The Conservation of Coastal Surfing Resources in Thailand: The Andaman Sea

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Abstract

Over the previous decade, concern for the value, management, and conservation of coastal surfing resources is evident in the research literature and the touristic academy. However, the vast majority of research is centered on prolific surfing destinations, especially Indo-Pacific islands, where experienced surfers seek world-class waves. Comparatively, Thailand is a non-prolific surfing destination where Thai and foreign residents, and a variety of tourists, are surfing with increasing interest, especially on the Andaman Coast and particularly on the resort island of Phuket. Although a considerable number of coastal resource assessments have been carried out in the wake of the 2004 Indian Ocean tsunami by the Thai government and numerous organizations from around the world, coastal surfing resources are absent from the coastal resource literature. Consequently, this research finds that there is no mechanism in place to identify, evaluate, or conserve these resources. Thus, framed as an exploratory investigation of the physical environment, this research serves to fill the gap in the literature through the systematic documentation and assessment of coastal surfing resources in six Andaman provinces. The study identifies sixty-one surfing areas and finds that these resources are indeed valuable in terms of recreation, tourism, and as iconic areas of aesthetic beauty. The investigation offers a discussion on the implication of integrating Thailand's surfing areas into the existing coastal resource management schema for the benefit of sustainability and conservation of these resources.

Key Words: Surfing, Coastal Resource, Conservation, Andaman, Phuket, Thailand

1. INTRODUCTION

The 2004 Indian Ocean tsunami ushered a new era of coastal research and coastal resource management in Thailand, with renewed attention to the vulnerability of the Andaman coast, including mangrove forests, seagrass beds, coral reefs, fisheries, and the coastal inhabitants who interact with the natural environment and each other. However, previous to the works generated by the researcher (Martin and Assenov, 2008; Martin, 2009; Martin, 2010a; Martin, 2010b), coastal surfing resources were not included in the Thai coastal resource literature. Framed as an exploratory investigation of the physical environment, this research serves to fill the gap in the literature through the systematic documentation of coastal surfing resources in six Andaman provinces. In this research, the term 'value' does not intend to place a pecuniary value or infer the potential to exploit the resource; rather it is used to identify the reality and significance of the resource. This research brings the discussion of coastal surfing resources to light; it presents a case that indeed these resources exist and identifies a range of related issues in order to open a pathway for the conservation of the resource for future generations. This research is relevant as Thailand faces a number of environmental resource challenges along the Andaman seaboard and surfing could prove beneficial to such awareness to individuals, communities, and the tourism industry. From an institutional standpoint, Thai and international organizations can integrate and benefit from this research.

1.1 Introduction to surfing in Thailand

Currently, there are approximately three hundred surfers in Phuket, including Thai nationals and foreign residents, and surf tourism is an emerging market segment on the Andaman Coast, especially in Phuket and Phang Nga provinces. Although surf tourism in the region serves to annualize the tourist season (attract visitation during the monsoon season, which occurs from May through October) and to address issues of seasonality in terms of tourism receipts and positive imagery, it has also increased the attention to environmental issues, such as water quality (Martin, 2010). Furthermore, increased visitation during the monsoon season has come with an increase in tourist drownings (Martin 2010a; b). Although the number of surf tourists to Thailand is not clear, the researcher estimates that several thousand tourists engage in the activity annually. The first surfing competition began in 1999 at Kata Beach and in 2010 Quiksilver Inc. propelled surfing in Thailand into the global media under the auspice of their 'Best Event' global media strategy. As surfers from overseas now visit Thailand, Phuket is legitimately an emerging surf tourism destination during the southwest monsoon season. Regional ties among surfing organizations are increasing in South East Asia, especially among Thailand, Indonesia and Malaysia. At the time of writing, surf tourism has kindled entrepreneurial spirit among beach vendors and is evident by the surfboard rental stands on many of the Phuket surf beaches.

1.2 The Research Problem

The research problem stems from a lack of understanding concerning the value of Thailand's surfing areas in concurrence with the broad environment. Buckley (2002a) identifies that surfing environments have a limited capacity to support sustainable use, yet the popularity of surfing among Thais, foreign residents, and tourists in Thailand is on the increase. As reflected in the absence of published literature, little has been documented regarding the physical environment for surfing on the Andaman Coast. Relevant research questions include: what are the locations of various surfing areas in each province; where do the waves come from; what type of waves are occurring; what are the differences among the six coastal provinces; how does the regional coastal bathymetry affect the waves for surfing; what is the value of the resource in terms of recreation, tourism, and as iconic areas of aesthetic beauty. The research problem identifies a need for the value of Thailand's physical surfing resources to be integrated with long-term coastal resource management and conservation planning; it identifies that the knowledge on Thailand's coastal surfing environment has yet to expand to a degree beneficial to all stakeholders.

1.3 Related literature

The literature review is centered on a relatively new area of coastal resource management, particularly the value of surfing areas as a coastal resource; it serves to frame the concepts of surf economics, surf tourism, and the coastal management and conservation of surfing areas as new and developing categories in the international coastal resource literature.

1.3.1 Identifying the value of surf sites

The socioeconomics of surfing has emerged as a leveraging tool to recognize the value of surfing areas and for the protection of coastal surfing resources. Nelson *et al.* (2007) characterized the domestic demographics, visitation patterns, and expenditures of surfers who visit Trestles Beach in San Clemente, California. The research identified that a considerable number of surfers used the area and contributed a surprising amount of revenue to the local community. Lazarow *et al.* (2007) explored the value of recreational surfing in order to improve decision making for coastal environments, especially in the context and need to consider negative impacts on surf breaks and the natural environment that may occur as a result of planning, development, and coastal protection works. Lazarow *et al.* (2008) observed market expenditure and nonmarket valuation, describing the socio-economic value of surfing and demonstrating

the significant economic, social, and cultural importance of surfing amenity alongside the need to consider negative impacts resulting from development or coastal protection works on surf breaks and the natural environment. The study introduced a typology of 'surfing capital' as a means of identifying market and non-market aspects of surfing areas and includes a wide range of physical and social categories.

