially when it comes to pollution and the use of natural resources. The same way tourism may affect global issues, the latter also have a direct impact on tourism.

4. Maintaining both the quality of the environment and the quality of tourism, assuming that a place that cares for the environment is more likely to care for the tourists.

5. Taking a holistic view when planning tourism development because it is part of a whole community, so its relation with other sectors should be addressed,

aiming for mutual support. An over-dependency in tourism should be avoided and promoting the harmony between local communities, tourism and the environment should be a priority.

6. Promoting sustainable consumption, creating benefits for both local people and tourists, together with considering the pattern and impact of consumption.

These principles correlate with the sustainable development spheres that compose sustainable tourism development (Elkington 1994; UNEP and UNWTO 2005):

1. Environmental sphere: Protect and respect the environment and its biodiversity by promoting optimal use of environmental resources that are key to tourism development while still maintaining their ecological processes.

2. Economic sphere: Provide socio-economic benefits to all stakeholders, especially host and local communities, ensuring employment and contributing to poverty alleviation, while promoting long-term viable economic operations.

3. Socio-cultural sphere: Protect and respect cultural heritage and traditions, promote intercultural understanding and facilitate collaboration and partnership.

Some authors list these spheres with a few alterations such as separating the social and the cultural realms (Agyeiwaah et al. 2017), adding a “governance” sphere that comprises all of the former three (Hall 2011a; Hall 2011b; Keyim 2018) or even adding three more spheres: political, institutional/management and technology (Hall 2016; Williams 2013). Still, the latter approach features some inconsistencies, seeing that “political”, “institutional/management” and “technology” may better fit into methods to achieve an end or conditions that somehow relates to an end (Agyeiwaah *et al.* 2017).

The second generation of sustainable tourism research – 2008-now thus have exposed the weaknesses of existing research along with suggesting and testing solutions to issues related to tourism that arose with the ongoing discussions. Buckley (2012) reviewed the general outcomes of sustainable tourism research, focusing on social and environmental impacts, their responses and indicators. It also showed that sustainable tourism has developed many ramifications inside its field of study. Therefore, sustainable tourism developed a more holistic view by focusing back on the triple core lines (environment, socio-cultural and economics), especially recognizing the importance of social responsibility. Novel agendas such as climate change, urbanization, degrowth, social conflicts and governance have been included in the sustainable tourism discussion realm. Therefore, more than following the main principles, sustainable tourism goals now are usually set accordingly with the context it applies to, and with its related conditions, which may also change over time (Bramwell *et al.* 2017).

3.2 Impacts of Tourism

There are numerous tourism related benefits recognized in research. They encompass from increasing revenue for local companies to cultural interactions between host and visitor (Das and Chatterjee 2015), however, the unfavorable social and environmental consequences have been distinguished, appearing with a greater focus (Buckley 2012; Pan *et al*. 2018). At the same time tourism generates employment, provides income and better salaries (Grey *et al.* 1991), it may affect living conditions by congestion of people and of urban traffic, by declining purchasing power and by unruly tourist behavior (Seraphin *et al.* 2018). While tourism increases government revenue and promotes a wider supply of goods and services due to mass production (Grey *et al.*

1991; Singh 2017), it also requires the implementation and enforcement of many regulations to deal with increased tourism inflow, besides sometimes causing price inflations (Borg *et al.* 1996; Alexis 2017). Although it may promote fruitful communication between different cultures, it may also threaten cultural identity, heritage, mores and wellbeing (Coria and Calfucura 2012). In addition to all of this, tourism could act as an educator and conserver of marine and terrestrial habitats, conversely, most of the times it represents several threats to mangroves, estuaries, reefs, etc. by both direct and indirect impacts (Bernard and Cook 2015).

In light of the study area approached by this study, distinct cultural heritage and mores, along with extraordinary and singular natural environments are characteristics of the coastal area of Thailand, which brings tourists from all over the world (WTO 2020). In spite of that, Thai people often have limited opportunities and incentives for economic diversification, so there is an encouragement of tourism as a development path, considering the potential contribution to the economic and employment contexts (Bojanic and Lo 2016). Although tourism development should lead to an increase in social capital (Hwang and Stewart 2017), local communities have local networks, rarely having access to outside resources, which limits their ability to take advantage of tourism development and trade (Bowles and Gintis 2002). In addition to this, sometimes tourism can have conflicting consequences on local traditions and social structure, bringing competition for resources for the community context and anticipating social transformation, resulting in increased crime and its respective related issues (WTO 2018). A visible example of this lies in the sexual exploitation issue faced by Thailand for many years (ECPAT International 2016).

Concerning environmental impacts, the short-term impacts are usually associated with constructions and urbanization processes related to tourism development, such as accommodations, infrastructure and public utilities. While most of the time long term impacts to the environment usually relates to the post construction phase, which means the operation and maintenance of tourism development structures, and to the actual tourist activities (Wong 1998; Green 2005). They promote direct negative effects to marine habitats, such as physically contacting coral reefs, anchoring from tourism boats, trampling in shallow water reefs, killing of fauna on purpose, land use change, increasing sedimentation and turbidity, etc. Even more, they cause indirect impacts, for instance pollution by lack of sewage treatment, by other chemicals related to land use change, urbanization and transport, waste disposal, increase in algae growth and consequent imbalance of the ecosystem, etc. (Phongphanich *et al.* 2013; Larsen *et al.* 2011). All of these pressures have been documented and observed in the Andaman Coast of Thailand and most recently, the country is actually taking into account the conflict and possible tradeoffs of tourism development and the necessity of a coastal environmental management plan (Nara *et al.* 2014).

Each ecosystem has its carrying capacity above which tourism becomes unsustainable (Mathieson and Wall 1982; O'Reily 1986). Besides being difficult to accurately determine the specific value and the best indicator for carrying capacity (O'Reiley 1986), it is usually difficult to make a distinction between non-anthropogenic and human related damages in the environment (Hannak et al. 2011). More specifically, the Andaman Coast of Thailand experiences several natural phenomena that pose threats to its marine habitats, especially coral reefs, including but not being restricted to oceanic storms, tsunamis, monsoon seasons and climate change induced coral bleaching events. Several authors have discussed direct tourism related impacts,

mostly considering scuba diving and snorkeling activities (Phongsuwan et al. 2013; Sutthacheep et al. 2018; Yeemin et al. 2006). Nonetheless, there is still a gap in knowledge when the focus is analyzing how and what damages to marine environment can be correlated with both direct and indirect tourism related impacts, based on short and long term perspectives.

3.3 The Holistic View of Sustainable Tourism

Accordingly with the fifth principle of sustainable tourism listed previously in this chapter, evolution of research in this field grew into holistic viewpoints, where it is no longer studied as an independent concept, but something that is intrinsically related to a variety of other sectors (Pasanchay and Schott 2021). Regarding the present study area, there are some specific conversations inside the sustainable tourism holistic realm extremely relevant. They are relationship between tourism and climate change, degrowth and tradeoff theories and applications, over-tourism and carrying capacity.

a. Climate change

Recently climate change has been on top of the global discussions, being a major issue for both political and economic agendas, including the tourism industry (Scott 2011; Scott and Becken 2010). Several articles have discussed the relationship between tourism and climate change (Scott et al. 2016a; Scott et al. 2016b; Weaver 2011), even suggesting that proper tourism policies and practices could help tackle issues related to climate change, which makes tourism directly related to the Sustainable Development Goal 13 - Climate Action (United Nations 2015). For instance, travel trade could be more active in promoting low-carbon products, transport and hotels (Yang 2010), in view of the buying power of the main agencies that makes them able to influence product supply (Jainchill 2012).

The discussions surrounding climate change have also renewed the focus on the impacts of tourism development in the environment, similarly to the early focus of sustainable tourism research (Bramwell and Lane 2008). Fundamentally, this relationship between climate change and tourism have a substantial importance in the Southeast Asia for example, where marine coral reefs act as a pillar of the tourism industry, while suffering not only impacts from this activity, but also the ones from climate change with bleaching events (Nitivattananon and Srinonil 2019).

b. Tourism degrowth and tradeoffs

Another important discussion in the sustainable tourism realm is whether tourism growth would be coherent considering sustainable tourism principles or if degrowth would be a necessary adaptation (Buscher and Fletcher 2017). The general concept of degrowth considers a finite limit of economic growth and use of natural resources, besides promoting a reconstruction of society and economy inside the idea of commons creation and governance (Dietz and O'neil 2013; D'alisa *et al.* 2014), avoiding the tragedy of the commons (Hardin 1968). Hence, degrowth may have the potential to be a pathway towards achieving sustainable tourism goals, by applying a period of planned economic contraction followed by a steady state of sustainable economy (Hall 2010). Although economy is one of the three principles of sustainable tourism, the latest research has shown that depending on the context and respective conditions, there will be a need for tradeoffs between goals, and this requires engagement and planning (Bramwell *et al.* 2017).

The ideas of degrowth and tradeoffs have also become particularly important in the Southeast Asian countries, where the growth in tourism industry has been exponential, with no proper planning or management on neither the economic, the environmental

nor the socio-cultural perspectives in the majority of times. A clear example of this pattern is Maya Bay - Thailand, which had to shut down tourism activities because of its overexploitation and environmental damages (Koh and Fakfare 2020). Maya Bay, Surin Islands, Similan Islands, Lanta Islands, along with many other tourist destinations on Southwestern Thailand are evident cases of both over-tourism and overreaching tourism carrying capacity, where degrowth and tradeoff measures might be unavoidable.

Over-tourism's popular definition describes the corresponding destinations as "where hosts or guests, locals or visitors, feel that there are too many visitors and the quality of life in the area or the quality of the experience has deteriorated unacceptably" (Goodwin 2017). It directly relates to the concept of carrying capacity – "the maximum limit to tourism development" (Borg et al. 1996) and to make it simpler, Alexis (2017) defines over-tourism meaning "under management of tourism". Any of these definitions make explicit the urgency for lowering social cost and environmental damage in the tourism context (Oklevik *et al.* 2019). Furthermore, they express the need for policy measures that effectively limit visitor numbers and/or optimize these numbers to achieve greater yield in terms of economic benefits, combining immediate and future, exploitations of opportunities and solutions (Seraphin *et al.* 2018).

3.4 Capacity Building in Sustainable Tourism Perspectives

According to Yazdi (2012), the aspiration of sustainable tourism is to balance environmental protection, cultural integrity preservation, social justice construction and economic support, while meeting both short and long term needs of the host community in view of their living standards improvement. Considering this, Thailand has been responding to negative impacts of tourism felt by decreased life quality of

local communities (Dabphet 2013). Thailand's latest National Tourism Development Plan (2016) includes as one of its focus strengthening local communities, distribution of incomes to promote preservation of culture and resources, together with increasing quality of life. However, this path has only started, and studies contemplating social understanding of and involvement with tourism related impacts are a high necessity now, especially with the need of improving the capacity building process.

Community involvement is a fundamental key in developing sustainable tourism, since residents are the cultural agents and the "delivers" of tourism (Muler Gonzalez *et al.* 2018), so they occupy both the object and the subject roles (Amerta 2017). Accordingly, community-based tourism development is a very important arm of the sustainable tourism field. Some authors state both as synonyms, however in community-based tourism development local people are the main actors, instead of the conventional triad representing sustainable tourism (Amerta *et al.* 2018). There are many examples of community based tourism successful sites globally and specifically in Thailand, focusing on cultural tourism (Kim *et al.* 2019; Chongbut and Chapman 2021), on creative economy on mangrove communities (Sangchumnong 2018; Basyuni *et al*. 2018) and on community based-ecotourism (Lonn *et al.* 2018). Therefore it shows that recognition of local resident's perspectives of tourism and engagement of the community in developing sustainable tourism is vital (Vargas-Sanchez *et al.* 2011), and this still represents a gap in research when addressing the Andaman Coast of Thailand as a unit and its marine ecosystem.

Likewise, there are also arms of sustainable tourism that mostly relates to management, use and conservation of natural environments. Again, some authors consider ecotourism or nature-based tourism equivalents to sustainable tourism

(Weaver 2014). However, it may fit into the same case as community-based tourism, in which ecotourism and nature-based tourism are practices inside the sustainable tourism realm that considers natural environments the main actor (Pan *et al.* 2018). This perspective is essential in sustainable tourism development planning in Thailand, considering that more than 80% of tourists visit Thailand with the main purpose of visiting its marine areas (Seenprachawong 2001). There are various studies focusing on the best practices of ecotourism (Tseng *et al.* 2019; Lonn et al. 2018), nature based solutions (Mandic 2019), and environmental management policy (Nara et al. 2014) which positively relates to sustainable tourism implementation. These perspectives can integrate a diversity of intangible and tangible interventions that may make a difference in the present and future contexts of tourism and natural resources (Mandic 2019).

