The Value and Conservation of Surfing Resources and Marine Ecotourism

Qualifying Report and Academic Review for
Ph.D. in Environmental Management

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Synopsis

The value and conservation of coastal surfing resources are emergent dimensions within the fields of marine and ecotourism. First appearing in the literature at the end of the twentieth century, surfing-related touristic activities in the marine environment have evolved into an independent field worthy of academic inquiry (Assenov & Martin, 2010; Martin & Assenov, 2011). The following qualifying report and academic review provide an in-depth background in four subject areas: (1) physical attributes of surfing areas; (2) the ecologic and economic values of surf resources; (3) marine ecotourism; (4) coastal tourism guidelines. The purpose of this report is to apply critical analysis and conceptual knowledge mapping of the subject area in order to identifying gaps in the current knowledge and to pose potential research questions relevant to future study. Analysis of the literature indicates that the recreational and touristic activity of surfing is progressive comparative to the published research (i.e. the sport of surfing and its expansion into new areas are occurring rapidly relative to the limited academic knowledge base in the subject area). Until just recently, research has for the most part been conducted by graduate students seeking degree conferral rather than specialized theoreticians. Non-prolific areas are clearly under-researched or not recognized by institutions, agencies, or organizations in those countries or regions. Therefore, surfing-related activities and resources are not well understood in terms of their value or conservation; they are not methodically managed or afforded recognizable levels of protection, and this is clearly the case in developing countries where the activity is undergoing rapid growth, such as Thailand. This qualifying report and academic review has found that surfing resources, although a prolific new research area in the academe, have been largely ignored in both the theoretical and practical contexts of tourism, management, value, and conservation in Thailand; it is therefore discernible to precede and expand research in this new and developing topic area.

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ASR	Artificial Surfing Reef
CRM	Coastal Resource Management
FIT	Free Independent Travelers
GIS	Global Information System
ICZM	Integrated Coastal Zone Management
IUCN	International Union for the Conservation of Nature
MPA	Marine Protected Area
MNP	Marine National Park
NOAA	National Oceanic and Atmospheric Administration
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
WWF	World Wide Fund for Nature

ORGANIZATIONS OPERATING IN COASTAL THAILAND

CHARM	Coastal Habitats and Resources Management
CORIN	Coastal Resources Institute (Prince of Songkla University)
DMCR	Department of Marine and Coastal Resources
DNP	Department of National Park, Wildlife and Plant Conservation
DOF	Department of Fisheries
MoNRE	Ministry of Natural Resources and Environment
MOTS	Ministry of Tourism and Sports
NAREBI	Natural Resources and Biodiversity Institute
ONEP	Office of National Environmental Policy and Planning
ONESB	Office of the National Economic and Social Development Board
SAMPAN	Strengthening Andaman Marine Protected Areas Networks
SEPF	Socio-Economic Policy and Forecasting Unit
TAT	Tourism Authority of Thailand
USAID	United States Agency for International Development

CHAPTER 1

INTRODUCTION

As a qualifying report and academic review in environmental management, this work serves as a background study, basis, and prescriptive framework for identifying the value and conservation of surfing resources in the context of marine ecotourism. First appearing in the literature at the end of the twentieth century, surfing-related touristic activities in the marine environment have evolved into a field worthy of academic study. The value and conservation of coastal surfing resources are emergent dimensions within the fields of marine and ecotourism—and surf tourism is an inherent thread throughout this report.

The following work provides an in-depth background in four subject areas: (1) physical attributes of surfing areas; (2) the ecological and economic value of surf resources; (3) marine ecotourism; (4) coastal tourism guidelines. The purpose of this report is to apply critical analysis and conceptual knowledge mapping of the subject area in order to identifying gaps in the current knowledge and to pose potential research questions relevant to future study. Although this review is intended as foundational to future study set in the context and environmental management of Thailand, it adheres to a broad and universal approach which is largely descriptive.

Outlined in the introduction are sections on the activity of surfing, surfing in Thailand, and the global phenomena of surf tourism. Chapter two overviews the physical attributes of surfing areas including the three types of surfing areas, three general classes of waves, surf-related ocean currents, physical processes of surfing areas, and three types of surf breaks; secondly, the ecological and economic value of surfing resources are placed in the contexts of the value of surfing resources, surf sites as ecological and coastal resources, and coastal surfing resources and conservation in Thailand; thirdly, marine ecotourism is reviewed through ecotourism, sustainable tourism, marine tourism, and sustainable surf tourism in the academe; and fourthly, coastal tourism guidelines are reviewed, including tourism and the environment; coastal management; +coastal tourism prescriptions; and tourism and coastal management in Thailand. A brief review of coastal management issues and organization specific to the Andaman coast concludes the chapter.

Chapter three offers a discussion of the topic areas in context, providing knowledge maps in various aspects of surfing-related tourism research literature. Chapter 4 offers the critical analysis, identification of the knowledge gap, and a series of potential research questions for future inquiry. An appendix provides two relevant and complete conference papers prepared by the researcher, one presented at the

Faculty of Environment and Resource Studies at Mahidol University in November 2010 and the other scheduled for presentation in November 2011 at Prince of Songkla University, Phuket Campus. The former is *The Conservation of Surfing Resources in Thailand: The Andaman Sea*; the latter is *A Statistical Analysis of Surf Tourism Research Literature*.

1.1 Introduction to the Activity of Surfing

Surfers are individuals who ride waves and have deep encounters with the marine environment; and surfing is the sport of riding the surf, especially on a surfboard. Figure 1.1 shows a surfer riding a wave in Phuket, Thailand.

Figure 1.1 Surfer Riding a Wave in Phuket, Thailand.

Source: Author (June 2008)

The activity comes from the Hawaiian and Tahitian legacy as an ancient tradition, and hardwood surfboards made in the fifteenth century can be examined in the Bishop Museum in Honolulu today. Such boards were made from various hardwoods, including the endemic Hawaiian *Koa* tree. Walker (2005) attests to the Hawaiians‘ deep and spiritual connection to the sport:

> Primarily through chants, ancient Hawaiian histories and traditions preserve great surfing love stories, surfing prayers, surfing *heiau* [temples], surfing priesthoods, competitions, and many legendary surfers... surfing has been a part of our history for thousands of years, and when you surf you have that connection, you connect spiritually and physically to all the elements around you, this is a part of you, it's a Hawaiian thing (Walker, 2005: 580).