In the context of international tourism, Pendleton (2002) explored the valuation of coastal tourism, including 'slow tourism' whereby expatriates may influence the market. Although focused on the hotel market, the research considers the draw factors to coastal Rincon's tourism market, such as surfing, diving, and fishing. Murphy and Bernal (2008) recognized the impact of surfing on the local economy of Mundaka, Spain, as one of the region's leading economic sources and the consequences of the partial destruction of the area's best surfing destination resulting in the cancelation of international surf competitions and the discernible loss of tourism revenue.

1.3.2 Surf sites as a coastal resource

Lazarow and Castelle (2007) produced a management research report which investigated physical processes and options leading to the potential improvement of surf quality at Australia's Kirra Beach and the surrounding surf breaks whilst maintaining coastal integrity, especially in the consideration of surfing as a major recreational and commercial activity in the Gold Coast area. The research explored the stakeholder engagement process (community, industry, and government), seeking to improve surfing amenity in the context of economic, management, and liability considerations (ibid.) The study was a reaction to a combination of engineering works which had altered natural coastal processes in the area and negatively affected how the waves break at the surfing site.

In the context of oceanography and coastal zone management, Kelly (2008) explored the coastal recreation values of saltwater fishing and surfing wherein Florida's economy was identified to have strong ties to natural coastal resources, and while coastal ecosystems provided benefits to society, especially recreational opportunities, coastal values were not well understood. The study indicated that coastal management and public policy decisions should consider the total economic value of host ecosystems. Green (2008) identifies the significance of the physical, ecological and socio-economic context and of area-specific activities, which reported on the human and physical environments of the Cornwall seaboard and offered insight for coastal management through exploring eleven beaches for water-based leisure activities, especially the carrying capacity for surfing and surf schools.

Scarfe (2008) presents the argument for the physical science behind coastal management of surfing areas and builds a case for surf break management and conservation, presenting the value, scarcity, and conservation of the resource using scientific data and steers the field toward the physical sciences. Scarfe *et al.* (2009a) noted that as the social, economic, and environmental benefits of surfing breaks are realized, surfers are increasing integral to the integrated coastal zone management course of action. Slotkin *et al*. (2009) presented research linking surf tourism, artificial surfing reefs, and environmental sustainability, which places the discussion of surf tourism in context with the artificial surf reef (ASR) literature and ties surf tourism to coastal management in both physical and social science perspectives. Although the ASR literature was not included in this brief literature review, it is inherently tied to surfing as a coastal resource and the protection and conservation of shoreline areas. ASR literature began in the mid 1990's and is continuative until today.

Conservation of natural surfing resources has emerged in Australia with research including that of Hugues-Dit-Ciles *et al.* (2005) which explored the development and management of surf tourism in wilderness areas and its potential impacts on the natural environment. Farmer and Short (2007) put forth *Australian National Surfing Reserves - Rationale and Process for Recognizing Iconic Surfing Locations,* which provided background and examination for an Australian surfing reserve system based on

the premise of surfing as an Australian cultural heritage and a means to long-term preservation of world-class surfing sites as a coastal resource.

2. METHODS

Given the identifiable value of natural surfing resources in the literature, the assessment of surfing areas is foundational to indentifying the nation's potential for the conservation of surfing areas. Given the limited body of research on surfing in Thailand, an exploratory research has been adopted to investigate and assess coastal surfing resources along the approximately 800-kilometer Andaman littoral, including insular areas. The research engages an inductive approach based upon the researcher's knowledge, supposition, and prior research results.

The Andaman Coast, as the primary research site, was selected for the following reasons:

- The researcher identified a gap in the Thai coastal resource literature on the topic of surfing areas.
- The researcher is based at Prince of Songkla University, Phuket Campus, affording access to academic materials.
- Opportunities were available to the researcher for participant observation at surfing areas and during surfing competitions.
- Thailand's tourism atmosphere and infrastructure (including well-developed roads), make it an inviting and favorable study location in which the researcher was able to carry out independent exploratory research in various provinces on the Andaman Coast.
- Accessibility and prospect of new and rich sources of field data.

2.1 Research design

At the prospect of identifying and charting surf sites on the entire Andaman Coast, a three-year (2007-2010) coastal survey and mapping research was conducted. The greater part of data and map design stem from the researcher's field observations, including those gained from surfing and exploring coastal areas by surfboard. As an exploratory research, the process was systematic:

- Explore the littoral and identify potential surfing areas.
- Document findings with detailed field notes, photography, and hand-drawn maps.
- Organize and analyze information gathered in the field.
- Make assessments and generate descriptions and maps.
- Employ *Google Earth* technology to pinpoint surfing breaks.
- Return to surf sites for clarification of data.
- Identify relevant topics for discussion.
- Present findings in summaries, tables and maps.

Google Earth technology has been employed to plot latitude and longitude coordinates (as displayed in the assessment tables found herein) and reflect the 'take off' zone where surfers would position themselves to catch the wave at the 'peak' (the location where the wave first begins to break). In such case, the words 'specific area' has been placed under the latitude/longitude data. If the coordinates represent an entire beach or section of beach, which may encompass more than one surfing area, the words 'general area' have been placed under the latitude/longitude data. One area or beach with multiple surfing sites may have more than one entry, such as when there is a rock or reef point extending from a surfing beach. This is significant inasmuch as surfing breaks, especially point and reef breaks, occur in very specific locations and were therefore identified and recorded accordingly. In all cases the most northerly surfing break is listed first.