A few articles more recently have brought new perspectives to sustainable tourism ways of increasing capacity building such as volunteer tourism, “voluntourism” or even “eco-voluntourism”. This is a way of changing tourism patterns, especially when talking about mass tourism, in which tourists donate and give back to the society or environment under the guise of learning (Sujarittanonta 2014). Some reef restoration projects are popular destinations of voluntourism and have been active in marine ecosystems of Thailand. However, despite bringing good outcomes, it has not been enough to mitigate damages in ecosystems (Yeemin *et al.* 2006).

Thus, tourism may facilitate education, while crossing cultural engagement, ecological responsibility and economic development (Higgins-Desbiolles 2017). Different perspectives and practices are decisive to adopt a sustainable tourism path and acquire a resilience trait. Some papers recently have also brought to mind that creating a way to achieve sustainable tourism goals is expected to include careful transition

management (Gossling *et al.* 2012). Hence, governance meaning "the inter-relationship among stakeholders and how they interact with one another" (Baggio *et al.* 2010) is a key component on sustainable tourism development, together with the power and trust relationship amongst involved sectors – environmentally, socially and economically (Nunkoo 2017).

3.5 Conclusion

There is still a long way to achieve sustainable tourism development goals both globally and specifically in the study area of the present work. Besides the former threats, opportunities, strengths and weaknesses, COVID-19 travel restrictions consequences gave the tourism industry a completely novel perspective. The pandemic context brought to awareness the lack of research on tourism organizational resilience, especially on the fundamental people-to-people nature of tourism (Sobaih *et al.* 2021) that characterizes the Andaman Coast of Thailand. In spite of the decline in tourism and respective income contribution to the country's economy, the post pandemic era provides a completely novel opportunity to develop sustainable plans and practices in tourism development, which does not necessarily mean growth.

This way, this study is an early attempt to analyze the former and the present relationship between tourism and environmental damage in the marine ecosystem of the Andaman Coast of Thailand. It is accomplished through an unprecedented perspective of the locally experienced divers and secondary raw data on marine tourism and the regional ecological impacts that show the issues, why they happen, how they have been addressed and how they should be addressed. Therefore, it has the potential to help local authorities, different stakeholders and policy makers in the tourism realm.

4. Methodology

At a first moment, it is important to state here that this research had to be adapted due to global COVID-19 travel restrictions. This way, digital technologies had to be used to achieve the original goals of this research in the best possible way. This study uses a multiple method approach, which offers complementary understandings that would not be possible to reach in a single method context (Darbyshire *et al.* 2005). As it has been already stated, current research related to sustainable tourism focuses on the universal goals but also takes into account the specific context in which the location is, since there is an heterogeneity between them (Schianetz and Kavanagh 2008; Castellani and Sala 2010). Therefore, the specific methodology exactly as it is in this study has not been used before, but it is trustable because it fits into the principles of the sustainable tourism indicators system. More specifically, it reflects the results of the actions of visitors and residents, it values the main perspective of sustainable tourism, which is the bigger interest for the local community and it serves as information for the decision-making process and management (Blancas *et al.* 2018).

This chapter contains three sections respectively related to the different methodologies used for collection and processing of data used in this study. The first one is an E-interview questionnaire with experienced SCUBA divers as respondents, which brings the view of the “delivers” of tourism. From these respondents, there was a selection of one of them according to their answers, for the conduction of an Online Interview. The second part is a brief gathering of data of Thailand’s policy framework, which this work covers in the Study Area chapter. At last, this research also uses secondary raw data

about the status of coral reefs that the Reef Check Organization[2] collects all over the world. Therefore, the present study does not use statistical analysis, but a qualitative coding analysis, identifying themes and common aspects.

4.1 E-Questionnaire and Interview with an Expert

One of the major distinctions of this research is the use of a selected group perspectives approach in the understanding of tourism related impacts on the marine environment and the path to sustainable tourism goals. Considering such inductive nature, two primary qualitative and quantitative methods of research were designed to examine the perceptions, notions and lived experiences of interviewed that are inside the investigation (Creswell 2012). In order to do so, an online survey was held based on a purposeful sample, in which the researcher selected people because they are affiliates of the SCUBA diving industry in the Andaman Coast of Thailand. These selected people compose an extremely meaningful stakeholder, which play an essential role in developing tourism since they are both the agents through and in which tourism is delivered (Muler Gonzalez *et al*. 2018). Besides, they have been diving in the same areas for years, most of them for more than thirty years, they have had the opportunity to see closely the changes in marine environment through time, so their perspectives have a certain weight in terms of understanding the ecological status of the reefs. Understanding divers' perceptions can help manage tourist activity, and studies using this approach have been conducted all over the world (Dearden *et al*. 2007; Gossling *et al.* 2008; Giglio et al. 2015).

[2] Reef Check is a non-profit organization leading citizen scientists to promote stewardship of sustainable reef communities worldwide.

The researcher forwarded the digital link to the E-interview (in the form of questionnaire) by email or Facebook, with a contextualization of its purposes to approximately sixty SCUBA diving shops equally distributed in the Andaman Coast of Thailand. The respective regions were covered: Phuket, Krabi, Phi Phi Island, Surin Islands, Lanta Island, Lipe Island, Tarutao National Park, Similan Island and Burma Banks. Unfortunately, there were no answers from the Laem Son region. From sixty contacts made, nineteen answered the E-interview. Of these people, almost 50% preferred to remain in anonymity, so they will be referred to as “an experienced SCUBA diver”.

The questionnaire was formulated in Google Forms and it contains objective and open-ended questions divided into five sections. The first one collects a few personal data such as nationality, residency country and city, and experience in both SCUBA diving and sites visited in the study area location. Next, an assessment on the status of marine habitats health is proposed, followed by an assessment on the degree of damage of each tourism-related impact on marine ecosystems. The fourth section regards possible changes in tourism patterns and their relation to the damages listed before. At last, the fifth concerns possible changes observed in marine ecosystems health since COVID-19 travel restrictions started, the relationship between local community and policy making and enforcement, and potential solutions to identified issues.

The full E-interview is in Appendix 1.

From the nineteen respondents, there was a selection of one of these experienced divers to conduct an in-depth online interview. His place of residency, the period he has been living and SCUBA diving in Thailand, and his profession – photographer and

diving instructor were the criteria when choosing this interviewed experienced diver. With this specific respondent, an one-hour interview was held by video call, in order to conduct some in-depth questions and discussions, with the objective of having more detailed information concerning tourism related environmental impacts, policy making and enforcement and possible opportunities. This was important because the interviewed has a high level of expertise and experience, so he was able to explain, from his perspective, some of the main issues related to tourism and its structure.

4.2 Policy Framework

In the sustainable tourism realm, governance is a fundamental actor, so it is essential to understand the policy framework of the study area. For this matter, a brief gathering of data was conducted in order to identify, understand and analyze the different policies related to this study's theme. Establishing the policy framework is extremely important, especially in Thailand's political instability context (Ingram et al. 2013). Both government and academic scientific sources were used, including a quick research on law enforcement and policy making in the tourism context, how the community relates to it and possible gaps. This has been covered in the study area chapter and will be used in the analysis of data collected.

4.3 Secondary Data and Reef Check

At last, this study also counts on secondary non-published raw data collected and provided by Reef Check Foundation. Reef Check is an international non-profit organization funded in 1996. This group uses a globally standardized protocol of data collection establishing the status of coral reefs to help better track and care for them. There was an intentional bias in the site selection towards coral reefs believed to have

less impact by human activities and with the biggest cover of seabed by corals and populations of indicator fish and invertebrates. In the protocol used, there is collection of four types of data using standard Reef Check Data Forms, through three 100 meters transect line per site (Hodgson 1999):

Site description – Biophysical features and socioeconomic human activities related to each reef detailed in 37 questions.

Fish belt transect – This is the first survey performed, in which there is a sampling for fish species typically targeted by human activities, by using four 5 meter-wide by 20 meter-long segments (centered on the transect-line).

Invertebrate belt transect – There is a sampling for Invertebrate species usually targeted by human activities (food species or collected as curios), and sampling of reef impacts.

Substrate line transect – not used in this study.

A slight limitation of this study lies in the fact that these secondary raw data are not collected by experienced researchers and/or scientists, but from civic volunteers. However, they go through a training process and it has shown success in other studies before (Reverter *et al.* 2020).

5. Status of Marine Environment

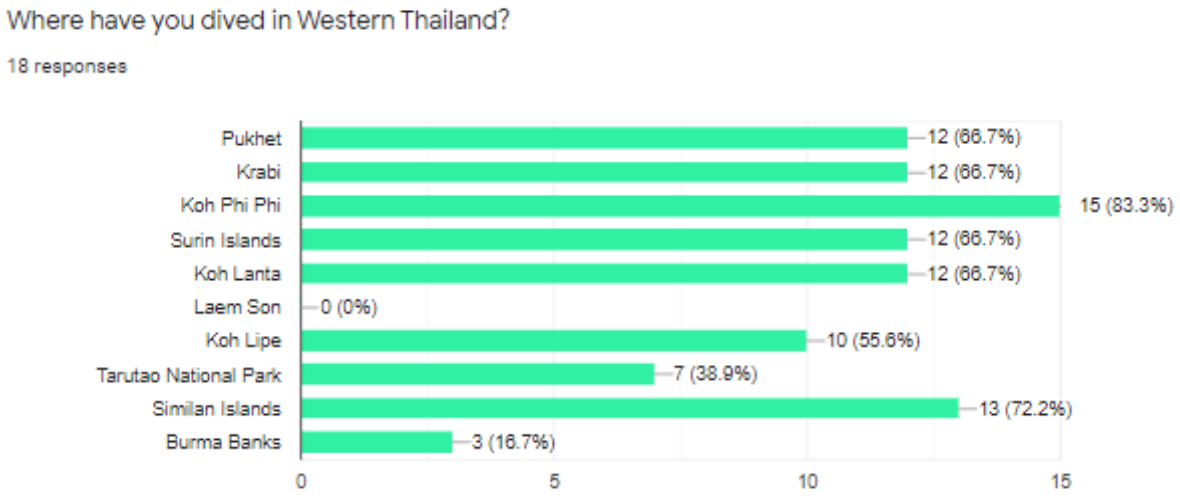
The results and discussion parts of this research are written together due to the logic adopted in this study, where a qualitative coding analysis is the main methodology used. To establish a coherent course of thought, three chapters compose the whole content of results and analysis. First, an illustration of the respondents' profile makes it possible to understand from which perspective we are assessing information. In addition to this, chapter 5 addresses the status of the marine environment by using the e-questionnaire, the online interview with a specialist and the secondary raw data from the Reef Check Foundation. Chapter 6 discusses tourism-related impacts in the Andaman Coast of Thailand, together with assessing patterns in tourism over the past couple of decades and their impacts on the habitats. Lastly, there is a discussion of the challenges and opportunities to a sustainable tourism path from an environmental perspective, by considering COVID-19 effects, community involvement in the policy framework and management, and possible suggestions from the surveyed SCUBA divers.

5.1 Questionnaire Respondents' Profiles

The e-questionnaire has a sample of 19 respondents, from which 50% chose to stay anonymous, so they will be referred as "experienced diver" in this text, in case there is any direct quotation from their responses. The nationalities of the respondents are relatively well distributed, since 28% are from Thailand and the remainder are Europeans with representatives from The United Kingdom, France, Denmark, Spain and Sweden. Currently, 72% live in Thailand (Phuket, Krabi, Koh Lanta, Koh Lipe, Bangkok, Koh Phangan), however, when questioned where they have dived in The Andaman Coast of Thailand, the only focused region that has not been visited by