Hawaiian legends tell of men chanting to the sea in praise of good surf and royalty (Ali‘i) competing in surfing competitions. At various surfing sites the ancient Hawaiians built temples and prayed for favorable surfing conditions, such as at the *Kuemanu Heiau* archeological site at Kahalu‘u Beach Park, Hawaii (see Figure 1.2). However, Christian missionaries, who judged surfing to be morally wrong, outlawed the sport in 1821 and ‗christianized‘ various sites by building churches alongside the ruins. Although the activity of surfing nearly vanished from the Hawaiian culture, it was revived in the 1920s by Hawaiian surfer and Olympic gold medalist swimmer Duke Kahanamoku (1890-1968). According to interpretation signage at Kahalu‘u, the surfing temple was restored in 1986 by the County of Hawaii. Surfers once again make offerings at the *Kuemanu Heiau* and pray for good waves. Kahalu‘u is the island of Hawaii‘s most prolific area for surf tourism.

Figure 1.2 Kuemanu Heiau Archeological Site at Kahalu‘u Beach Park, Hawaii

Source: Author (January, 2001)

1.2 Introduction to Surfing in Thailand

It has only been in recent years that recreational surfing in Thailand has gained any notable degree of popularity in terms of participation in the activity and attention in the domestic and international media. While the tropical resort island of Phuket is hub of surfing activity in Thailand, much of the Andaman Coast (736 kilometers) and Gulf of Thailand coast (1,874 kilometers) areas remain virtually unchartered for coastal surfing resources (Martin, 2010a, b). Consequently, the value and conservation of surfing resources in Thailand constitute new areas of research in terms of coastal resource management and marine tourism (ibid).

Foreign travelers in the 1980s introduced the sport to Phuket and occasionally left their surfboards behind, and by the 1990s a handful of Thais were surfing. By the turn of the twenty-first century a new generation of young Phuket surfers had come of age and the sport was popular among this particular group. On September 25, 1999, Thailand‘s first surfing contest was held Kata Beach in Phuket. Fostered in part by employees from *Cobra*, the world‘s largest surfboard manufacturing company which is located in Chon Buri (near Bangkok), the contest has remained an annual event. By 2007, the _Phuket Surfing Contest‘ at Kata Beach had grown to include more than one-hundred and fifty competitors from thirty-five countries. The contest is supported by community volunteers, the local surfing clubs, the Kata-Karon Municipality, the Kata-Karon Hotel Association, and a number of local businesses (Nadon, 2008 personal communication).

Consequent to the turn of the twenty-first century, several private surf clubs and organizations began to form in the Phuket area. These include the Phuket Boardriders Club (a not-for-profit organization), the Kata-Karon Surf Club, and the Kamala Go Surfing Club. Club members have been instrumental in the promotion and development of surfing in Phuket. Spawned by organizers from the Phuket Boardriders Club in 2009, a new era in Thai surfing began with the commitment of a three year sponsorship by the corporate surf clothing manufacturer *Quiksilver Inc*., thus placing the promotion and marketing of major surfing competitions under one organizer. Corporate sponsorship was viewed by local surfing organizations as a strategy to promote regional ties in Asia, especially with Indonesia and Malaysia (Aiyarak, 2009 personal communication). For the first time in Thai history a Thai surfer, 11-year-old Annissa Flynn, received sponsorship from a major international surf clothing sponsor which included travel expenses to attend a surfing competiotion in Bali, Indonesia. In 2010, the Phuket Boardriders was dissolved and reinstituted as *Surfing Thailand*, a new entity then recognized as the official organizer of the sport in Thailand by the International Surfing Association (ISA) and at various administrative levels within the Thai government. Subsequently, 13-year-old Panu Wisetsombat was awarded the first-ever student scholarship in Thailand‘s history. In 2010, the first magazine dedicated to surfing was published in Thailand, featuring and promoting the activity of surfing nation-wide and attracting international surf clothing advertisements from the United States and Australia.

As surfers from overseas now visit Thailand, Phuket is legitimately an emerging surf tourism destination during the southwest monsoon season (May through October). This new market has kindled entrepreneurial spirit among the Thais in recent years, evident by the increase in board rental enterprises which appeared on Phuket surf beaches in 2008 to 2011. Currently, there are an estimated three hundred

plus surfers in Phuket, including Thai nationals and foreign residents, a number which has grown significantly from about thirty surfers in 2002 (Aiyarak, 2009 personal communication). Figure 1.3 shows Thai surfers at the 2008 Phuket Surfing Contest, Kata Beach.

Figure 1.3 Thai Surfers at the 2008 Phuket Surfing Contest, Kata Beach

Source: Author (September, 2008)

1.3 Introduction to Surf Tourism

Among the earliest research conducted on surf tourism, Augustin (1998) explored the advent of surf-related sports on the French Atlantic, especially the development of surf resorts in the three southernmost provinces, which were attributed principally to an emerging trend in _freedom-loving activities', and where surfing events are corollary to the growth phenomena and are driven by surf clubs, corporate sponsors, media linkages, and especially in the case of France, supported by the regional government. Augustin (ibid.) identified the early development of surfing in France as a new sport activity recognized and supported in hospitality and tourism and viewed as a sure commercial bet given the driving forces of territorial dynamism, regional self-promotion, and the creation of a new image for coastal resorts. The research provided insight to four areas of surfing and town planning: 1) the tendency to create new seaside sites with the added impetus of surfing; 2) the surf resort concept; 3) the growth of surf clubs; 4) the significance of undeveloped and difficult to reach sites.

Fluker (2003) presented the significance of, and definition for, surf tourism in order to identify areas of further research. The study identified that as of 2002, extensive query for surf tourism research yielded no results. Consequently, Fluker

(ibid.) consigned traveling for the sake of surfing onto a traditional concept of tourism to produce a definitive characterization for surf tourism:

> Surf tourism involves people travelling to either domestic locations for a period of time not exceeding 6 months, or international locations for a period of time not exceeding 12 months, who stay at least one night, and where the active participation in the sport of surfing, where the surfer relies on the power of the wave for forward momentum, is the primary motivation for destination selection (Fluker: 6).