This research is focused on the surfing resources and the physical environment of the Andaman Coast, and it is from this position that the following results are framed. For

practical reasons, environmental factors which mitigate the resource, such as water quality, the health of coral reefs, effects from tin mining, etc., are not reported in this research paper. Appendices are listed in order of appearance.

3. Results

3.1 Bathymetry

This research indicates that bathymetry varies at different latitudes along Thailand's Andaman Coast and this affects wave speeds and heights (waves approaching a particular coast from deep water travel faster than waves approaching over shallow water). The research identifies that the deepest water on Thailand's Andaman Coast is found near Phuket; hence Phuket has the best surfing waves regardless to the fact that provinces to the north have a better swell window to the southern Indian Ocean. As the continental shelf is wider to the north and south of Phuket, the sea depths along the Andaman coast decrease relationally in latitudes north and south of Phuket. The near-shore continental shelf is approximately 110 kilometers wide in the north (Ranong and Phang Nga provinces), narrowing approximately to 25 kilometers near Phuket and widening again to about 130 km in the south (Trang and Satun provinces). However, offshore islands, such as the Surin Islands of Phang Nga province have deeper coastal waters than those compared to the continental coast and may experience more significant wave heights. Approximate water depths are displayed in Figure 1.

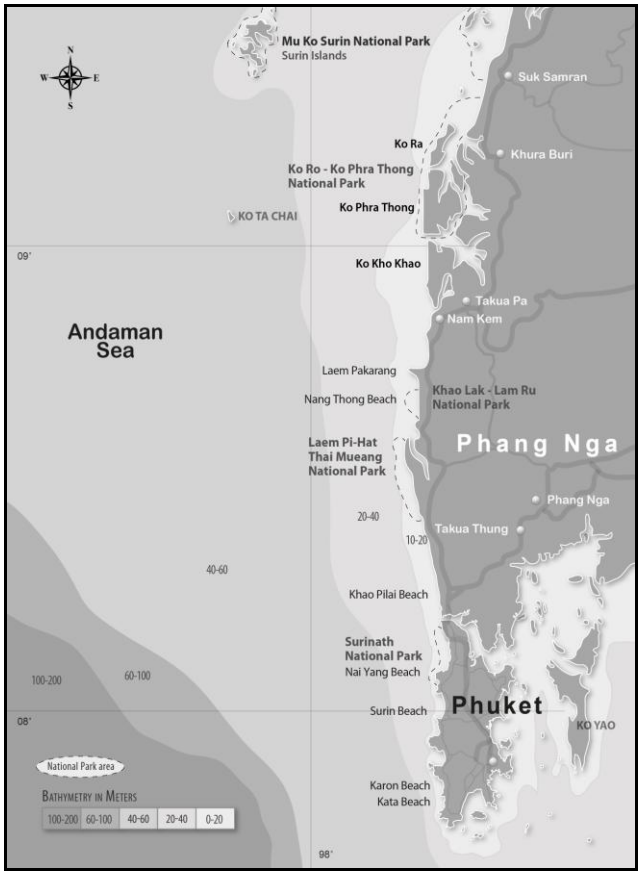

Figure 1: Bathymetry of the Andaman Coast

3.2 Meteorology

Swell directions and swell windows (the direction which a given set of waves travel and the corresponding accessibility to a given coastal area) are the significant aspects for investigation and they are correlated with the weather phenomena which generate the

waves. The following notes are in a general and prospective context:

- The southwesterly monsoon weather pattern (May through October) generates windswell from the southwest through west, and the narrow regional swell window (through *The Great Channel*) restricts surfing waves from reaching the southern provinces of Krabi, Trang, and Satun.
- Indian Ocean groundswells are distinctive given the quality of the waves and the potential to arrive throughout the year, including the high season (when weather conditions on the Andaman Coast are highly favorable). However, the swell window for Indian Ocean groundswell (through *The Great Channel*) is measurably narrow whereby only explicit swell directions are favorable.
- Cyclonic storms, including depressions, tropical storms, and cyclones, may propagate large swells ranging from the southwest through northwest. Depending on the location of a specific storm, the ocean swells they create may either directly pass through *The Great Channel* or *The Ten Degree Channel*, or if waves propagate west of these channels, have a direct hit on Thailand's Andaman Coast. Related implications include that northwesterly swells directions enter the Andaman southern region of Krabi, Trang, and Satun provinces. Overall, these storms may generate regional groundswell or windswell with a significant degree of westerly direction and send large ocean waves which have a direct hit on the Andaman Coast, and these storms can produce high-quality surfing waves at a variety of locations including the southern provinces.

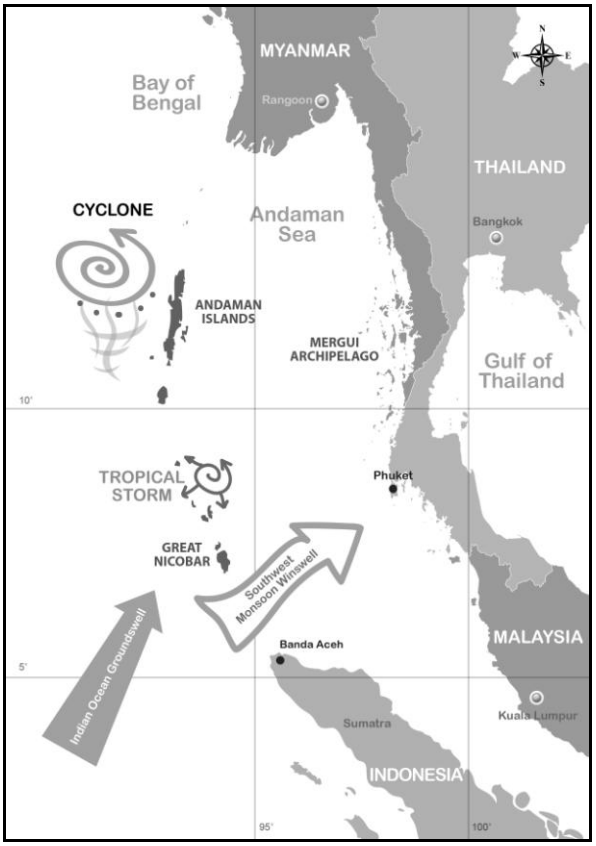

Figure 2: Surf Meteorology of Thailand's Andaman Coast

3.3 Inventory of the resource

The researcher has identified approximately 61 areas on the Andaman Coast. As aforementioned, this is not an exhaustive account, rather it represents surfing areas located and assessed by the researcher prior to September 2010. Results are presented from the northernmost province (Ranong) to the southernmost (Satun).