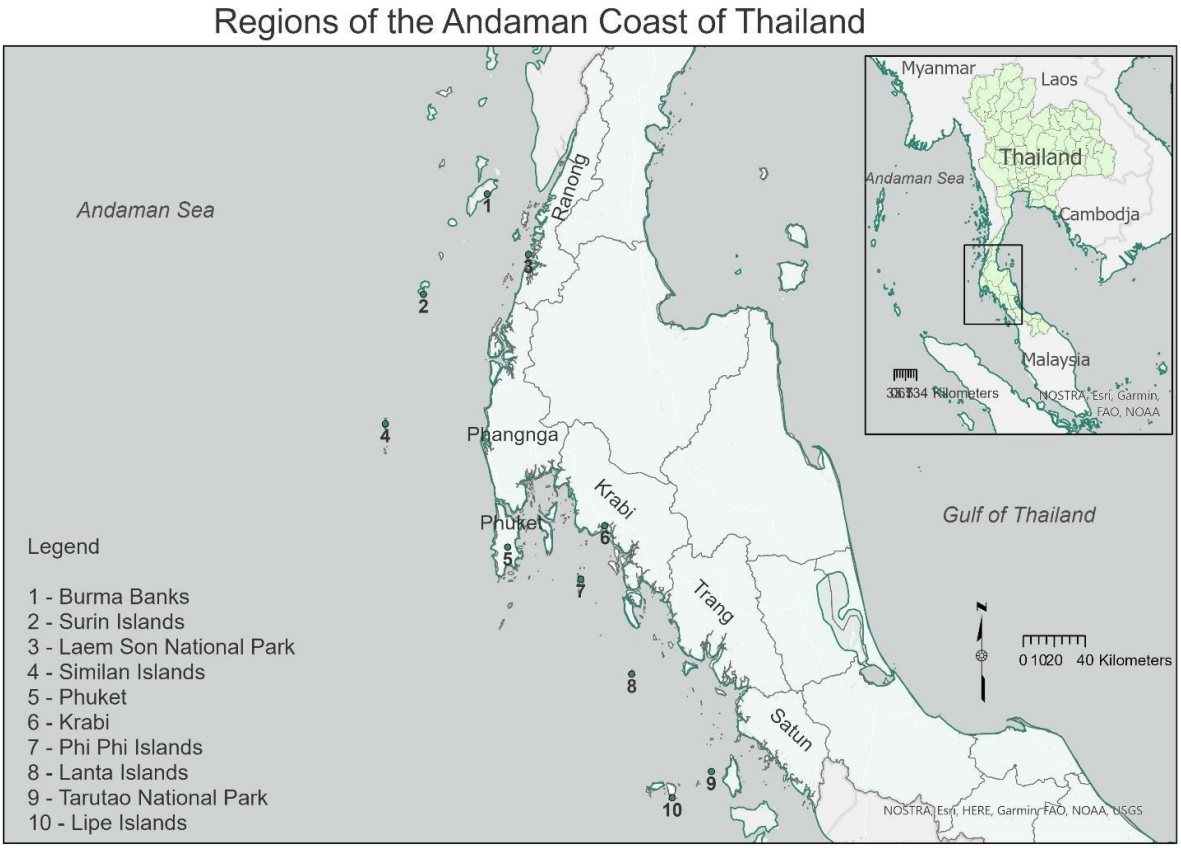
anyone was Laem Son (Figure 3 and Figure 4). This might be because the Laem Son region is under UNESCO heritage sites' protection, so the visits there are probably more controlled.

Figure 3 - Graph of the regions of interest visited by the SCUBA divers.



Source: Author; e-interview.

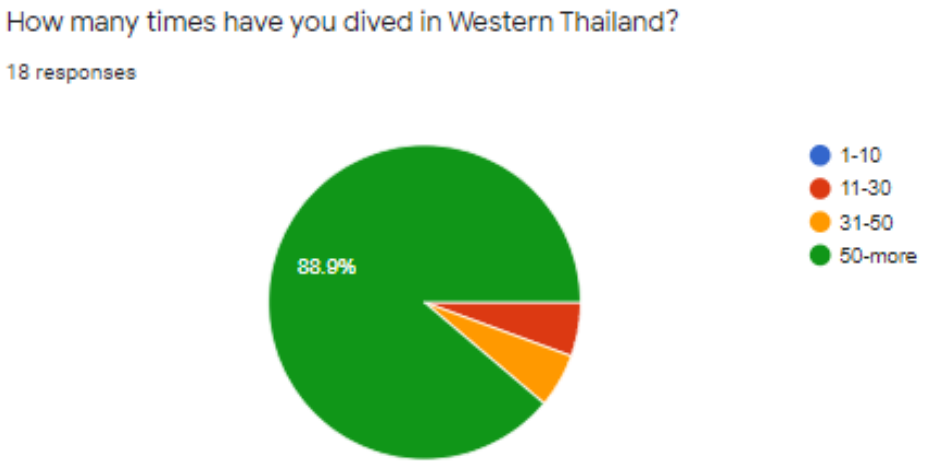
Figure 4 - Regions of the Andaman Coast of Thailand.



Source: Author.

Regarding their experience, most of them have instructor levels of SCUBA diving certification (83%) - with even one CMAS (World Underwater Federation) course director - and have dived more than 50 times in the Andaman region of Thailand (Figure 5). The respondents provided information of the period between their first and last dives in the region as well, and almost 40% have dived in Thailand for a period of more than twenty years, while 17% have informed a period within eleven and twenty years. Again, the majority of answers are from divers that have dived in the Southwestern part of Thailand within at least an eleven-year period.

Figure 5 - Graph showing how many times the SCUBA divers have dived in Thailand.



Source: Author; e-interview.

Establishing the profile pattern of the respondents is essential for justifying the approach of this study, which is tourism-related ecological impacts, policies and community involvement through the SCUBA divers' perspectives. This profile pattern shows that the respondents have been or had been in Thailand for a long time, so even if they are not nationals, they already have familiarity and understanding of characteristics of the marine environment in the study area, the policy framework related to it, and the local community engagement on this subject. In addition to this, supposedly when becoming a certified SCUBA diver, especially rescue and instructor levels, marine environmental conservation is part of the course, and since most of them are instructors, they have direct contact with tourists. Therefore, if added to the time they have been diving in that region, their knowledge on ecosystems health and tourism impacts should be of great value.

5.2 Status of Marine Ecosystem in the Andaman Coast of Thailand

In the e-questionnaire, the section responsible for addressing the status of the marine ecosystem consisted of four main questions. The first one asked the respondent to

compare the visible health of the environment on his/her first and last dives in the same area. For this, they were supposed to rank the visible apparent damage in a scale from 0 (not damaged) to 5 (severely damaged). By associating the condition of damage indicated by the respondent to the regions of interest where he/she has dived, it was possible to achieve an environmental indicator of perceived damage based on respondents (as a result of the average of all responses related to that specific region). It was also possible to compare the averages for each place considering all the responses and considering only the responses of those who have a period of at least 20 years between their first and last dives (Table 3).

Table 3 - Visible environmental indicator of damage (0-5).

Region of Interest	**Total Average**	**Average (+20 years)**
Burma Banks	4.6	5
Surin Islands	3.75	4
Laem Son National Park	Not Applicable	Not Applicable
Similan Islands	3.61	3.8
Phuket	3.8	3.77
Krabi	3.25	3.66
Phi Phi Islands	3.0	3.66
Lanta Islands	2.75	3.75
Turatao National Park	3.42	4
Lipe Islands	3.1	3.66

Source: Author. Note: This was not a statistical analysis based on a random sample, but the averages simply provide information based on the study sample that indicates that those within longer diving periods perceive more damage.

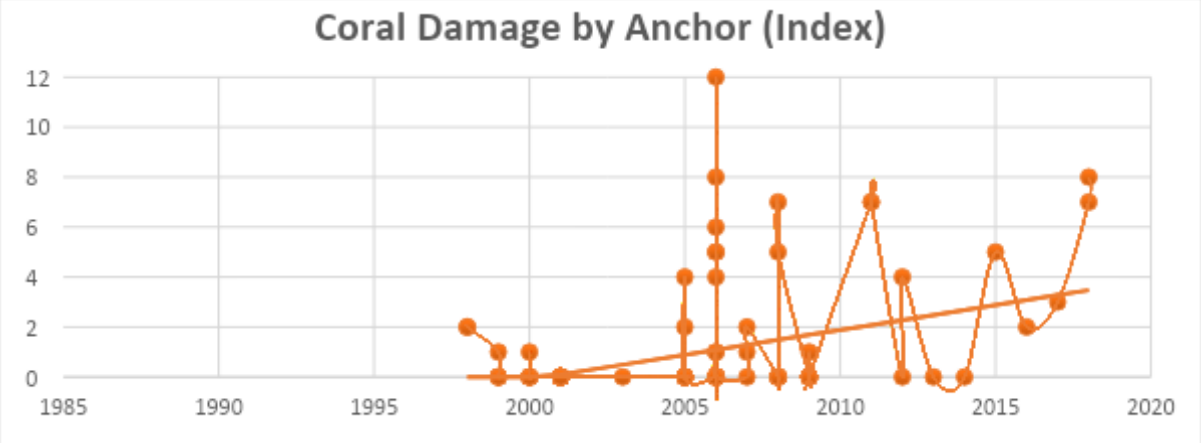
It is possible to notice that according to these experienced divers the damages on marine habitats observed in the regions studied are moderate to high, with a lot of loss of coral structure. In addition, when comparing the results from both averages, the indicator of damage increases, except for the Phi Phi Islands region, where it slightly decreases (0.3 points). It shows that when considering the former status of the ecosystems, divers perceive that a significant intensity of damage has occurred in a longer period. This perspective is in agreement with published research regarding coral reef's status of the Andaman Coast of Thailand. Phongsuwan *et al.* (2013) detailed the change in coral reefs' patterns in four regions of the Southwestern coast:

- The Similan Island region, where the percentage cover of coral reef decreased to 8.5% after 2010, from 30.6% in the former decade;
- The Phi Phi Island region, where the percentage cover of coral reef decreased to 22.5% after 2010, from 41% in the former decade;
- The Rok Island region (similar area as Lanta Island region used in this study) where the percentage cover decreased to 17.6% after 2010, from 39% in the former decade;
- The Adang- Rawi region (similar area as Tarutao National Park and Lipe Island) where the percentage cover decreased to 44.9% after 2010, from 57.8% in the former decade.

In addition to this, one of the indicators of the belt transect from Reef Check Foundation refers to coral damage due to anchoring, mostly from tourism boats in the Andaman Coast of Thailand (Figure 6), where 0 means no damage and 12 means maximum damage. In this graph, it is possible to observe that there are samples with zero

damage in almost every year in which data was collected. These sites are probably the same ones, and they probably refer to National Marine Parks such as Laem Son National Park in which management is efficient and the number of visitors remained low for this whole period (Nakamura and Sato 2017). Even in the respondents' answers, they indicate some differences in tourist numbers between the locations, with Phi Phi Islands always registered as the most touristic one. However, the trend line still indicates that this index has been increasing from a general perspective, which is one of the drivers of anthropogenic impacts on the marine environment in this area (Yeemin *et al.* 2001). The data shown in Figure 6 is also in accordance with the perspectives presented in the e-questionnaire.

Figure 6 - Graph showing the environmental coral damage related to anchoring boats.



Source: Author; Coral Reef Check.

The second and the third questions assessed the changes in benthic and pelagic biodiversity, according to these experienced divers perspectives. The results contain two categories: moderate to high change (decreasing) and none to low change (also decreasing) (Table 4). When analyzing the results, it is possible to notice that almost half of the respondents suggested that the changes in biodiversity were moderate to high and half of them suggested that there have not been changes in biodiversity or if there were, they were not so significant. However, if considering only the results from

the SCUBA divers who have dived for at least twenty years in the Andaman Coast of Thailand, it is possible to notice that 82% of them agreed that there has been a moderate to high decrease in pelagic abundance. At the same time, 73% of them have also agreed that there has been a moderate to high decrease in both benthic and pelagic richness and in benthic abundance.

Table 4 - Perspectives on biodiversity changes.

Decrease in biodiversity	Benthic Abundance	Benthic Richness	Pelagic Abundance	Pelagic Richness
Moderate-High	47%	47%	53%	47%
None-Low	53%	53%	47%	53%
Moderate-High (+20 years period)	73%	73%	82%	73%

Source: Author; e-interview.

The respondents could also indicate what has caught their attention regarding biodiversity loss and status of marine habitats in question 4. Within the eighteen comments, at least eight of them indicated a huge decrease in sharks and/or big fish. One of these experienced divers wrote “over time the ‘big fish’ have disappeared ... Zebra Sharks, Black Tips, Groupers...”. Another experienced diver gave even more details: “I worked in the dive industry in Thailand from 2005 to 2020 and have done 5000+ dives on the west coast from Hin Daeng/Hin Muang in the south, Koh Ha, Phi Phi, Phuket, Krabi, Similans, Surin, Burma Banks, Mergui Archipelago. One significant change is that I up to 2011 could always find Leopard Shark (or more correct Zebra Shark) around Phi Phi. As in ALWAYS and my record was 7 in one dive. Now I hardly see them there anymore”. These quotes align also with another respondent’s perspective (who was interviewed online), who again has been living in Thailand for

more than twenty years, has been a diving instructor for more than ten years in Thailand and now works supervising diving instructors in a Non-Governmental Organization called CORESea (Koh Pha Ngan – Thailand). One of his observations points out the existence of many giant pelagic species in The Similan Islands, such as large “Trevally” and “Spanish Mackerel” that were all gone in his last dives after a few years. Another point he makes is about Krabi, where he had worked as a diving instructor: “On the West Coast [of Thailand], interestingly, not a reduction in the biodiversity (as in richness), but a reduction in the biomass of fish. So the same species but not as many of. (…) If you are looking at pelagic and semi-pelagic species, the top predators, less of them, so less ‘barrakudas’, less ‘meckerrels’, ‘trevallis’, etc”.

Another particularly important aspect is the decrease in Manta Rays and other types of rays observed in the Southwestern Thailand Coast. One experienced diver wrote: “(…) less observations of Manta Rays, leopard sharks and reef sharks. Less large shoals of fish”. This may deeply affect especially The Similan Islands, which is a global tourism hotspot for Manta Rays sightings. Manta Rays are also flagships for marine conservation, so they could also serve as one indicator of ecosystem health (Rani 2020). Furthermore, a specific comment about the Similan Islands from one of the respondents states “Similan Islands, no sharks and very few rays”.