As the field of surf tourism developed, studies have endeavored to define the field and its place in context with other aspects of tourism. For example, Orams (1999) provided the history and development of tourism in the marine environments and mentions surf tourism as a relevant component of marine tourism, identifying that ―Surfing has had a massive influence on the image of marine activities, and forms a world-wide recreational activity participated in by millions.” Orams (ibid.) noted that surfing extends well beyond the enthusiasm for the activity itself, having far-reaching influences as a result of image, surf clothing, and movies. In the context of sport tourism, Poizat-Newcomb (1999) examined the dynamics of surfing in Puerto Rico, finding that the sport provides stewardship and positive ties for the island‘s history, economy, and developmental strategies; the study traces the evolution of surf tourism as a positive element within Puerto Rico, exploring the issues of conservation, ecology, territoriality, the dichotomy among surfers and boogie boarders, and the government‘s limited attention to the market segment. Jennings (2007) offered discussion on fresh water and marine tourism with focus on boating, sporting, adventure, and sustainability, including research by Ryan (2007) who identified the environmental aspect of surfing is driven in the vanguard of movements concerned with water quality. Buckley and Carter (2007) overviewed the surf tourism sector structure as a component of adventure tourism as segmented into eight categories: activity, equipment, accommodation, statistics, access, community, experience, and environmental management.

Buckley (2002a) investigated the appearance of commercial surf tourism, bringing it into focus as an emergent and significant global industry, indentifying that the impacts, including environmental, socio-cultural, and economic, depend on how particular islands manage their natural and human resources. The research found that client response to crowding, together with increased pressure on natural or cultural host environments, provided an immediate and financially measurable indicator of capacity and such thresholds were generally low and could be reached very rapidly; it also identified that surf tourism destinations differ significantly in regards to relations

between tour operators, local access to surf breaks, and approaches to capacity management. The study recommended ‗practical politics' regarding capacity management of Mentawai surfing resources for both conservation and social welfare.

Buckley (2002b) marked a new page in the surf tourism research literature with an in-depth study into the Indo-Pacific region with a focus on surf tourism planning, management, and policy. Key issues identified include crowding at surf sites alongside the subject of quota and permit allocation. Through a case study on the Mentawai Archipelago, Indonesia, recreational capacity is assessed through field survey of the physical area by classifying surf breaks in conjunction with proposing cash flow scenarios, management systems, and potential investment of land-based resorts. The research identifies that prior to 2002, there had been very little practical or theoretical investigation into surf tourism and therefore research, analysis and insight were found to lag behind the growth and changes in the industry itself -- thereby establishing the significance of the surf sector in tourism research and development analysis.

Martin (2008a, b; 2009; 2010a, b) identified the growth of surf tourism in non-prolific surf destinations such as Phuket, Thailand has increased significantly in recent years. Following the December 25th, 2004 Indian Ocean Tsunami, surf tourism has increased steadily in Phuket in both the international and domestic markets. Figure 1.4 shows first-time Thai surfers from Bangkok preparing for a surf lesson at Kalim Beach in 2009.

Figure 1.4 Domestic Surf Tourists in Phuket Thailand

Source: Author (June, 2008)

CHAPTER 2

SIGNIFICANT TOPICS IN THE RESEARCH AREA

Significant topics in the research area illustrated in this report are four-fold: the physical attributes of surfing sites; ecological and economic value of surf resources; marine ecotourism; and coastal tourism guidelines. Subtopics are included appropriately.

2.1 Physical Attributes of Surfing Sites

The physical attributes of surfing sites are wide ranging and include general descriptions for the coastal features and processes; surfing waves; general classes of breakers; surfing sites and coastal topography; physical features of surfing areas; bathymetry; and surf-related ocean currents.

2.1.1 Coastal Features and Processes

Coastal features are classified according to the dominant processes at work along a coast; either erosional or depositional. Identified by the researcher as most relevant to the discussion on surfing locations, four depositional and one erosional coastal features have been adapted from Perry (2011) and listed below:

Depositional coastal features formed as abundant sediment settles from coastal currents and waves:

- **Beach:** beaches are normally composed of sand-sized sediment which is deposited a short distance inland as well as offshore. Beaches are formed by a combination of longshore current, which transports sediment parallel to shore within the surf zone, and wave action which bulldozes the sediment shoreward
- **Spit:** spits are elongated buildups of sediment that develop as strong longshore current carries sand and silt out across a harbor or bay entrance, or from a point of land.
- **Delta:** deltas are large fan-shaped wedges of sediment formed where a sediment-laden stream enters the ocean. Large deltas may support wetland habitats, agriculture, or mariculture. Many deltas are transient features which tend to form and grow during times of prolonged rainfall, which triggers high-volume stream flow capable of transporting lots of sediment to the ocean. Otherwise, moderate to occasional heavy surf can wear away the deltas.
- **Continental shelf:** a continental shelf is a flat and shallow ocean bottom extending from the shoreline out to the continental slope, where depth increases rapidly. The shelf itself is mostly composed of terrigenous (land-

derived) sediment deposited on the submerged edge of a continent, along with some biogenous skeletal sediment produced as marine organisms die in shelf water.

Erosional coastal features formed by the combination of terrestrial processes (weathering, stream flow, and mass wasting) and marine processes (waves and currents). Tectonic uplift can rejuvenate some of these features. Of these, the most relevant to the formation of surfing locations are headlands:

- **Headland:** Headlands are portions of elevated coastal landscapes which jut out into the ocean. Formation of a headland can involve several processes, including erosion by streams, unequal weathering of coastal cliffs, wave action, and movement of rocks along a fault. Some headlands are products of only one or two of these processes, whereas others are affected by all of the processes to varying degrees.

(Perry, 2011: online)

2.1.2 Surfing Waves

Butt (2010) offers a brief nine-point overview of the wave creation process and their arrival at coastal areas where surfers seek to catch and ride them as the waves crest and break:

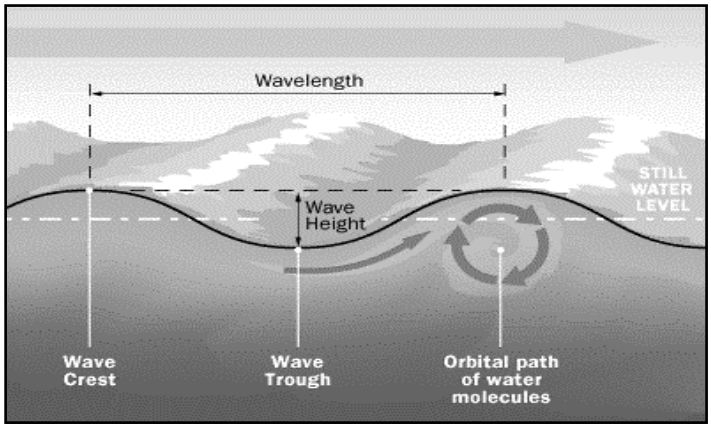
- sun's energy heats the atmosphere;
- equator gets hotter than the poles;
- air moves to compensate for temperature differences;
- vortices are produced in surface air motion;
- surface air transfers energy to water surface;
- waves are generated;
- waves propagate away from generating area;
- waves change shape as they hit shallow water;
- waves break and are surfed

Challinor & Weight (2005) identify that surfing waves are typically defined by a number of key characteristics, including:

- Wave breaking type.
- Wave height and velocity.
- Wave peel angle.