Figure 3: Surf Sites of the Andaman Coast Thailand

3.3.1 Ranong Province

Ranong was found to have negligible surfing resources (approximately 4 surf sites), save for Ao Yai Beach on Ko Phayam, which receives wave activity from both windswell and groundswell and can offer a degree of surfing opportunity year-round. The beach is favorably open to groundswell, while unfavorably it is open to monsoon wind flow. Furthermore, while the area has a more favorable swell window than Phuket for groundswells generated in the Southern Indian Ocean, the regional bathymetry is less favorable than Phuket. This is to say that groundswell must pass over a wide continental shelf (20-40 meters depth) at a southerly angle and cross nearly one full degree of latitude before arriving at the island. Of note, the inshore bathymetry is in the 0-20 meter range which is comparable to Phuket. Regarding other swell types and directions, the island is sheltered by Zaddetkyi Kyun Island and Than Kyun Island of Myanmar's Mergui Archipelago to the north and west respectively. Overall, the Laem Son area, including Bang Ben Beach, is fronted by a 10 kilometer shelf of 0-20 meters and has comparatively less-favorable inshore bathymetry than Ko Phayam. However, some degree of windswell is able to penetrate the area and surfing waves can be found there, although infrequent and of generally poor quality.

Table 1: Surfing Areas of Ranong Province

	Toponym (and detail)	Latitude / Longitude	Type	Governance / Access
1	Ao Yai Beach	9°43'4.55"N 98°23'37.62"E (specific area)	beach break	Laem Son National Park [MPA]
2	Bang Ben Beach	9°36'25.61"N 98°27'44.98"E (general area)	beach break	Laem Son National Park [MPA]
3	Laem Son	9°31'29.22"N 98°26'34.77"E (general area)	beach break	Laem Son National Park [MPA]

3.3.2 Phang Nga Province

Phang Nga has the longest coastline of the Andaman provinces and the second largest inventory of surfing resources with a minimum of 16 surfing areas. These surfing sites are clustered in the Khao Lak/Laem Pakarang area and to some extent in the Na Tai Pier area (Khao Pilao Beach). Therefore, alongside the given weather conditions and wave activity of the Phang Nga littoral, it is reasonable to conclude that out of 216 kilometers of provincial coastline there is relatively limited surfing space. Although Phang Nga has a larger south-southwest swell window than Phuket, it has a wide and shallow continental shelf which negates much or all of the advantages gained by the increased swell exposure, resulting in waves with generally less power and 'punch' than similar surfing breaks on Phuket.

Table 2: Surfing Areas of Phang Nga Province

	Toponym (and detail)	Latitude / Longitude	Type	Governance / Access
1	Surin Islands	9°26'42.98"N 97°51'26.14"E (general area)	*inconclusive results*	Mu Ko Surin National Park
2	Ko Ra	9°12'53.36"N 98°16'31.74" (general area)	beach breaks	Public access (boat)
3	Ko Phra Thong	9° 4'49.31"N 98°14'31.21"E (general area)	beach breaks	Public access (boat)
4	Ko Kho Khao	8°56'32.62"N 98°15'15.17"E (general area)	beach breaks	Public access (car ferry)
5	Cape Pakarang (The Corner)	8°44'35.60"N 98°13'3.25"E (specific area)	point break over coral deposits	Public access
6	Cape Pakarang (The Tree)	8°44'18.71"N 98°13'0.61"E (specific area)	reef break	Public access
7	Cape Pakarang (Taxi Dave's)	8°43'26.27"N 98°12'58.93"E (specific area)	point/reef break	Public access
8	Cape Pakarang (The Beach)	8°43'16.28"N 98°13'45.27"E (specific area)	beach break	Public access
9	Khuk Khak Beach	8°41'28.22"N 98°14'18.94"E (specific area)	beach break	Public access

	Toponym (and detail)	Latitude / Longitude	Type	Governance / Access
10	Bang Niang Beach	8°40'25.74"N 98°14'23.02"E (specific area)	beach break	Public access
11	Nang Thong Beach (north of lighthouse)	8°38'35.72"N 98°14'42.39"E (specific area)	beach break	Public access
12	Nang Thong Beach (outside of lighthouse)	8°38'32.09"N 98°14'35.72"E (specific area)	beach break	Public access
13	Nang Thon Beach (south of lighthouse)	8°38'27.68"N 98°14'42.17"E (specific area)	beach break	Public access
14	'Mystos'	8°36'36.42"N 98°13'59.18"E (general area)	reef/rock	Access through Merlin Hotel
15	North of Na Tai (small bridge)	8°16'59.06"N 98°16'25.12"E (specific area)	beach break	Public access
16	Na Tai Pier (north side)	8°16'24.79"N 98°16'31.76"E (specific area)	beach break	Public access
17	Na Tai Pier (south side)	8°16'20.88"N 98°16'32.94"E (specific area)	beach break	Public access
18	Na Tai (rock/reef break)	8°16'15.38"N 98°16'29.25"E (specific area)	rock/reef break	Public access

3.3.3 Phuket Province

The research found that Phuket, with a minimum of 29 surfing areas, is the province with the most frequently occurring high surf and greatest number of surfing sites. This is attributed mainly to the favorable bathymetry and coastal topography of the island. Water depth along the west coast of Phuket, especially the southwestern coast, is the deepest (both inshore and offshore) among all six Andaman provinces (Figure 1) and therefore surfing waves in Phuket are the generally the largest and most powerful in Thailand. In overview, surfing areas in Phuket are somewhat clustered in the Nai Yang coastal area, the Pansea, Surin, and Laem Sing coastal area, the Kalim Beach area (which has more than one surfing area on the local reef), and the Kata Yai / Kata Noi coastal area.