Regarding benthic biodiversity, one of the respondents, who has a scientific biological background, could provide specific details about the decrease he has observed: “Huge drop in number of benthic organisms, nudibranchs, seahorses, pipefish, moray eels. Also drastic reduction in reef fish such as groupers, sweetlips, snappers”. Most of the experienced divers focused on coral reef life decrease, including the specialist who was interviewed online. In his answer, he said, “Big reductions in hard coral cover,

particularly *Acropora,* essentially the hard corals that tend to live in shallow water, seem to be the most affected (…)". However, in his interview he also mentioned that the last time he dived in some regions of the Andaman Coast of Thailand, he had noticed some areas recovering, which may also explain some of the results in Table 4 above. He said: "(…) Although having said that, the last time I came back there seems to be quite a lot of regrowth in some areas, there were quite a lot of juveniles, which was really nice to see". This information is in accordance with some recent research results that suggested that despite the impacts from the coral bleaching event in 2010, the coral reefs in the Andaman Coast have presented high quantities of coral recruits and juveniles afterwards (Sutthacheep *et al.* 2018). It shows that in spite of the impacts climate change may cause, this region has shown a high resilience rate.

5.3 Conclusion

Considering the status of the marine environment of the Andaman Coast of Thailand, established in this chapter, it is important now to understand how these impacts relate to tourism. Especially considering the last content approached in this chapter, suggesting that coral reefs in the study area have shown resilience to climate change effects, it is essential to consider the relationship between reported damages (e.g., declines in certain species) and tourism activities.

6. Key Drivers of Tourism Related Ecosystem Damages in the Marine Environment and Changing Tourism Patterns

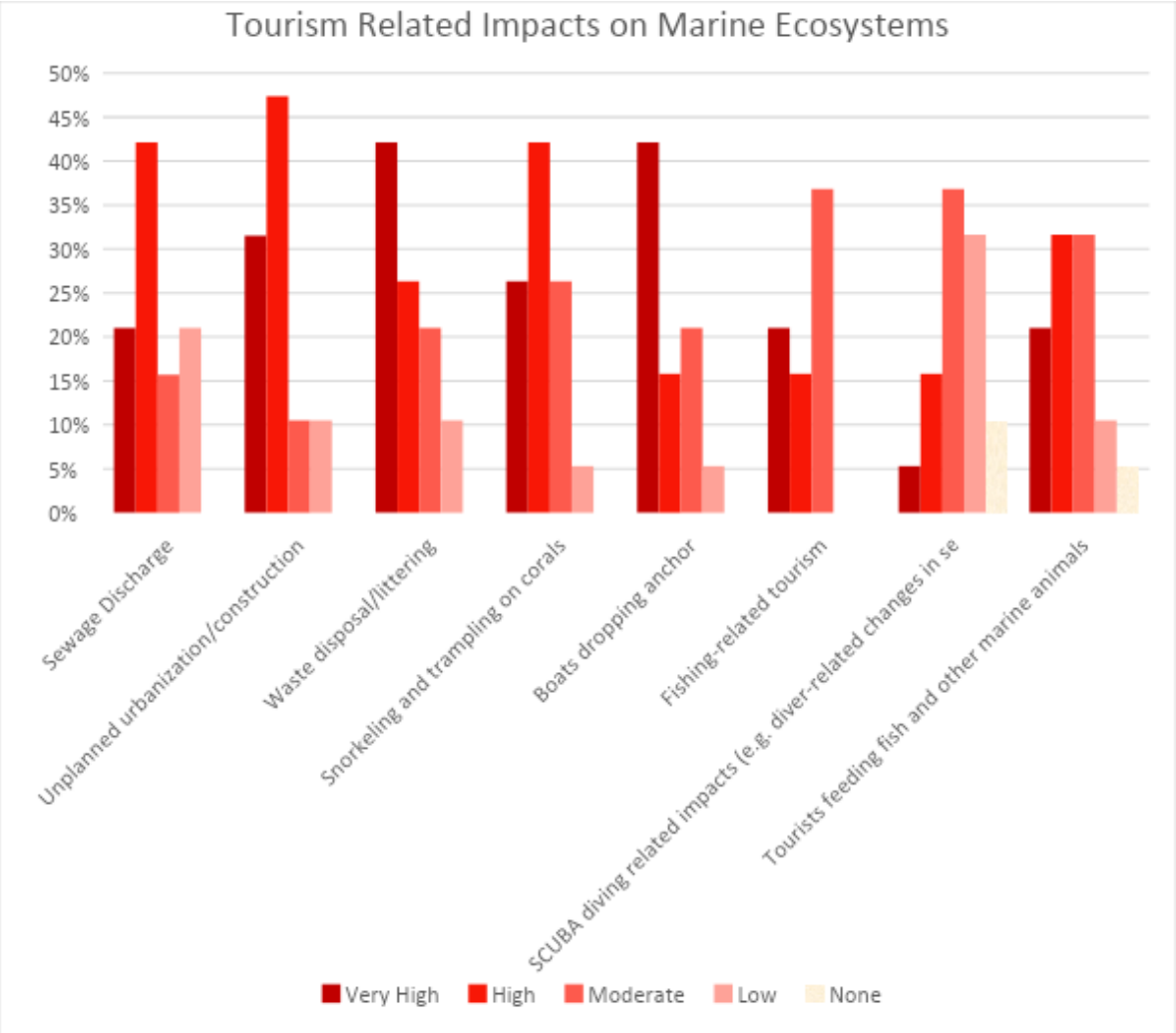
In the previous chapter, it was possible to understand the habitats' health, how it has changed through the years and specific indicators of some of the regions. Therefore, this chapter covers an assessment of tourism-related impacts and changes in tourism patterns over the years. It also covers these changes in relationship to the marine environment in the Andaman Coast of Thailand, as well as possible measures that the government has implemented in order to deal with these tourism related-impacts. This will give a solid background to understand tourism in relation to the status of the marine ecology of the region, in order to shed light on the challenges and opportunities for sustainable tourism in this study area.

6.1 Tourism Related Ecosystem Damage

The respondents of the questionnaire were asked to rank the degree of damage that each of specific tourism related impacts have had on marine ecosystems in the Southwestern coastal region of Thailand. The specific impacts were sewage discharge, unplanned urbanization/construction, waste disposal/littering, snorkeling and trampling on corals, boats dropping anchors, fishing-related tourism, SCUBA diving related impacts (e.g., diver related changes in sedimentation/turbidity, coral touching and damage, etc.) and tourism feeding fish and other marine animals (Figure 7). According to the perspective of divers, snorkeling and trampling on corals, waste disposal and littering, unplanned urbanization and construction, tourists feeding marine

animals and sewage discharge are the tourism related impacts that affect marine environment in the highest intensity.

Figure 7 - Graph showing how each tourism related impact has been affecting the environment according to the experienced divers.



Source: Author; e-interview.

Of course, speaking from a SCUBA diver perspective, there are some impacts that are more easily identified, which is the case of waste disposal, since they can actually see waste in the waters and snorkelers trampling on corals, for example. Conversely, sewage related impacts are not so easy to identify from this view. However, some of these results have appeared in previous studies regarding tourism-related impacts. Sewage discharge, for instance, and the subsequent input of nutrients that follows, had

42% of experienced divers indicating it has highly damaged coral reefs and 21% indicating it has had very high damage in coral reefs (Figure 7 above). This result is in accordance with related research that has shown that considering sewage discharge indicators, both water and reef quality usually decreases where tourism is intense, besides showing improved quality in reefs located within a biggest distance from sewage discharge (Reopanichkul *et al.* 2010).

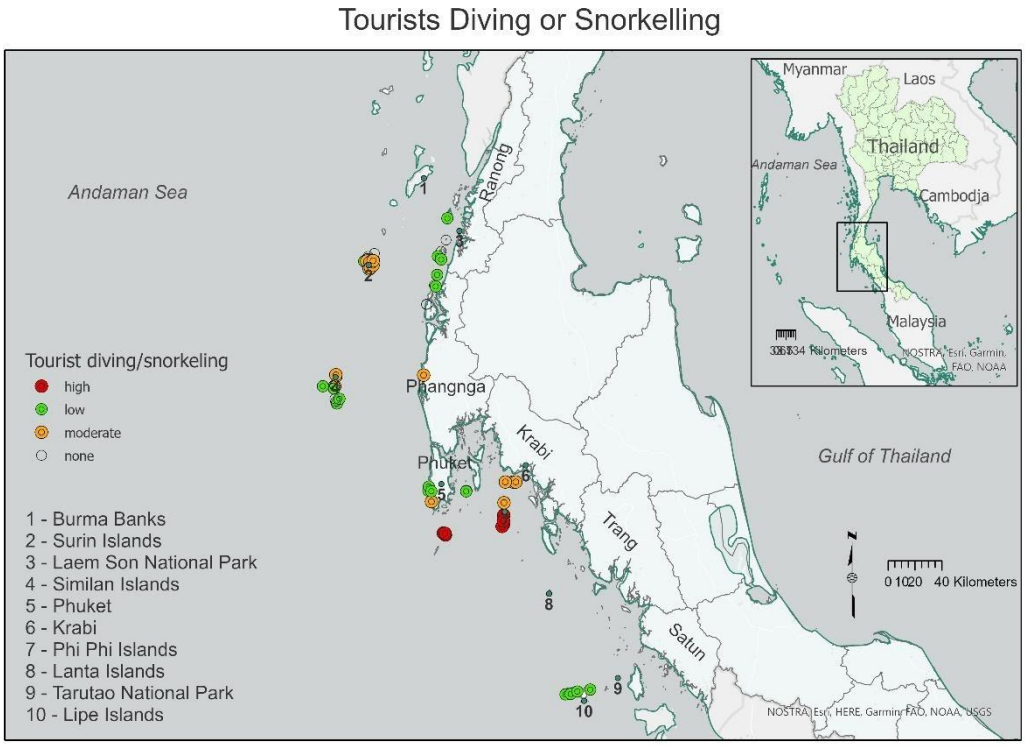
Moreover, unplanned urbanization and constructions have also been responsible for environmental damage, according to questionnaire answers and to the experienced diver properly interviewed. In the survey, 31,5% of respondents indicated a very high impact from this sector and 47,4% indicated a high impact. In the interview, the photographer and diving instructor has given examples on the Andaman Coast of Thailand of rapid and unplanned urban growth to attend visitors' needs. He cited Koh Lipe (Lipe Island), where fifteen years ago had only two diving schools, while now "it has 7 Eleven[3] stores", he said. Additionally, he reported that in 2016 or 2017 the Marine Park authorities have "cleaned out The Similans", where people had been settling beach bars on the islands completely illegally. This happened almost at the same time authorities closed Maya Bay (Koh and Fakfare 2020). In a general way, building of resorts, hotels, bars and other tourism related constructions have happened uncontrollably, with limited knowledge and environmental awareness as shown in Wongthong and Harvey (2014). Therefore, tourism development happened without any concern about wastewater treatment, energy effectiveness, rubbish management or surrounding ecosystems.

[3] 7-Eleven is a Japanese-American international chain of convenience stores

Direct impacts related to tourism are easier to visualize. According to the results from the graph above (Figure 7), 52% of respondents have suggested high or very high environmental impact level from tourists feeding marine animals in addition to almost 70% indicating a high or very high level of damage from snorkeling activities, especially the usually related trampling practice. This relationship between snorkelers and direct mechanical environmental damage appears in many previous researches (ONEP 2019; Yeemin *et al.* 2006; Juhasz *et al.* 2010).