Like other types of waves, ocean waves have measurable wave lengths and heights (i.e. the distance between wave heights or crests) as orbital paths of water molecules travel across the surface of the sea. Wavelengths are normally expressed using the terms _wave period‘ by surfers, which is essentially the distance between wave crests (see Figure 2.1).

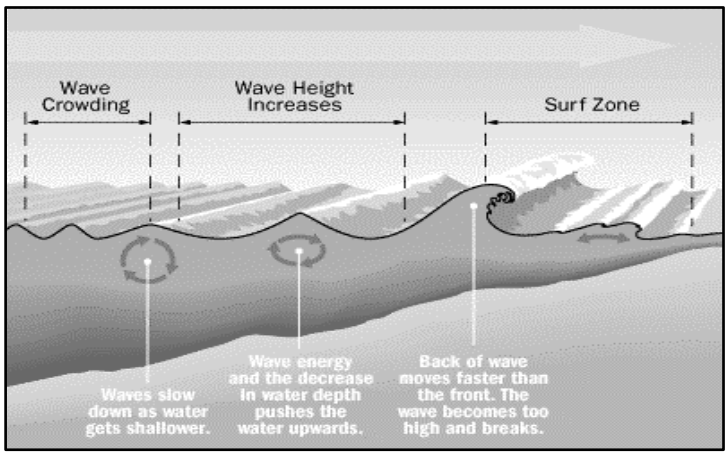
Figure 2.1 Wavelength



Source: Wilson (2007)

Perry (2011) identifies that ocean waves are nearly friction-free wave-form energy capable of traveling great distances within the surface zone of the ocean. Most waves form as wind transfers energy into the water. A wave's energy is typically released within the surf zone as they begin to ‗feel bottom', slow dramatically, and then break. Figure 2.2 offers an example of ocean swells approaching and cresting near a beach face.

Figure 2.2 Dynamics of a Breaking Wave



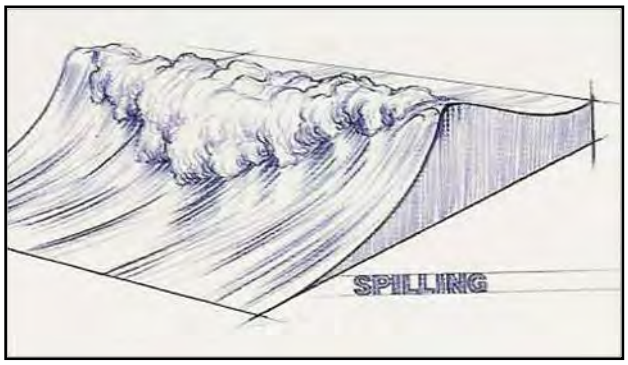
Source: Wilson (2007)

Perry (2011) defines ‗swell' as waves of fairly equal height, length, and period which form as storm-generated waves become sorted according to size and period as they move away from the storm's center. Swell, can travel thousands of miles before breaking along a distant shore. Comparatively, local wind waves are generally smaller and less organized than swell. As local wind waves can be superimposed onto swell, making the ocean surface chaotic, surfers dislike these smaller waves (referring to them as ‗wind chop') because they disturb the uniform swell waves (ibid.).

2.1.3 Three Classes of Breakers

Spilling breaker: spilling breakers are waves which break gradually over a considerable distance (satisfactory for surfing).

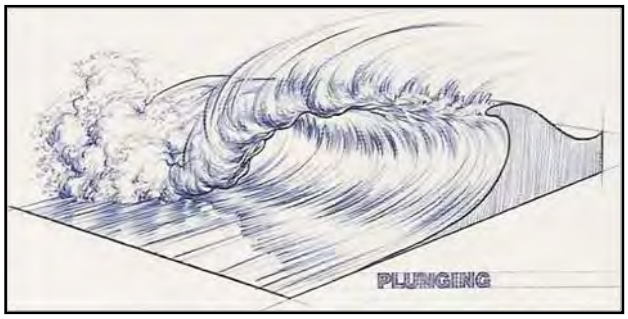
Figure 2.3 Spilling Breaker in Phuket



Pearson Education (2005)

Plunging breaker: plunging breakers are waves which tend to curl over and break with a single crash (good for surfing).

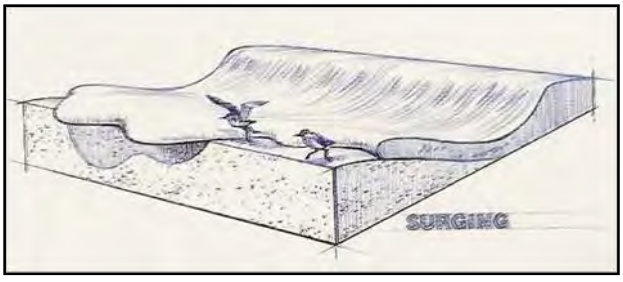
Figure 2.4 Plunging Breaker in Phuket



Pearson Education (2005)

Surging breaker: surging breakers are waves that peak up and surge up the beach like powerful wall of white water (not good for surfing).

Figure 2.5 Surging Breaker in Phuket



Pearson Education (2005)

The Three Classes of Breakers in Phuket, Thailand (Martin 2010a, h)

Figure 2.6 Spilling Breaker in Phuket

Martin (2010a, h)

Figure 2.7 Plunging Breaker in Phuket

Martin (2010a, h)

Figure 2.8 Surging Breaker in Phuket

Martin (2010a, h)