Table 3: Surfing Areas of Phuket Province

	Toponym (and detail)	Latitude / Longitude	Type	Governance / Access
1	Sarasin Sand Banks	8°11'55.00"N 98°16'39.19"E (specific area)	offshore sandbanks	Public access
2	Sai Kaew Beach	8°11'41.56"N 98°16'58.58"E (specific area)	beach break [rights]	Sirinat Marine National Park [MPA]
3	Sai Kaew Beach	8°11'3.19"N 98°17'17.59"E (specific area)	beach break [rights/lefts]	Sirinat Marine National Park [MPA]

	Toponym (and detail)	Latitude / Longitude	Type	Governance / Access
4	Mai Kao Beach	8° 9'56.32"N 98°17'32.95"E (general area)	beach breaks [rights/lefts]	Sirinat Marine National Park [MPA]
5	Nai Yang (middle reef) (‘Parking lots’)	8° 5'59.47"N 98°17'31.52"E (specific area)	reef break [rights/lefts]	Sirinat Marine National Park [MPA]
6	Nai Yang (beach break)	8° 5'37.24"N 98°17'51.99"E (specific area)	beach break [rights/lefts]	Sirinat Marine National Park [MPA]
7	Nai Yang (reef point) (the ‘Island’)	8° 5'22.11"N 98°17'18.99"E (specific area)	reef point break [lefts]	Sirinat Marine National Park [MPA]
8	Nai Thon	8° 3'31.55"N 98°16'34.88"E (general area)	beach breaks [rights & lefts]	Public access
9	Nai Thon Noi	8° 2'49.45"N 98°16'37.39"E (general area)	beach breaks [rights & lefts]	Access through Andaman White Hotel
10	Trisara Beach	8° 2'8.18"N 98°16'29.83"E (general area)	beach breaks [rights & lefts]	Access through Andaman Trisara Resort
11	Layan Beach	8° 1'41.49"N 98°17'8.37"E (general area)	reef & beach breaks [rights & lefts]	Public beach park
12	Bang Tao: Ao Le Phang [north] Ao Bang Tao [south]	8° 0'35.01"N 98°17'22.54"E (general area)	beach breaks [rights & lefts]	Public access
13	Pansea Beach	7°59'1.25"N 98°16'24.48"E (specific area)	reef/rock point break [rights]	Access through Amanpuri Hotel
14	Pansea Beach	7°58'54.18"N 98°16'35.02"E (general area)	beach break [rights & lefts]	Access through Amanpuri Hotel
15	Surin Beach	7°58'31.34"N 98°16'40.70"E (general area)	beach break [rights & lefts];	Public beach park
16	Laem Sing	7°58'7.76"N 98°16'44.58"E (general area)	beach breaks [rights & lefts].	Two public trails
17	Kamala Beach	7°57'46.61"N 98°16'52.09"E (specific area)	point break [rights]	Public access
18	Kamala Beach	7°57'39.95"N 98°16'59.03"E (general area)	beach breaks [rights & lefts]	Public access

19	Nakhale Beach	7°55'28.06"N 98°16'25.25"E (general area)	reef/beach breaks	Access through Thavorn Beach Village
20	Kalim 'The Point'	7°54'52.51"N 98°17'23.20"E (specific area)	reef break [rights]	Public access
21	Kalim Reef	7°54'42.69"N 98°17'28.78"E (specific area)	reef break [rights & lefts]	Public access
22	Patong Beach	7°54'12.36"N 98°17'45.72"E (general area)	beach breaks [rights & lefts]	Public access
23	Freedom Beach	7°52'29.61"N 98°16'29.01"E (general area)	beach breaks [rights & lefts]	Access by dirt road / trail
24	Karon Noi Beach [Relax Bay]	7°51'51.82"N 98°16'55.41"E (general area)	reef / beach breaks [lefts and rights]	Access through Le Meridien Phuket Resort
25	Karon Beach	7°51'2.63"N 98°17'29.28"E (specific area)	beach break [rights & lefts]	Public access
26	Kata Yai Beach	7°48'52.73"N 98°17'54.69"E (specific area)	beach break [rights & lefts]	Public access
27	Kata Noi Beach	7°48'32.46"N 98°17'53.14"E (specific area)	beach break [rights & lefts]	Kata Thani Resort
28	Nai Harn Beach	7°46'38.13"N 98°18'14.41"E (specific area)	beach break [rights & lefts]	Public beach park
29	Nai Harn Beach	7°46'24.27"N 98°18'22.23"E (specific area)	beach break [rights & lefts]; left wedge and barrel	Public beach park

3.3.4 Insular Krabi, Trang, and Satun

Exploratory research to insular Krabi identifies 4 surfing sites. During periods of southwesterly groundswell, waves were found to be somewhat smaller when compared to Phuket (approximately half of the size) at the same point in time. Anecdotal evidence suggests that a higher degree of west would result in larger wave heights in the Ko Lanta area. Surfing waves in Krabi were found on the west-facing coastlines of two islands, Ko Lanta Noi and Ko Lanta Yai. The western coast of Ko Lanta Yai southward to Laem Tanot at the southernmost point of the island receive windswell or groundswell through a narrow swell window of approximately 30 degrees (240 degrees southwest through 270 degrees west). When compared with Phuket, the Ko Lanta coastline is less favorable for surf as it lacks the necessary 'set ups' to produce quality waves and the coastal bathymetry is unfavorable.