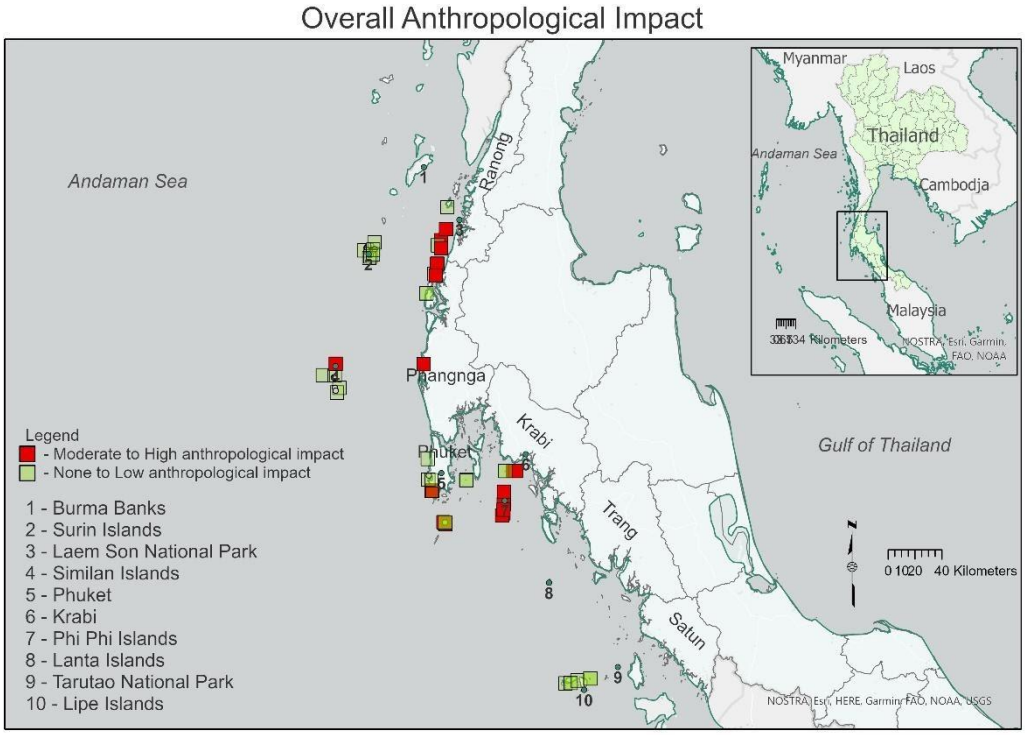
On the other hand, SCUBA diving activity was considered the less harmful activity when comparing all tourism related impacts approached here (only 5,3% of respondents indicated very high impacts and 15,8% indicated high impacts). There may be some bias when considering this result, since they are SCUBA divers, so usually they consider other impacts much more significant than theirs, which could be true. However, it does not mean SCUBA diving does not pose threats to marine habitats. Several studies have argued for the existence of deep effects in the environment due to lack of environmental awareness, abilities as a diver, holding up to corals, pushing corals with fins, etc. (Mason 2008; Worachananant *et al.* 2013). Furthermore, data from the Reef Check Foundation have shown that depending on the region, the quantity of tourists diving and snorkeling may directly relate to visual anthropological impact on coral reefs (Figure 8 and Figure 9).

Figure 8 - Map showing amount of tourists diving or/and SCUBA diving.



Source: Author; Reef Check.

Figure 9 - Map showing the overall anthropological damage identified in each sample region.



Source: Author; Reef Check.

In the online interview, the experienced diver gave his perspective on the SCUBA diving and snorkeling impacts on the marine environment. Here he explained a little bit how the respective damages happen: "(…) The average diver comes in contact with the reef ten times per dive. And that is an interesting statistic because that is regardless of their level of experience. (…) novel divers come in contact with the reef because they don't have the skills to avoid it and more experienced divers pump into them because they are obviously not quite as good as they think they are. Photography is awful; it is a disaster for the coral reefs (…) they (tourists with selfie sticks) are bumping into anything without any awareness. (…) People want to see fish, so you see a lot of tour guides throwing food into the water to get fish to come".

He has also expressed some concerns particularly about the SCUBA diving industry in Thailand: “Dive education, regardless of what training agency, all of the training agencies, they have really built into the education system and how we should not interfere with the marine environment (…). It’s difficult to point the fingers at the training agencies in that sense, because they have got it in their literature, in their training, but the responsibility lies really on the individual dive instructors and the dive schools (…) some diving instructors are much more concerned about the environment than others, who just don’t care”. In his speech, he mentions over-profiting diving schools who have had a “free ride” until now. This is clear when considering how much the diving industry has grown over the last decades (Figure 10). It is important to establish to what extent this sector is bringing education, awareness and profit, and use it as an opportunity, rather than coming to a point where the only goal is profit. This activity heavily relies on the quality of the environment, so there is a huge need for management plans and possible tradeoffs solutions (Tapsuwan and Asafu-Adjaye 2008).

Figure 10 - Total diving certifications issued by PADI offices.

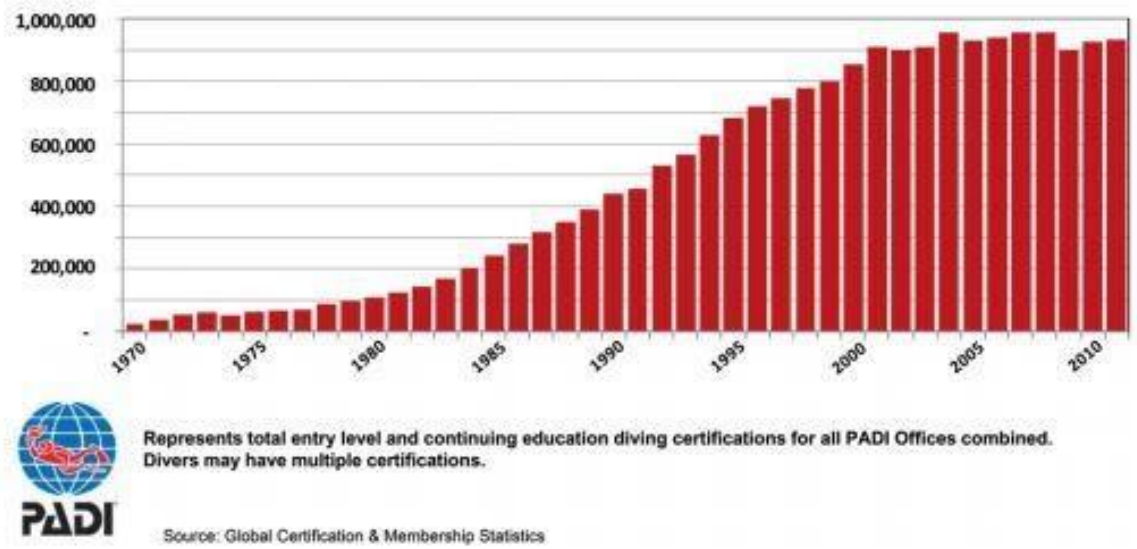


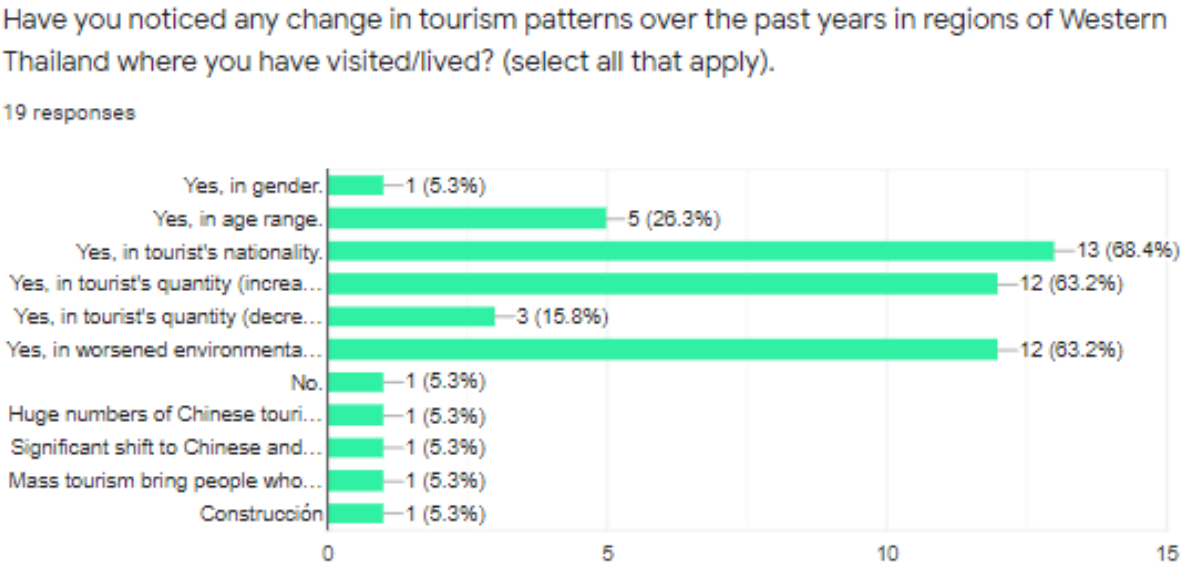
Fig. 13.3 Number of PADI diving certifications obtained worldwide from 1970 to 2011. (Adapted from PADI global certification and membership statistics (http://www.padi.co.kr/images/Statistics-Kor.pdf accessed 21/05/2018) with permission from PADI Worldwide)

Source: Padi Global Certification and Membership Statistics.

6.2 Tourism Patterns

In the e-questionnaire, respondents identified changes they might have noticed in tourism patterns over the years in the Southwestern region of Thailand. Besides the original answer options, some of them have also added other details as shown in Figure 11.

Figure 11 - Graph of changing tourism patterns in Thailand.



Source: Author; e-interview.

The options in order: “Yes, in gender” “Yes, in age range” “Yes, in tourists’ nationality” “Yes, in tourist’s quantity (increased)” “Yes, in tourist’s quantity (decreased)” “ Yes, in worsened environmental behavior (e.g. beach littering, more coral touching, etc.)” and “No”. The details the respondents added in order: “Huge numbers of Chinese tourists are less educated/aware of environmental issues and more likely to break the rules” “Significant shift to Chinese and Russian tourists. Very obvious increase in beach littering” “Mass tourism brings people who don’t care about ecotourism” “Construccion”.

According to these experienced divers perspectives, there has been a clear increase in tourists' quantity, a change of tourists' nationality pattern and a worse environmental behavior from them. In the online interview, the photographer and instructor have also given some details on this. According to him, before 2000 there were many European backpackers between 18 to 25 years old. A few years before 2010, "Russian tourism started on mass", he said, with a lot of money involved. After 2010, mostly 2014 onwards, the Chinese mass tourism exploded, accordingly with the explosion of the new middle class in China. Several sources have documented these shifts (Rungsrisawat 2017; Canals 2014; Wongthong and Harvey 2014) therefore it is important to understand how these changes in tourism patterns (from backpacking Europeans to Russian and Chinese mass tourists) have impacted and/or may impact marine ecosystems.

6.3 Tourism Patterns and Environmental Damage

When asked about any relationship that tourism patterns and environmental damage might have, all of the experienced divers correlated the increase in tourists' numbers and/or mass tourism to increase in marine environmental impact. They indicate the presence of too many boats and too many tourists, particularly too many non-swimming tourists, which increase the damage in the coral reefs because of their trampling behavior. One of the respondents wrote: "Untrained snorkelers, divers and uncaring boat operators who put profit before anything else have a huge responsibility for these changes (in the environment)". There was one response though, from a diving instructor living in Koh Lanta that indicated "Less snorkelers on speedboats = healthy reefs". This may either be a particularity from a specific region, probably inside Mu Ko

Lanta National Park's perimeter, since nobody else specified a decrease in snorkeling tours and tourists.

In the beginning of the sustainable tourism research realm, a specific tourism pattern was the only one that fell into this classification status. However, the concept has evolved, now it considers the whole tourism context and specific features of the region in order to establish goals to achieve sustainable tourism (Bramwell *et al.* 2017). From this perspective, there is an acceptance of mass tourism, however, this shall too be under well managed tourism development plans and respective implementation, considering carrying capacity and environmental recovery (WTTC 2017).

Although an increased quantity of tourists was highly suggested as a main driver of environmental damage, change in the nationality pattern is the most important one from the respondents' perspective. Along with tourists' nationality, comes the environmental awareness and education backgrounds they may or may not have received in their culture. Besides, each nationality has a different interest when talking about tourism. One of the experienced divers explained the changes in this quotation: "30 years ago, tourists were younger, more sporty, and more aware of the dangers and impact of mass tourism on the environment. In the last 10 years, mass tourism, Asian tourism, and generally less educated, new rich tourists came to Thailand without any knowledge and care about the sea, the corals, and the environment. (…) older, richer and less sporty tourists who come and destroy the sea and reef by walking on it for instance". While another experienced diver also indicated lack of environmental awareness in Russian tourists: "Yes - many Russian tourists do not dive and prefer to have beach holidays or go on day long snorkeling trips to feed fish (which is very damaging). The increase in beach tourism has led to much higher levels of beach

littering with resultant washing onto reefs. I have also noticed that divers from some countries very noticeably have poorer diving skills that often result in reef damage". Wongthong and Harvey (2014) and Singh (2017) have discussed specific characteristics of Chinese tourists, and they have pointed out the lack of knowledge and skills, the lack of environmental awareness and their main purpose of traveling to marine areas, which is to take pictures and being able to walk on the reefs.

Another important aspect is that many new tourists (mostly Russian and Chinese) do not speak English, which makes it impossible to communicate rules and regulations, making it easier for tourists to break them. One of the experienced divers reported collection, touching and stepping on top of all fragile marine life in shallow water. Additionally, several respondents stated the lack of caring from the tour guides, since "they are really happy to have a job". This can also suggest the vulnerability in employment in some regions.