2.1.4 Surfing Sites and Coastal Topography

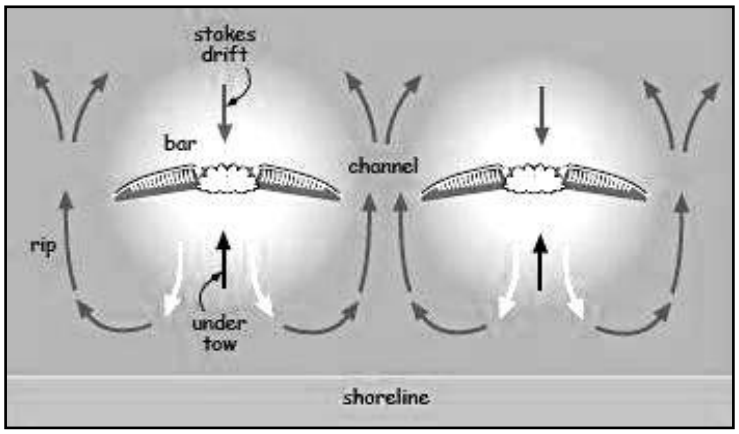
- **Pointbreak (a single-direction wave):** point breaks constitute waves which break around a point of land, such as a headland, and are generally long, evenly tapered, and predictable. Point breaks may occur at headlands, deltas, or other points of land. In terms of surfing, a pointbreak is a ‗single direction' wave whereby a surfer can only ride the wave in a single direction (i.e. away from the point of land or headland).
- **Single-peak (simultaneous left and right breaking waves):** single peak beach break: the type of waves that take shape over a sandy beach and are dependent on sand bars. Beach breaks are more mutable and unpredictable than surf found at point breaks or reef breaks.
- **Beachbreak (multiple random peaks and breaking waves):** a sand bottom area with multiple random peaks and breaking waves.
- **Reefbreak (single or two direction wave):** reef breaks are the types of wave which are centered on a permanent high spot in the underwater topography, such as a coral reef, rocks, or a rock ledge.

2.1.5 Physical Features of Surfing Areas

The following description of physical attributes and processes of surfing areas has been adapted and summarized from Butts (2010) *The WAR Report: Waves Are Resources* and offers only an introductory explanation of surf site formation.

> **Beachbreak**
>
> A beachbreak is a surf spot where the waves break on a beach. Beaches complicated and unpredictable systems in Nature. The main feature of a beachbreak is that the wave-breaking platform is mobile. The waves move the sediment around and the resulting shape of the sea floor then changes the way the waves break. Whether or not there are good sandbars for surfing depends upon that complex interplay between the waves and the sandbars. When considering only the movement of sediment in an onshore-offshore direction, the action of the waves coming into shallow water beyond the breakpoint tends to move sediment onshore through a mechanism called *Stokes drift*, and inside the breakpoint the undercurrent tends to move sediment offshore.

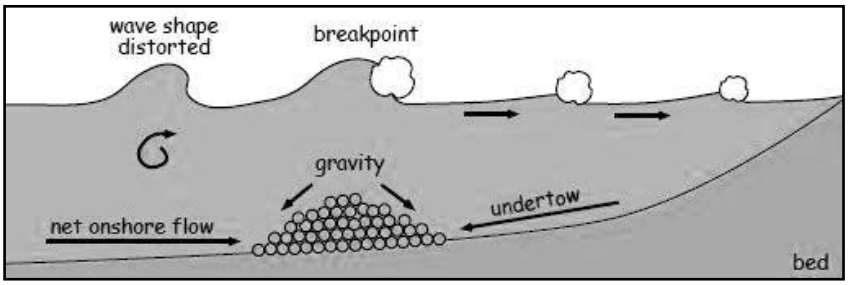
Figure 2.9 Beachbreak



Source: Butts (2010)

The action of both these mechanisms causes sediment to accumulate on the sandbar at the breakpoint, which makes the waves break more strongly at that point. If the waves break more strongly, the sediment-transport mechanisms are reinforced, which builds up even more sand at the breakpoint, which further reinforces the mechanisms. A point is eventually reached where the sandbar cannot physically get any steeper, and gravity starts to pull the grains back down again. Additionally, sediment is transported along the shore as well.

Figure 2.10 Sandbar Formation



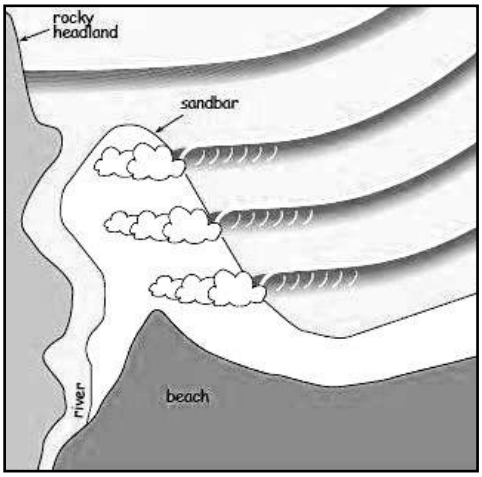
Source: Butts (2010)

Rivermouth

A rivermouth break is a surf spot where the waves break on a sandbar at the mouth of a river. It is a special case of a beachbreak because the waves break on sand, but it has a number of unique characteristics, including acting as a semipermanent feature, kept in place by the sediment-transport mechanisms of the estuary. A rivermouth sandbar forms where the width of the river increases, which is also where the speed of the water flowing into the sea decreases. The formation of the sandbar is intimately linked to the speed of the water flow, which

controls the transportation of sediment down the river and the deposition of that sediment on the bar.

Figure 2.11 Rivermouth Pointbreak



Source: Butts (2010)

Reefbreak

A reefbreak is a surf spot where the waves break over a rigid, immovable sea floor, rather than a movable one in the case of a beachbreak. The material making up the reef takes many years to change (whereas the sediment beneath a beachbreak or rivermouth can shift around daily or even hourly). Reefbreaks can take many different forms, depending on the local coastal geology and the material that makes up the sea floor. The waves that break on them can be of every possible type, from long, slow point-type waves, to large-scale offshore big-wave spots. Reefbreaks are distinguished by the type of material they are made of, such as those in higher latitudes where the majority of surfing reefs are made of sedimentary rock such as limestone or sandstone. In contrast, on volcanic islands most surf spots are made of solidified magma that spewed out of the volcano, and in tropical zones, the best reefbreaks are usually made of coral. Reefbreaks made of sedimentary rock are formed over millions of years as layer upon layer of sediment is built up and gradually compressed under its own weight and are often rock platforms cut below cliffs.