Three islands are of particular interest in the Trang area: Ko Ngai, Ko Muk and Ko Kradan. 3 surf sites have been identified in insular Trang. Ko Ngai and Ko Kradan are small islands with coral reefs. Similar with the Ko Lanta area, a narrow swell window allows ocean swells from approximately 240 degrees southwest through 270 degrees west (see Figure 3.4). However, given the slightly more favorable bathymetry of insular coastal

areas, anecdotal evidence indicates that surfing waves are potentially better than those found in Ko Lanta.

Insular Satun encompasses more than 50 islands. Surfing waves have been reported to the researcher at Ko Tarutao National Park which has islands with west and northwest facing beaches (Blauer, 2009 personal communication). Ao Phante Malaka (Turatau Island) has a long, sweeping west-facing beach and interviews with Thai fishermen indicate that waves of two meters occur here (ibid.). Blauer (ibid.) notes that windswell generated during the southwest monsoon, particularly from a westerly direction, may produce surfing waves in the Ao Phante Malaka area, while sea conditions may remain favorable for surfing (i.e. minimal on-shore winds) due to the sheltering affect from Sumatera. Ko Rawai has a string of north-facing beaches and anecdotal evidence supports that surfing waves occur here on rarely occurring northwest swells. In any given year, tropical storms located near the Andaman Islands may produce northwesterly ocean swells resulting in wave activity along west and north-facing beaches in the insular Satun province. On the southern coast of Ko Adang, there are west-facing beaches which are open to southwesterly windswell or groundswell. Of particular interest, Ko Bulon Le has west to northwest facing beaches with potential for both point and reef breaks.

Table 4: Surfing Areas of Krabi Province

	Toponym (and detail)	Latitude / Longitude	Type	Governance / Access
1	Lang Son beach	7°40'47.95"N 99° 2'8.61"E (general area)	beach break	Public access
2	Klong Dao Beach	7°38'24.29"N 99° 1'29.96"E (general area)	beach break	Public access
3	Ko Lanta Yai (southern beaches)	7°29'9.69"N 99° 4'22.04"E (general area)	beach break + potential reef/rock breaks	Ko Lanta Marine National Park [MPA]
4	Laem Tanot	7°28'4.91"N 99° 5'44.56"E (specific area)	reef break	Ko Lanta Marine National Park [MPA]

Table 5: Surfing Areas of Trang Province

	Toponym (and detail)	Latitude / Longitude	Type	Governance / Access
1	Ko Ngai	7°23'58.16"N 99°12'1.22"E (specific area)	reef breaks	Hat Chao Mai National Park [MPA]
2	Ko Muk	7°21'33.90"N 99°17'36.41"E (specific area)	beach break	Hat Chao Mai National Park [MPA]
3	Ko Kradan	7°19'25.39"N 99°14'46.09"E (specific area)	beach break + potential reef/rock break	Hat Chao Mai National Park [MPA]

Table 6: Surfing Areas of Satun Province

	Toponym (and detail)	Latitude / Longitude	Type	Governance / Access
1	Ko Bulon Le	6°50'0.15"N 99°31'51.39"E (specific area)	beach break + potential reef/rock break	Koh Petra National Park [MPA]
2	Ko Turatao	6°41'4.92"N 99°38'18.97"E (general area)	beach breaks	Mu Ko Turatao National Park [MPA]
3	Ko Turatao	6°34'28.58"N 99°36'37.36"E (general area)	reef/rock break	Mu Ko Turatao National Park [MPA]
4	Ko Rawai	6°34'51.03"N 99°12'44.95"E (general area)	beach breaks + potential reef/rock break	Mu Ko Turatao National Park [MPA]

4. Discussion

Collectively, surf tourism research from around the world is stalwartly focused toward the concepts of sustainability, conservation, and management of surfing areas; it makes up the greater share of the available research literature (Buckley 2002a; Buckley 2002b; Farmer & Short, 2007; Hageman, 2006; Frood, 2007; Hill and Abbott, 2009; Hugues *et al*., 2005; Lazarow, 2007; Lazarow *et al.* 2008; Lazarow and Tomlinson, 2009; Lazarow *et al*, 2007; Lazarow and Castelle, 2007; Mach, 2009; Martin and Assenov, 2008; Martin, 2009; Murphey and Bernal, 2008; Nelson *et al*., 2007; Persoon, 2003; Ponting, 2001; Ponting, 2006; Ponting, 2007; Ponting, 2008; Sarfe, 2008; Scarfe *et al.*, 2009a; Scarfe *et al*, 2009b; Tantamjarik, 2004). The discourse on coastal surfing resources in Thailand can benefit from the literature, and the following discussion explores three perspectives:

- Limitation of the resource
- Management of the resource
- Conservation of the resource

4.1 Limitation of the Resource

Although the results of this research confer that indeed there are surfing resources, the study indicates that Thailand's physical surfing resources are somewhat precarious and limited. Spatially, the research identifies that the Andaman Coast is 800+ kilometers including Phuket and others islands sustaining approximately 61 surfing areas identified thus far. With these figures in mind, the study takes into account that surfing areas on the Andaman are located predominantly in Phuket and Phang Nga, and furthermore, these areas are clustered together. Ranong Province, with prospectively one single beach (Ao Yai Beach on Ko Phayam Island) conducive to surf tourism, and the scattered (and infrequently 'surfable') surfing areas located in the insular areas of the southern provinces, further attest to the significant limitation of the resource (i.e. surfing waves are less frequent in the southern provinces and issues of public access during the monsoon season need to be considered and further exploration is recommended).