At last, according to the experienced diver instructor and photographer interviewed, lack of awareness of specific nationalities (e.g. Chinese and some other Asian countries) have caused intense marine ecosystem damage due to a disconnection between tourists and environment. He said: "Primarily just a lack of awareness, people just aren't aware. If you are coming from a large urban environment to a beach destination in Thailand, you just don't have the awareness that the ecosystem that exists under the water is a sensitive environment, whereby it's susceptible to mechanical damage, just by walking on it, it could have a very negative impact. Also, a lot of people have this disconnection, so it is like it's a theme park. **They don't quite see it as a living functioning ecosystem; it's there for their entertainment** (…)".

6.4 Measures Currently Tackling Ecological Issues Related to Tourism in the Andaman Coast of Thailand

The last question of this section in the questionnaire relates to measures currently running in order to deal with ecological issues related to tourism impacts, either by government authorities or by the tourism industry in a general way. The results in Figure 12 show that the most adopted measure, according to the experienced divers, is the installation of fixed mooring buoys so there is anchoring in the coral reefs. It is indeed an important measure to establish in this region, because of the impact that this practice has shown (Figure 6, in the previous chapter). This measure is a well-known implemented one and it has been well documented in previous research, together with several creations of coral recovery sites, although this last practice has not been really effective if the main drivers of damage are not controlled (Yeemin *et al.* 2006).

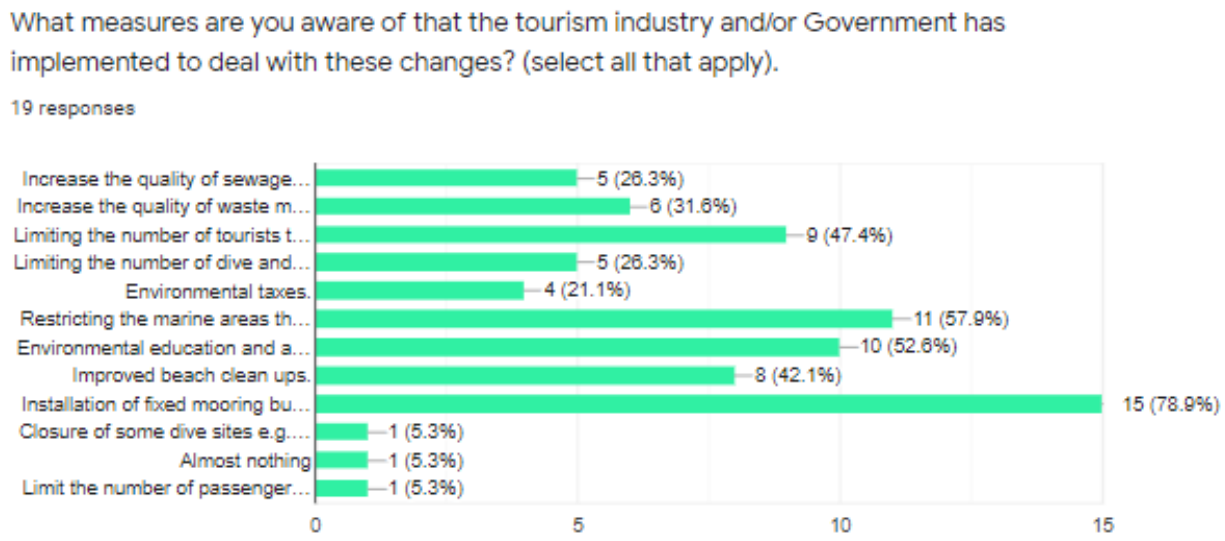
In their perspective, restricting marine areas that can be visited and environmental and awareness programs have also been somehow successfully implemented. However, the environmental awareness and education programs are majorly associated with SCUBA diving schools, via PADI Project Aware[4] and to any other Non-Governmental Organizations, such as Green Fin[5]. According to the experienced photographer and diving instructor interviewed, “Green Fin has been printing materials in Thai, English, Chinese, Russian, so you have snorkeling tours that have this information available,

[4] PADI AWARE Foundation is a publicly funded non-profit and PADI AWARE programs address the key threats facing the marine environment

[5] Green Fin is an initiative that protects and conserves coral reefs through environmental guidelines that promote a sustainable diving and snorkelling industry.

where they explain ten points to responsible tourism". Therefore, there has been an attempt to increase the quality of this measure.

Figure 12 - Graph of existing measures tackling ecological issues related to tourism in the Andaman Coast of Thailand.



Source: Author. E-interview.

Measures in order: "Increase the quality of sewage treatment systems" "Increase the quality on waste management" "Limiting the number of tourists to certain locations" "Limiting the number of dive and/or snorkeling boats per area" "environmental taxes" "Restricting the marine areas that can be visited" "Environmental education and awareness programs" "Improved beach clean ups" "Installation of fixed mooring buoys for dive and/or snorkeling boats". Measures added by interviewed divers in order: "Closure of some dive sites e.g. Koh Bon" "Almost nothing" "Limiting the number of passengers per boat (1:20) and ban speedboats on snorkeling and diving zones".

6.5 Conclusion

Understanding how tourism related activities impact marine ecosystems and what the current characteristics of this industry in the study area are, is extremely important to establish a background for possible tourism management plans. Following previous

discussions of this research, sustainable tourism considers a whole range of variations in tourism features in order to come up with the best solutions to reach a sustainable tourism path. This way, it is necessary to understand current measures and issues related to them, but the results here only show that, although there have been advances, there is still a long way to go, especially considering indirect damage. Accordingly, the next chapter addresses the challenges and opportunities for a sustainable tourism path in the Andaman Coast of Thailand.

7. Additional Challenges and Opportunities for a Sustainable Tourism Path

This last “results and discussion” chapter considers the background that the previous chapters have constructed by establishing the status of marine ecosystems, the extent of tourism-related ecological impacts with respective patterns in tourism industry and the context of measures that are already ongoing in the Andaman Coast of Thailand regarding tourists’ activity. In further addressing the research question, this chapter begins with a discussion on the perceived effects of COVID-19 travel restrictions in tourism related impacts and activities, followed by a quick assessment on community involvement in decision making process and enforcement, and ends with sustainable tourism perspectives and challenges and opportunities towards achieving sustainable tourism goals.

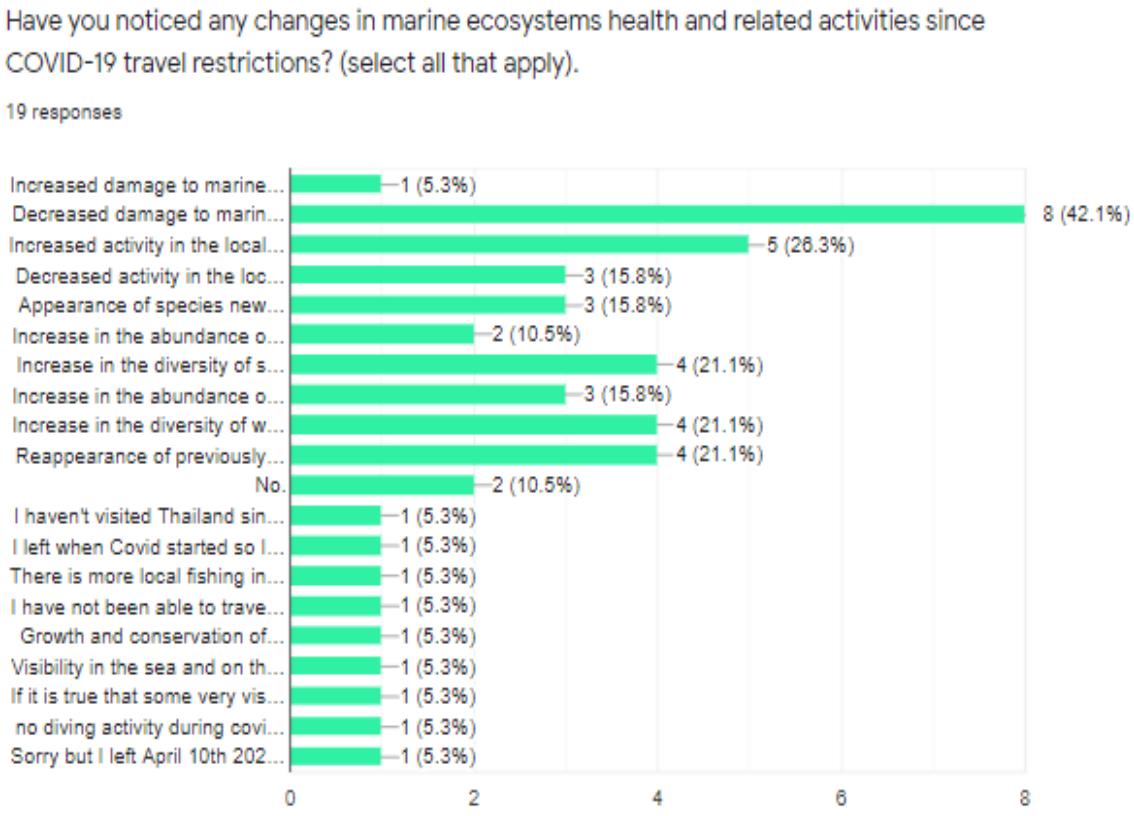
7.1 Covid-19 Travel Restrictions effects in Marine Ecosystems Health and Related Activities

While COVID-19 posed severe threats to the hospitality industry and to tourism in a general way (Pillai et al. 2021), it may have had some beneficial impacts on marine health in specific locations. In the last section of the e-questionnaire, the experienced divers that filled out the questionnaire indicated whether they have noticed changes in marine habitats health or not, and their related activities (Figure 13). The main change they addressed is a decrease in damage to marine ecosystems, which could also be a logical inference since there are less tourists, less activities in the coral reefs, less noise, less anchorage, and a general decrease in all tourism related activities. Besides, no extreme natural phenomena have happened during this period, which means

neither coral bleaching nor extreme storms have been documented. Some participants have added some notes stating “growth and conservation of corals and their reefs”, “no diving activity during COVID” and increased visibility of seawater.

Another interesting observation is that many respondents suggested an increase in the local fishing industry. A good portion of tourism boats correspond to fishers who shifted to the tourism industry when it started to grow (Yeemen *et al.* 2006), so with the lack of tourists they may have shifted back to their original activity. Some respondents stressed the increase in local fisheries and even gave some details concerning fishing in Marine Parks: “Unfortunately, as local fishing communities don’t get money from tourists, they compensate for that by overfishing and collecting all types of shells, mollusks and sea cucumbers from the sea”. There were several comments on how fishing does not respect prohibitions of certain areas of Marine Parks and on the amount of fishing related garbage, such as fishnets. Other comments even report park rangers fishing when there is no tourism activity: “The big problem with Koh Rok is that all the national park rangers there are regularly fishing when there are no tourists around. Very sad that they are damaging the place that they are meant to be protecting”.

Figure 13 - Changes in marine ecosystems health and related activities since COVID-19 travel restrictions.



Source: Author; e-interview.

Changes in order: “Increased damage to marine ecosystems” “Decreased damage to marine ecosystems” “Increased activity in the local fishing industry” “Decreased activity in the local fishing industry” “Appearance of species new to the area” “Increase in the abundance of seabed animals (e.g. clams, sea cucumbers, starfish, etc)” “Increase in the diversity of seabed animals (i.e. greater range/variety of different species)” “Increase in the abundance of water column animals (e.g. fish, sharks, rays, etc)” “Increase in the diversity of water column animals (i.e. greater range/variety of different species)” “Reappearance of previously lost species” “No”. The last options were added by the participants. Four of them say that the respondents have not been in Thailand during this period, the other ones are addressed in the main text.

On the other hand, some respondents have also indicated a decrease in the local fishing activities. This could be due to reduced fish consumption, because of the lack of tourists, but they have not added any other comment on this matter. Conversely, the results of this question also show an increase in diversity of both seabed animals and water column ones, together with reappearance of previously lost species, according to these experienced divers' perspectives. This pattern agrees with latest news on one of the most affected and tourist-crowded regions, the Phi Phi Islands, where large schools of blacktip sharks have reappeared (Promchertchoo 2021). In the interview, the experienced photographer and diving instructor has mentioned he has not been in the Andaman Coast of Thailand post COVID-19 restrictions, however, he has been diving in the Gulf of Thailand. Trying to make a parallel, he reported seeing more marine mammals, probably because of less noise, and seeing more turtles as he explained: "I think that is also because during nighttime, the beaches are darker, they are not so bright and so noisy, which would determine, particularly if they are coming in to nest".