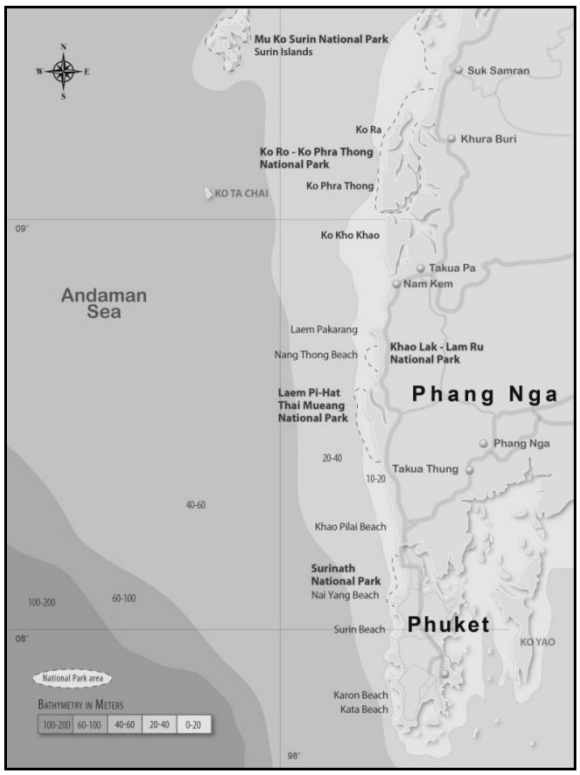
Butts (2010: 6)

2.1.6 Bathymetry in Context

Bathymetry is the two-dimensional shape of the sea-floor, resulting in different water depths at different positions (Butt & Russell, 2007). Bathymetry (seafloor topography) may vary considerably at different coastal areas and the affect on surfing waves can be substantial. Generally, waves approaching a particular coast from deep water travel faster and contain more energy than waves approaching over shallow water, such as when they are passing over a continental shelf before reaching the shore. For surfers, waves approaching from deep water are essentially more powerful and ‗punchy' and generally considered better or more challenging for surfers.

For example, Figure 2.12 identifies the bathymetry near Phuket and Phang Nga Provices on Thailand's Andaman Coast. Notably, the deepest water on Thailand's Andaman Coast is found near the southern beaches of Phuket. Martin (2010a) observed that waves at southern beaches of the island are among the most powerful on the Thai coast, especially Karon Beach, Kata Beach, and Nai Harn Beach, and this was attributed mainly to deep water. Martin also suggests that bathymetry is a factor in explaining why these beaches have higher than average drowning rates than other beaches on the coast (ibid).

Figure 2.12 Bathymetry of Phuket, Thailand



Source: Martin (2010a; 2011g)

2.1.7 Surf-related Ocean Currents

Perry (2011) describes ocean currents as coherent flows of water molecules generally moving in the same direction; and these coastal-ocean currents transport nutrients, energy, and sediment as they flow.

- **Large-scale nearshore and offshore currents:** currents which generally flow parallel to the coast; flow is typically related to gyre current flow, or possibly to seasonal wind flow. Large-scale currents play a critical role in distributing nutrients and plankton within the surface zone of a coastal ocean.
- **Longshore currents:** currents which flow parallel to the coast, but only within the surf zone (between breaking waves and the shoreline). Longshore current, formed as waves break and release energy at an angle to the shoreline, are significant because they can transport great quantities of sediment from where it is introduced into the ocean by a stream to beaches up or down the coast.
- **Rip currents:** flow offshore from shallow surf-zone water. Rips form where longshore currents or wave backwash collide due to the configuration of the coastal or beach topography. A strong rip current can carry sediment and swimmers out past the breaker zone. Rip currents are sometimes incorrectly referred to as ‗rip tides'.
- **Tidal currents:** currents which form within restricted inlets to bays and harbors as tide rises, forming a flood current, or as tide lowers, forming an ‗ebb' current. Tidal currents are often the sole means for circulating water within bays and harbors.

Perry (2011: online)

Martin (2010g) describes six surf-related ocean currents on the Andaman Coast of Thailand as follows:

- **Rip currents:** rip currents are strong near-shore ocean currents which pose a danger to swimmers and surfers; a river-like flow of water returning to the open sea. Rip currents are normally strong nearshore ocean current which can carry a person out to sea and normally related to the wave phenomena occurring at a given point in time and place.
- **Longshore Currents:** long-straight beaches have year-round currents which move parallel to the shore. These currents may increase in speed and power as wave activity increases. Normally, longshore currents are found inside of the surf zone.

- **Fixed Currents:** beaches often have specific areas where ocean currents are strongest. Fixed currents generally occur around the same area and direction from day to day.
- **Headland Currents:** headland areas often have rip currents which can permanently occur at one particular end of a beach, where the sand meets the rocks and jungle. They are especially strong when there is surf.
- **Flash Currents:** strong nearshore currents can suddenly and unexpectedly appear in Phuket, especially after a series of waves. Flash rips in Phuket can be caused by a mixture of wave types and conditions which combine with additive affects.
- **Backwash:** a backwash affect occurs when waves which arrive at a beach and then ‗bounce' off the shore whereby their energy returns to the sea. Normally associated with high tides and steep beaches.

Martin (2010g: 44)

2.2 Ecological and Economic Value of Surfing Resources

The term ‗eco' is derived from Latin, meaning ‗management of household affairs' (Random House, 1987), and the term has evolved to connote environmental and ecological aspects (ibid). ‗Eco', as a root word, is foundational in the terms ecology and economy, and this may indicate the intrinsic relationship between business and the environment. Lipton and Wellman (1995) (in Kay & Alder, 2005) assert the human aspect of ―economic value': ―A fundamental distinction between the way economics and other disciplines such as ecology use the term ‗value' is the economic emphasis on human preferences. Thus the functionality of economic value is between one entity and a set of human preferences." In the following section, the research moves to illuminate the preference and meaning of the value of surfing resources.

The ecological and economic values of surf resources, and the role of stakeholders in the management process, are not well understood, and academic inquiry in this subject area is clearly limited. However, in recent years, research into the economic aspects of surfing areas has risen to the call from the surfing community, seen as a leveraging tool for the conservation and protection of surfing amenity (i.e. establishing that surfing areas have value can be leveraged toward their protection in the wake of coastal developments which could negatively impact the resource). Lazarow (2010), with regard to celebrating the significance of coastal surfing resources, provides the following excerpt:

> Our understanding of the coastal environment, new participants and evolving dimensions continue to test institutional arrangements and the capacity of scientists, decision-makers, politicians and other coastal stakeholders. This begs new approaches. In an era of increasing emphasis of stakeholder engagement in environmental management, and of focus on the crucial importance of the marine and coastal zone, the actual and potential role of marine and coastal communities and stakeholders has been little documented or analyzed.
>
> Lazarow (2010: abstract)

Particularly, the research literature has been generated over the past decade in the touristic academe, not by theoreticians, but by graduate students on track to degree conferral through conference papers and theses. Subsequently, some of this research has led to journal publications and are examined herein. Three other sources of academic inquiry attest to the valuation of surfing areas: (1) economic impact studies of surfing events by sport event research specialists or those commissioned by international surf clothing sponsors such as *Quiksilver*, *Billabong*, and *Rip Curl*; (2) the Artificial Surfing Reef (ASR) literature, which seeks to delineate surfing areas as valuable assets in terms amenity as well as for coastal protection structures; and (3) those developed or commissioned through the not-for-profit sector, particularly surf-centered organizations surf as *Surfers Against Sewage*, *Save the Waves Coalition*, and the *Surfrider Foundation.* While the economic impact studies of surfing events and ASRs are among the earliest research attesting to the value of surfing and surfing locals, the NPO literature are relatively recent, appearing in the academe in the previous five years.