In Phuket, the best surfing areas (with the largest and most consistent waves) are mainly in the southern portion of the island where coastal topography and bathymetry are especially conducive to the formation of quality surfing waves. Surin Beach on the central coast and Nai Yang Beach, in the Sirinat National Park in the north of the island are exceptions.

Along the 216-kilometer Phang Nga province, ten out of eighteen surfing areas are clustered along the ten-kilometer stretch of coastline in the Khao lak/Laem Pakarang area. Although Phang Nga is identified as having the second highest inventory of surf sites among Andaman provinces, there are approximately just eight surfing areas spread across 200 kilometers of coast. Therein, the ten surf sites are clustered around the Khao-Lak area, and another four in the Na Tai Pier

area are highly significant and bring to the fore the consideration of the limited surfing resources in the province.

4.2 Tangential management of surfing areas in Thailand

This research maintains that surfing areas were not previously documented in the literature (save for Martin 2010) or integrated into the coastal management schema of Thailand. This is to say that given the identifiably valuable and limited resource at hand, Thailand's surfing resources are unprotected per se. However, the research finds that a great number of surfing areas are located in National Parks (NP) and Marine Protected Areas (MPA), and are therefore afforded some level of conservation. Resulting from the increased awareness and management following the 2004 Indian Ocean tsunami, Thailand's MPAs were conceived in each province. As MPAs afford a significantly astute level of protection to specific and sensitive coastal zones, they currently stand to circuitously provide a level of sustainability for coastal surfing resources. This research is not intended to provide an in-depth discussion on the implications of Thailand's current coastal planning regime; rather the study identifies to what extent surfing areas are tangentially afforded protection under existing NP and MPA strategy. Table 7 identifies the total number of surfing areas for each province in correlation with NP and MPA (as all of the NPs with surfing areas are also under MPA status, they form a single category).

Table 7: Thai Surfing Areas within National Park Jurisdiction

Province	Total number ofsurfing areas	National Park (NP) /Marine Protected Area (MPA)
Ranong	3	3
Phang Nga	18	3
Phuket	29	6
Krabi	4	2
Trang	3	3
Satun	4	4
Total	61	21

Table 7 identifies that 21 surfing areas are under NP and MPA protection, including Ko Phayam, the premier surfing area of Ranong Province. Phang Nga Province has only three of areas are under NP or MPA protection (the Khao Lak/Laem Pakarang surfing areas are not under protection). Phuket has six areas afforded NP or MPA protection (in the Sirinat National Park) which encompasses Nai Yang Beach. Of particular consideration, all of the surfing areas located in insular Krabi, Trang, and Satun are within NP/MPA jurisdiction. Overall, approximately one-third out of 61 surfing areas are afforded NP/MPA governance. In light of the tangential management and protection which NP/MPA governance affords to coastal surfing resources, the research moves to discuss the rationale for identifying 'surfing reserves' for the Andaman Coast of Thailand.

4.3 Rationale for surfing reserves for Andaman Coast, Thailand

As identified in the results and discussed herein, the Andaman littoral has approximately 61 surfing areas, and these areas are clustered in specific locations. This stands to reason that much of the vast 800+ kilometers of the continental and insular coast are void of natural resources for surfing. Additionally, given the clear-cut limitations of the resource in contrast with the onset of surf tourism amidst Thailand's large tourism climate, the implications signal for the rationale of 'surfing reserves' in Thailand. Following the Australian model of identifying

prolific surfing areas for protection and conservation as iconic 'surfing reserves' (Farmer and Short, 2007), it is reasonable and plausible that the aforementioned clusters of surfing areas be designated as surfing reserves (Figure 4 and 5).