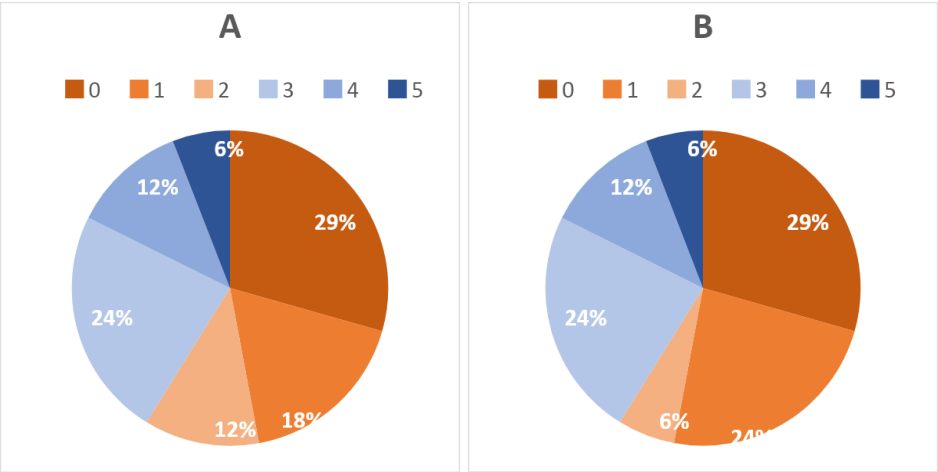
It is still not certain whether travel restrictions have done more bad or good to marine environmental health, so more research would help in this matter. However, it did decrease drastically the quantity of visitors, which can pose opportunities to the sustainable tourism path. It is a chance to restructure the tourism industry, and to try to manage how it will develop from now on (Sobaih et al. 2021). According to the online interviewed diving professional, developing sustainable infrastructure is the main goal now, he said: "I think the opportunity that Thailand has would be to develop sustainable infrastructure for tourism". This an interesting point since it also addresses indirect impacts from tourism, such as sewage discharge, water usage, etc. He also added that now there are no disruptions, so it is possible to structure and put into place structures

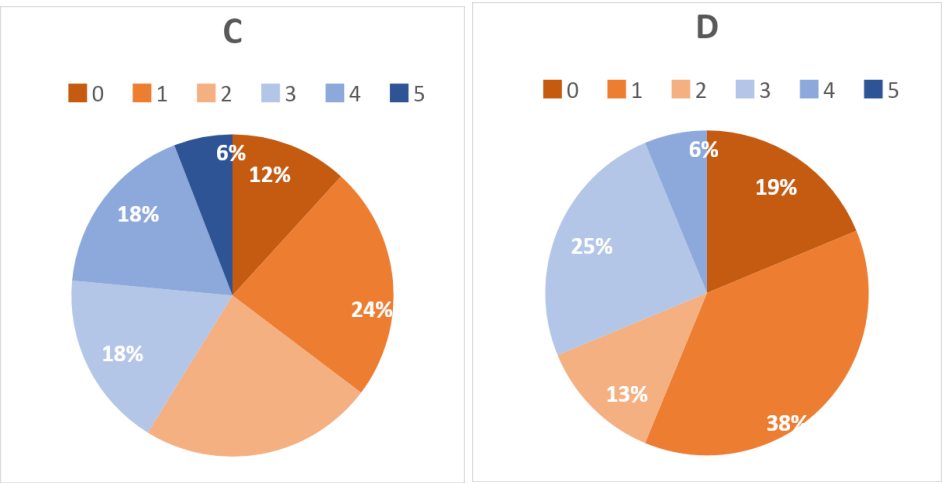
that takes accountability for waste disposal, water usage, electricity and solar energy, sewage discharge and treatment, etc., which has been one main issue regarding tourism constructions in this region (Wongthong 2014). Likewise, some respondents of the e-questionnaire have indicated “Increase in building control, better sewage treatment, reduction in single-use and disposable plastic” as a possible opportunity to assist promoting sustainable tourism goals.

7.2 Community Involvement and Governance

Still in the e-questionnaire, experienced divers indicated to what extent they were aware of community participation in decision-making and monitoring processes (Figure 14). Regarding decision-making processes regarding environmental issues and the tourism industry, around 60% of the respondents have declared the existence of none to low participation of the local community. Regarding management and monitoring processes around marine environmental issues and the tourism industry, around 65-70% reported none to low local involvement. Although a few participants have indicated some presence of the local residents in the policymaking and enforcement realm, there is still a big gap on this issue (Polnyotee and Thadaniti 2015).

Figure 14 - Local community involvement in tourism and environmental related processes.





Source: Author. A = Decision-making processes around addressing marine environmental issues. B = Management and monitoring processes around marine environmental damage/issues. C = Decision-making processes in the tourism industry. D = Management and monitoring of the tourism industry.

Still inside the community participation analysis, there are discussions in the literature concerning what the best type of approach would be in the sustainable tourism sphere and respective principles. Considering the background built up to this point of this study, top-down approaches of government using ecosystem-based Marine Protected Areas and fisheries embargos, could be the best choice to a region where the economy is mostly based on tourism (Yacob *et al.* 2007; Munga *et al.* 2012). However, results from this study have shown lack of effectiveness of law enforcement, especially in Marine National Parks. One of the experienced divers that answered the survey has proposed as a measure to reduce marine ecosystem damage the enforcement of more patrols at night, for example, in Marine Protected Areas, he reports: “Fishermans get inside and fish there often”.

In a comparison, bottom-up approaches with collaborative management should promote empowerment of local communities (small-scale fishers, tourism operators) so they would self-regulate, which could be a way to bring resilience (Cinner *et al.* 2012; Weeks and Jupiter 2013). Nonetheless, in spite of having significant societal

benefits, some studies in the Indian Ocean and Indo-Pacific indicated that this type of governance does not necessarily improve fish biodiversity and ecosystem health, besides the possibility of monopolization by large resorts and tourism businesses (Levine and Richmond 2014; Cinner *et al.* 2012). Therefore, a decision making system that puts together Government-Local forms of co-management, where a top-down approach is used to ensure local participation and enforce management of established Protected Areas and regulations, with an additional involvement of some experts and scientists may present a better choice in this context. Besides the obvious governance realm, this approach would also cover education and awareness, leading to better choices from the community, which would represent a decrease in both direct and indirect impacts on the environment. Consequently altogether this would promote environmental, social and economic sustainability, hence, sustainable tourism (Weeks and Jupiter 2013; Wongthong and Harvey 2014). Accordingly, one of the diver respondents added as a possible way of dealing with law enforcement and tourism impacts challenges: “Empower local communities to police their local ecosystems, conservation awareness programs implemented, allow NGO and volunteer organizations to assist by removing the restrictions on visa and work permits”.

7.3. Additional and Final Considerations

In addition to everything that has been addressed, there are still some further details to acknowledge. Even though questionnaire respondents and the expert interviewed have indicated that Thailand has a good regulatory framework concerning environmental impacts and tourism related activities, there are still some challenges to address. According to the experienced divers that answered the e-questionnaire, there is a clear need to establish limiting amounts of both boats and tourists for each specific

location, one of them specified: “Create a quota to manage the number of tourists appropriate for the carrying capacity of the coral reef”. Besides, they also indicated an urgent implementation of education and environmental awareness programs, for the local community, so they can help in this matter, and for tourists. One of the interviewed stressed: “That the Thai government invests in educating the population and in its national parks, enforcing strict regulations for their use”. Sombatsubsin (2015) analysis equally suggests the need to revise The Master Plan and Ministerial Regulations and Proclamations, since they might not be suitable for current circumstances. They lack regulation on feeding or harming wildlife from tourism activities, besides not including some diver-attractive animals (e.g. Manta Rays and seahorses). This represents a big challenge in the tourism industry, because business as usual contexts tend to be more easily accepted, however they have also been documented as the most impacting ones (ASEAN 2012).

Another challenge based on the e-questionnaire responses is the overlapping jurisdictions of Marine Parks. For this matter, one respondent proposed: “Have only one Ministry in charge of regulation to protect the ecosystem as today, TAT, DMCR, DNP, Thai Navy, etc., make their own regulations and at the end nobody respects them”. At last, from the experienced divers’ perspectives, other possible opportunities in the post pandemic period include but are not limited to coastal and marine zoning, establishment of beginners snorkelers or divers areas; closing some areas; and building of other purposes tourist destinations. Within other examples, the later suggestion indicates opportunities in developing cultural tourism, for instance, which has also been addressed by Kim *et al.* (2019).

7.4 Conclusion

This chapter addressed challenges and opportunities related to sustainable tourism goals in the Andaman Coast of Thailand considering its background and previous discussed features. COVID-19 has brought a complex situation where it may have brought more fishers inside the waters, which is a challenge, but at the same time, it may provide opportunities for animal life to expand their distribution, for ecosystems to start regaining their health and for tourist infrastructure to be more sustainable. Equally, community involvement may both be a challenge or an opportunity depending on how it happens. For this matter, an adaptive co-management approach may be the best option promoting environmental, economic and social sustainability, therefore sustainable tourism. At last, some remaining challenges regarding tourism management and possible solutions such as restricting the number of visitors and boats, as well as reviewing regulations are also suggestions, together with better management and law enforcement in Marine Parks.

8. Conclusion

The methodology approach used in this study allowed a multi perspective discussion on tourism related marine environmental impacts and a possible path towards sustainable tourism. The experienced divers e-questionnaire and online interview gave a fundamental perspective of one group of the local community who is deeply involved in the tourism industry. Their experience diving gave them the expertise needed to report environmental health and their experience in tourism activities gave them the expertise to address the relation of this activities with possible ecological issues. Therefore, it was also possible for them to suggest what may work when aiming a sustainable tourism approach and what has been working. The secondary raw data was also important in this research, because they allowed the visualization of important features for this discussion, such as anchoring damages on coral reefs and most visited diving and/or snorkeling sites.

This study has shown that according to these experienced divers perspectives, through the past decades there has been a decrease in marine ecosystems health, especially when considering coral reefs and pelagic species. Impacts from snorkeling and trampling on corals, waste disposal and littering, anchoring of tourism boats and sewage discharge has presented great threat to the rich coral reefs that inhabit the Andaman Coast Of Thailand. Although there has been a lot of damage because of the coral bleaching event of 2010, this region has shown high recovery potential, so it is an opportunity for implementing measures that will prevent more damages to occur.

Some changes in tourism patterns have also been related to environmental harming, according to the experienced divers. They include, but are not limited to an increase of tourists' quantity, with a mass tourism pattern growing through the past decades and

a significant shift in tourists' nationality, with increase of Russian and Chinese people. Still considering the respondent's reports, these nationalities tend to have less environmental awareness, so they have posed more threats to marine health.

The experienced divers have made several suggestions to identified challenges in the sustainable tourism path, such as limiting number of tourists, better law enforcement in Marine National Parks and managing tourism related constructions. On the other hand, several opportunities have been identified, especially in a post pandemic context when travel restrictions still apply. In this case, a sustainable tourism infrastructure, an adaptive co-management governance approach and education programs for both local community and tourists are expected to lead the tourism industry of the Andaman Coast of Thailand towards a sustainable tourism path.

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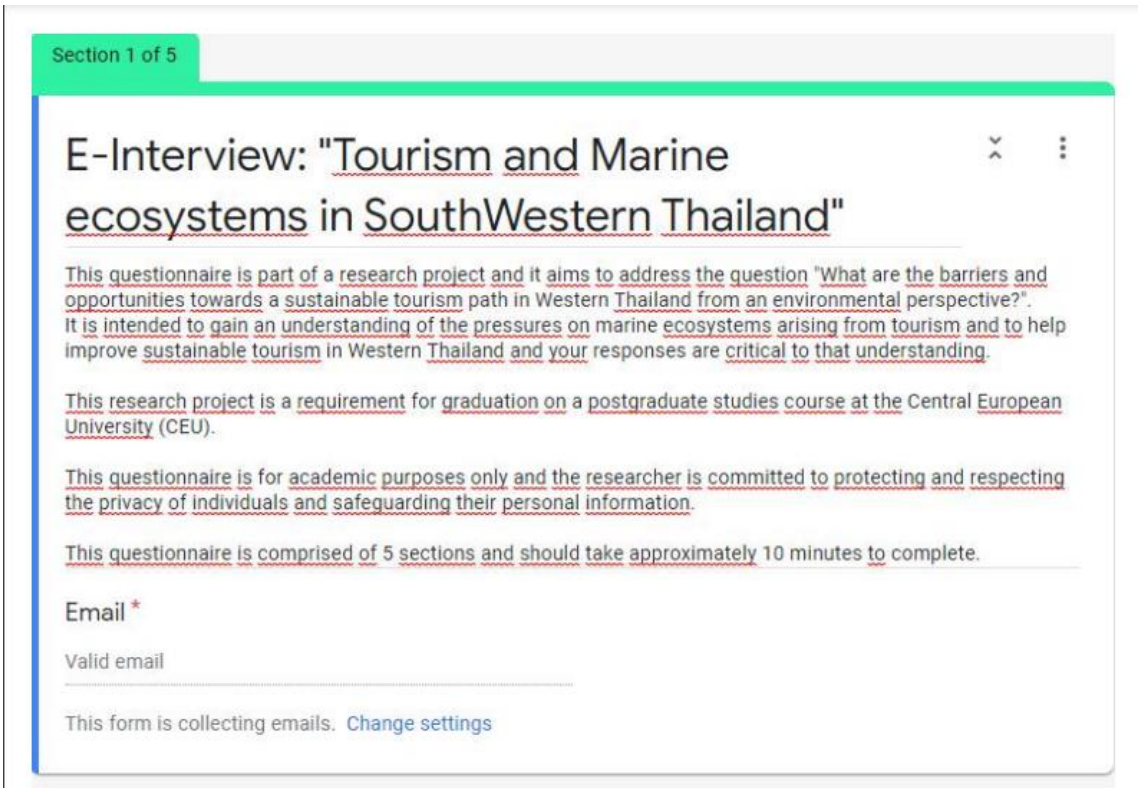
10. Appendix 1



Section 1 of 5

E-Interview: "Tourism and Marine ecosystems in SouthWestern Thailand"

This questionnaire is part of a research project and it aims to address the question "What are the barriers and opportunities towards a sustainable tourism path in Western Thailand from an environmental perspective?". It is intended to gain an understanding of the pressures on marine ecosystems arising from tourism and to help improve sustainable tourism in Western Thailand and your responses are critical to that understanding.