2.2.1 The Value of Surfing Resources

The populace has in the past ~~h~~opelessly underestimated the value of surfing to coastal communities; Australian communities discovered that they were dependent on the surf economy after it was too late, such as after constructing coastal groins and dredging estuary openings; surfers paradise is an example of this" (Richie, 2011 personal communication). However, 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.

The value of surfing resources has intrinsic and extrinsic values. For example, an intrinsic value to a surfer could include personal preference, wave quality (some waves are particularly consistent and of high quality), or the number of surfers affected; whereas the value of a surf spot to a local community through secondary effects, such as the influx of tourists and the money they bring is largely an extrinsic value (Butt, 2010). 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.

Table 2.1. Typology of Surfing Capital

Item	**Description**	**Natural or Human Impact**
Wave quality	Dominant local view of how the wave breaks. Both beauty and physical form become assessable.	Construction of coastal protection/amenity structures (e.g., groynes, seawalls, piers, seawalls, river walls, breakwaters, artificial reefs)
Wave frequency	_Surfable' waves measured against an accepted standard.	Sand management (e.g., beach fill, dredging, sand bar grooming)
Environmental	Environmental or biophysical conditions that may mitigate against a surfers' physical health.	- Biological impacts (e.g., water quality or nutrient loading) -Climate change/variability (e.g., temperature change, sea level rise, less or more storms less or more often) -Amenity of the surrounding built and natural environment -Marine predators (e.g., sharks)
Experiential	Societal conditions surrounding the surfing experience.	-Legislation/regulation that might grant, restrict, or control access (e.g., community title, private property, payment strategies, craft registration, proficiency requirement, policing) -Code of ethics (i.e., road rules for the surf) -Signage & education strategies -Surf rage, aggression, intimidation -Self-regulation/localism/lore -Mentoring, sharing, physical activity, challenge, joy and laughter, well-being, community spirit self-fulfillment -Local aesthetic

Source: Lazarow, Miller, and Blackwell (2008); Lazarow (2010)

Butt (2010) suggest that the concept of a ‗surrogate' value, which is twofold: the first is called revealed preference, and is based on how much money it costs us to perform the activity that allows us to enjoy the resource (costs in fuel, transport, surfboards, and other equipment, etc.), noting that every surf session costs us something; the second method is ‗stated preference', based on how much money would hypothetically pay to stop that resource (a surfing area) from damage or destruction. Butt (ibid.) warns of the paradox of conducting cost-benefit analysis on the value of surfing areas as this could lead to numerical arguments in favor of developments, such as a boat marina, which could be leveraged as higher in value.

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.

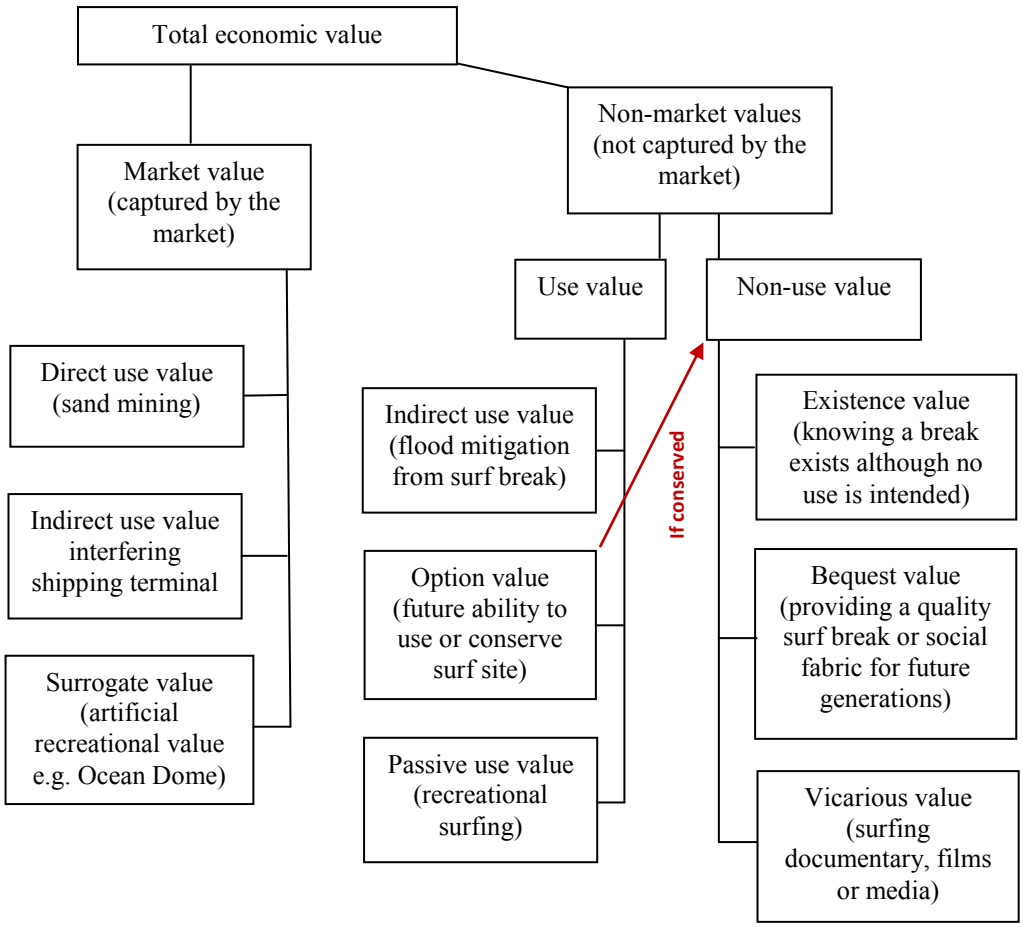
Buckley (2002a) notes that surf travel is generally not differentiated specifically as surf tourism, so its total economic scale and value currently remain unknown. For example, many surfers travel within or between the major continental surfing destinations, such as Australia, west-coast USA, south-coast Europe, Brazil and Central America, and South Africa. Surfers visiting Australia may also purchase surfboards; and surfers and non-surfers alike may purchase surf clothing and accessories (ibid.). Thus overall, while surfers may constitute only a small component in proportional terms, their total numbers are sufficient to make a significant economic contribution.