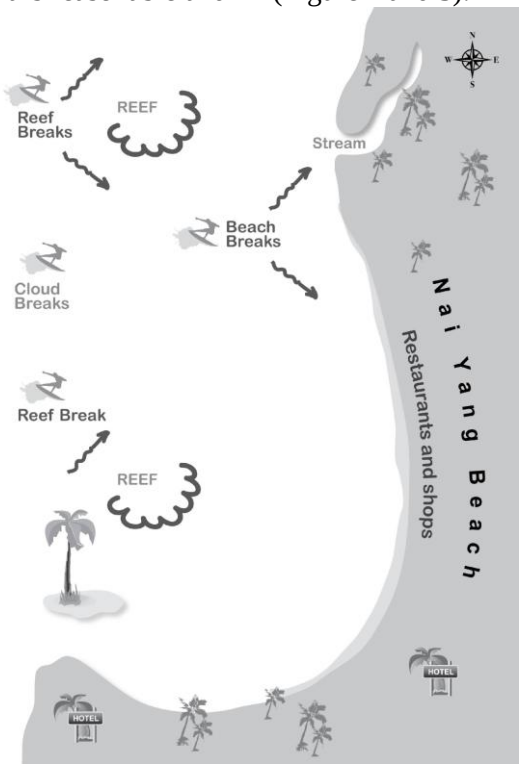

Figure 4: Prospective Surfing Reserve, Nai Yang Beach, Phuket Province

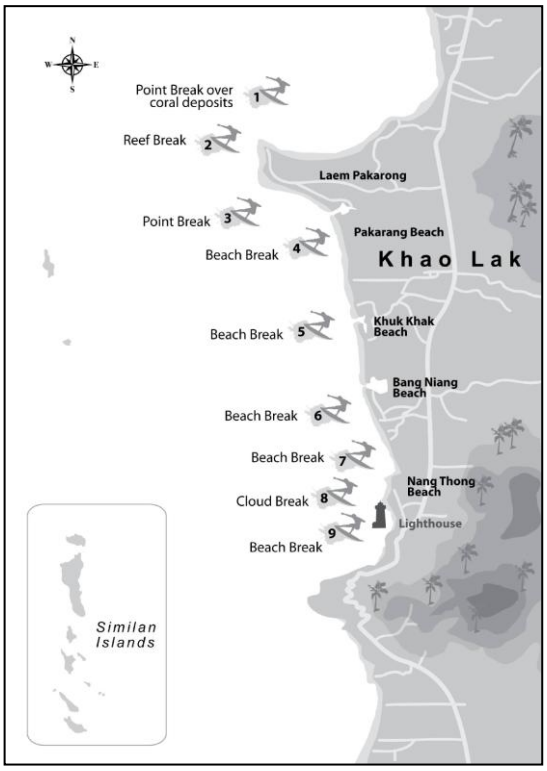

Figure 5: Prospective Surfing Reserve, Laem Pakarang, Phang Nga Province

Table 8 identifies the rationale and prioritization for surfing reserves on Thailand's Andaman littoral. The rationale for surfing reserves has been built through the literature review, the results of this research, and is an implication of this research; it forms framework wherein surfing resources are understood to be valuable coastal resources. The consequence of the resource to the tourism industry is evident and imminent. In light of the spatiality and clustering of the resource, seven areas are identified for conservation status as 'iconic' surfing reserves. The prioritization provided in Table 8 is relative to each province, whereby the number '1' represents the area best-suited for reserve status of each province. For practical reasons, only the Northern provinces are represented. Herein, the research identifies the Laem Pakarang area on the central Phang Nga coast and the Nai Yang area of northern coast of Phuket as the two most noteworthy areas for surfing reserve status.

Table 8 indicates that save for Nai Yang Beach in Phuket and Ao Yai Beach in Ranong, the remaining foremost surfing areas identified are currently not recognized in terms of conservation in Thailand's Integrated Coastal Zone Management (ICZM) schema, and therefore the significance and urgency to conserve these resources is most apparent.

Table 8: Rationale and Prioritization for Surfing Reserves in Thailand

province	surfing area	rationale	current status of protection	priority
Phuket	Nai Yang Beach and outer reefs	-multiple reef breaks and beach breaks with a variety of wave types -favorable seasonality	NP/MPA	1
	Kalim reef	-potentially the best reef break in Thailand	none	2
	Kata Yai Beach & Kata Noi Beach	-the definitive focal point of surfing in Thailand. Kata Beach support a wide variety of waves and conditions for surfing -Kata Noi receives any and all swell types and sizes, making it one of the most consistent surfing areas in Thailand -favorable seasonality	none	3
Phang Nga	Pakarang	-potentially the best surfing areas in the province with a variety of surfing areas clustered around the cape -favorable seasonality	none	1
	Khao Lak area	-unique cluster of surfing areas of Nan Thong Beach	none	2
	Khao Pilia Beach (Na Tai Pier area)	-quality surfing waves in proximity to the Na Tai pier and a single offshore reef	none	3
Ranong	Ko Phayam (Ao Yai Beach)	-potentially the best beach break located on an offshore island in Thai waters -favorable seasonality	NP/MPA/ Biosphere reserve	1

Furthermore, the development of surfing reserves invites surfers and surf tourists to participate in coastal resource awareness and conservation. Scarfe *et al.* (2009) suggests that as the social, economic, and environmental benefits of surfing breaks are realized, surfers are increasing integral to the overall ICZM course of action.

5. Concluding Thoughts

The documentation of surfing areas has the potential to spawn the conservation of the resource, as suggested by Scarfe *et al.* (2009):

For the best environmental result, recognition is required of surfing amenities as specific natural resources in coastal plans and environmental legislature to facilitate their protection and enhancement. For example, a coastal plan that identifies surfing break locations, the physical processes that cause the quality waves to form, and the threats to wave quality gives greater weighting to any concerns that a coastal engineering project may jeopardize the surfing break (Scarfe *et al*., 2009: 701).

Documentation of the resource and recognizing Thailand's surfing areas places the significance of surfing areas into context; it identifies their existence in the face of natural and man-made impacts. Increased awareness of the resource may in fact lead to an increase in conservation through ICZM. Therein, this study opens a pathway to recognizing and understanding that the surfing areas can be taken into consideration when decisions are made on the conservation of natural areas and equally in the expansion of environmentally damaging commercial activities. The knowledge generated and outlined herein provides a holistic approach to understanding coastal use and management concerns. This study has laid the foundation for civil society and the government to conserve natural surfing resources.

This research has presented the first published academic discourse on the value of coastal surfing resources in Thailand; it advocates that surfing sites in Thailand are inextricably linked to the discussion on coastal resources in terms of the physical environment. However, the motivation for this research was not purely academic; rather it was to foster illumination to a previously unexplored aspect of recreation, tourism, and environmentalism in the Kingdom.

6. Recommendations and Suggestions for Further Research

- Coastal exploration of surfing resources should expand and continue, especially provinces north and south of Phuket.
- Coastal surf resource assessments for the Gulf of Thailand are recommended.
- The data generated in this research is recommended for integration into an appropriate Geographic Information System (GIS) schema in Thailand.
- Scientific analysis of water quality at surfing areas when wave activity is eminent (i.e. periods of surf-related turbidity).
- Research targeting the issues of marine debris in the Andaman Sea relevant to the sustainability of coastal surfing resources and the development of surf tourism is recommended.
- Environmental impact studies in the marine and coastal areas should consider the value of coastal surfing resources. For example, the construction of artificial reefs along the Andaman Coast, such as those at Mai Kao Beach, and those proposed at Karon Beach (Nongkaew, 2010) could affect nearby surfing sites.
- The integration of coastal surfing resources into the Marine National Park protection strategy and the formation of national surfing reserves (as detailed herein) are recommended.
- Research targeting the environmental degradation of coastal surfing resources in the Thai context, especially water pollution, coastal tin mining, coral reef integrity, and the effects of climate change.

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