This research project is a requirement for graduation on a postgraduate studies course at the Central European University (CEU).

This questionnaire is for academic purposes only and the researcher is committed to protecting and respecting the privacy of individuals and safeguarding their personal information.

This questionnaire is comprised of 5 sections and should take approximately 10 minutes to complete.

Email *

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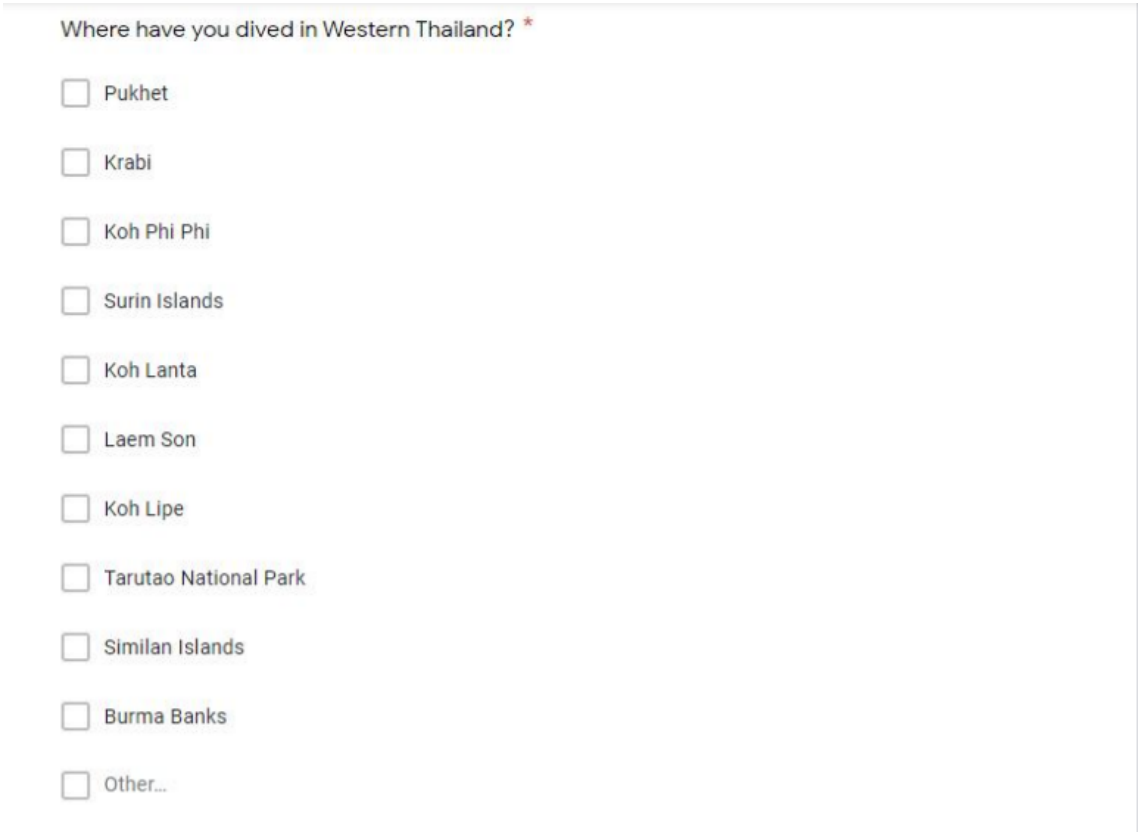


Where have you dived in Western Thailand? *

- [ ] Pukhet
- [ ] Krabi
- [ ] Koh Phi Phi
- [ ] Surin Islands
- [ ] Koh Lanta
- [ ] Laem Son
- [ ] Koh Lipe
- [ ] Tarutao National Park
- [ ] Similan Islands
- [ ] Burma Banks
- [ ] Other...

How many times have you dived in Western Thailand? *

- 1-10
- 11-30
- 31-50
- 50-more

What is the time period between your first dive in Western Thailand and your last? *

- Less than one year
- 1-3 years
- 4-7 years
- 8-11 years
- 11-20 years
- More than 20 years

What is your diving certification level? *

- Open Water or Advanced
- Rescue
- Dive Master
- Instructor
- Other...

After section 1 Continue to next section

Section 2 of 5

Marine ecosystem's conservation status in Western Thailand

Please consider the data before COVID-19 travel restrictions.

Comparing the visible health of marine ecosystems between your first and last dives in Western Thailand, what condition did you think the ecosystems were in when you undertook your last dive? Please indicate on a scale of 0 to 5 the level of damage. *

	0	1	2	3	4	5	
It did not look damaged, the structure remained almost the same.	○	○	○	○	○	○	Intensively damaged, some of the coral reefs' structures have even disappeared.

How would you classify the changes in the biodiversity of animals on the seabed (e.g. corals, crustaceans, seastars, sea cucumber, sea worms, clams, etc.) noticed between your first and last dives? *

0 = No changes at all; 5 = Dramatically changed. Extremely poor in my last dive if compared to my first dive in the same area.

	0	1	2	3	4	5
Abundance (...	○	○	○	○	○	○
Richness (va...	○	○	○	○	○	○

How would you classify the changes in the biodiversity of organisms that inhabit the water column (e.g. fish, whales, sharks, rays, turtles, jellyfish, etc.) noticed between your first and last dives? *

0 = No changes at all; 5 = Dramatically changed. Extremely poor in my last dive if compared to my first dive in the same area

	0	1	2	3	4	5
Abundance (...	○	○	○	○	○	○
Richness (va...	○	○	○	○	○	○

Is there anything in particular that has caught your attention in terms of marine biodiversity loss and/or ecosystem damage through the years you have dived? If possible, please identify the location. *

Short answer text

After section 2 Continue to next section

Section 3 of 5

Tourism related ecosystem damage in marine environments in Western Thailand

Please consider the data before COVID-19 travel restrictions.

What is the degree of damage that you think each of these tourism related impacts has had on marine ecosystems in Western Thailand? *

	Very high	High	Moderate	Low	None
Sewage dischar...	○	○	○	○	○
Unplanned urba...	○	○	○	○	○
Waste disposal...	○	○	○	○	○
Snorkeling and ...	○	○	○	○	○
Boats dropping ...	○	○	○	○	○
Fishing-related ...	○	○	○	○	○
SCUBA diving r...	○	○	○	○	○
Tourists feedin...	○	○	○	○	○

After section 3 Continue to next section

Section 4 of 5

Tourism Patterns

Please consider the data before COVID-19 travel restrictions.

Have you noticed any change in tourism patterns over the past years in regions of Western Thailand where you have visited/lived? (select all that apply). *

- [ ] Yes, in gender.
- [ ] Yes, in age range.
- [ ] Yes, in tourist's nationality.
- [ ] Yes, in tourist's quantity (increased).

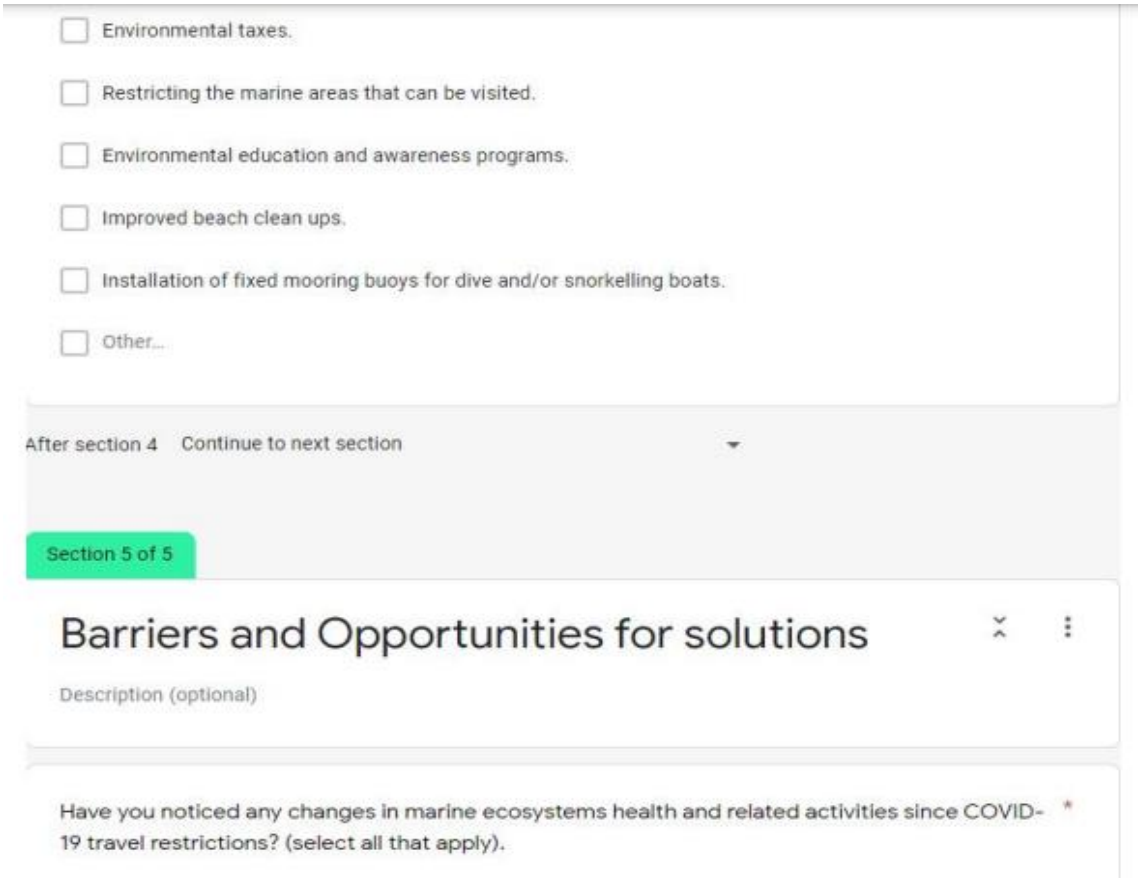
- [ ] Yes, in tourist's quantity (decreased).
- [ ] Yes, in worsened environmental behaviour (e.g. beach littering, more coral touching etc.)
- [ ] No.
- [ ] Other...

Do you think there is any relationship between these changes on patterns and impacts to the marine ecosystem? Please explain. *

Short answer text

What measures are you aware of that the tourism industry and/or Government has implemented to deal with these changes? (select all that apply). *

- [ ] Increase the quality of sewage treatment systems.
- [ ] Increase the quality of waste management.
- [ ] Limiting the number of tourists to certain locations.
- [ ] Limiting the number of dive and/or snorkelling boats per area.



Have you noticed any changes in marine ecosystems health and related activities since COVID-19 travel restrictions? (select all that apply). *

- [ ] Increased damage to marine ecosystems.
- [ ] Decreased damage to marine ecosystems.
- [ ] Increased activity in the local fishing industry.
- [ ] Decreased activity in the local fishing industry
- [ ] Appearance of species new to the area.
- [ ] Increase in the abundance of seabed animals (e.g. number of clams, sea cucumbers, starfish etc.)
- [ ] Increase in the diversity of seabed animals (i.e. greater range/variety of different species).
- [ ] Increase in the abundance of water column animals (e.g. number of fish, sharks, rays etc.).
- [ ] Increase in the diversity of water column animals (i.e. greater range/variety of different species).
- [ ] Reappearance of previously lost species.
- [ ] No.
- [ ] Other...

To what extent are you aware of the local community being involved in the following processes in Western Thailand: *

0 = Not involved at all; 5 = Deeply involved.

	0	1	2	3	4	5	Not applic...
Decision-...	○	○	○	○	○	○	○
Manageme...	○	○	○	○	○	○	○
Decision-...	○	○	○	○	○	○	○
Manageme...	○	○	○	○	○	○	○

What, if anything, do you think should be changed to help reduce marine ecosystem damage related to tourism in Western Thailand? *

Short answer text

What Government/legislative policies do you feel would assist the most in promoting marine ecosystem health in Western Thailand? *