Butt (2010) identifies a number of variables, complexities, and interrelated factors when attaching a monetary value to a surfing area. For example, there is the value of waves to surfers and there is the value of waves to non-surfers. Surfers obviously have a vested interest, but assessing relative values to specific locals are complex. In the case of Hawaii, Buckley (2002a) identifies the value of surfing as a touristic activity outside of the realm of those who actually surf. For example, surfing, and particularly surf competitions, may contributes more to the Hawaiian tourist economy as spectator sports than as adventure tourism. Desmond (1999) makes a case for the ―viewer and the viewed" wherein the race, gender, and cultural aspects of surfing in Hawaii have served, since the turn of the century, as ―fantastic spectacles of corporeality" which ―form the basis of hugely profitable tourist industries." Hence the

lines of valuation for both the activity of surfing and the surfing environment as touristic draw cards are skewed and indicate a much broader value to the image and economy of Hawaii than visiting surfers themselves.

Lazarow observes that since the study by the University of Hawaii (Kelly, 1973), —N further academic studies have attempted to provide a framework for the investigation of the market and non-market value of recreational surfing to particular locations, with the specific intention of using this data to assess the importance of surfing in a comparable fashion against competing uses or developments that may impact or have impacted on surfing" (Lazarow, 2010: 61). In an attempt to patrician the total economic value of surfing, Figure 2.13 delineates market and non-market aspects.

Figure 2.13 Total Economic Value of Surfing



Adapted from Lazarow et al. (2007b); Lazarow (2010: 60)

Surfing Events

Surfing events are a particular area of interest when attempting to valuate surfing resources and is a highly prevalent topic in surf tourism research (Martin & Assenov, 2011). In a review of 119 pieces of surf tourism research, surfing events were mentioned in nearly 45 percent of the papers reviewed (ten papers were dedicated to surf events while 42 papers included some discussion on surfing events) (ibid.). Many of these papers can be more broadly defined as papers on the socioeconomic impact of surfing, which underscores the economic importance of surfing events**.** Like other aspects of event tourism, the value of surfing events are relavant to local economies in the short and long term and are worthy of academic investigations as such (O'Brien & Harrison-Hill, 2005; O'Brien, 2007, 2009; O'Brien & Chalip, 2007). Surf event research, including economic impact studies also help to accentuate the value of the activity at specific locals. However access to economic impact analyses on surf events prepared for corporate sponsors are difficult to locate as they are geared for internal use of the corporation only and are rarely made public (Martin & Assenov, 2011). Table 2.2 identifies surfing events as a highly significant topic in the literature.

Table 2.2 Surfing Event Research

Focal Point of the research	**Pieces of research**
Dedicated surf event research	10
Includes discussion on surfing events	42

Source: Martin & Assenov (2011)

Surfing as a commodity

Long-recognized by corporate surf clothing manufacturers, and in surf tourism, the marketing value of surfing is exceptional (Buckley, 2003). From a sociological perspective, the value of surf images and travel have been portrayed as a valuable commodity and influence on lifestyle choice through early surf films and the media. Reed (1999) looked at the social construction of surfing in the contexts of commodification, gender, mobility, and nature in media depictions of the surfing lifestyle, offering a discourse on the history and meaning of surf travel in the framework of colonization, social resistance, and globalization of the surfing subculture. Through a critique of the film *The Endless Summer*, Ormrod (2005) identified surf tourism as emanating from California and spreading to the global stage, indentifying the commodification of surfing, particularly in the context of surf exploration, romance, and the youthful consumers. Buckley (2003) offered a study of

the surfing industry which identifies sponsorship of qualified surfers as an effective marketing exercise which persuades customers to buy the sponsors‘ products through high exposure in specialist magazines and websites. Ponting (2007) identified surf tourism as a highly commodified global industry where management models may ignore local communities, citing that conflicts over the world‘s best surf breaks have erupted between surf tourism entrepreneurs and destination communities. Ponting (2009) offered *Projecting Paradise: the Surf Media and the Hermeneutic Circle in Surfing Tourism*, which identified how the imagery of perfect un-crowded surf in paradisiacal tropical destinations has been the dominant theme in the surf media, exploring tourism demand through the symbolic elements of surfing tourist space, which drives a multi-billion-dollar global surf industry. Wearing and Ponting (2009) explored the contrasts among commodified and de-commodified tourism in the context of volunteerism, offering a case study of surf tourism in the Mentawai where on one hand high-paying surf tourists offer no support for local communities, and on the other hand volunteer tourists do a great deal to support local communities.

2.2.2 Surf Sites as Ecological and Coastal Resources

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. ASR literature 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. As 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. As a course of action, World Surfing Reserves (WSR) (2011) was founded in 2009 by an international group of surfers, scientists & environmentalists led by not-for-profit organizations *Save The Waves Coalition* and *National Surfing Reserves* (NSR Australia), to create a global model for proactive surf break protection and stewardship. The organization provides dialoged in five key areas:

- The aesthetic, historic and cultural value of waves;
- The economic value of waves;
- Coastal laws, public policy and politics;
- Management and conservation of natural surfing resources;
- The sport of surfing, its core organizations and how they can help protect waves: opportunities and challenges.

Source: worldsurfingreserves.org

In line with various definitions as proposed by Garrod, Wilson and Bruce (2002) on marine ecotourism, the mission statement of World Surfing Reserves includes the proactive identification, designation and preservation outstanding marine environments, but with a special focus on waves, surf zones and their surrounding environments around the world: ―The program serves as a global model for preserving wave breaks and their surrounding areas by recognizing the positive environmental, cultural, economic and community benefits of surfing areas" (worldsurfingreserves.org).

In terms of ecology, Richie (2011 personal communication) explains ―the conservation of surfing areas is much like conserving elephants, it requires the protection of habitat which encompasses not only a large area but also any number of other resources and species; conservationist who seek the protection of habitat like the idea of protecting surfing areas for this reason." Furthermore, ―Surfing requires clean water and beaches, and water quality is a serious issue... If you get sick surfing an area you will not likely come back... Nobody wants to surf or vacation at a polluted area (ibid.)".

Lazarow et al. (2007b), Lazarow (2010), and Lanigan (2001) have explored *Surfing Capital* whereby ecological features of surfing areas are seen as intrinsic and valued. First, wave quality and frequency are ecologically dependent and easily altered by the construction of coastal protection/amenity structures (e.g., groynes, seawalls, piers, seawalls, river walls, breakwaters, artificial reefs) or through sand management (e.g., beach fill, dredging, sand bar grooming) (Lazarow et al., 2007b; Lazarow, 2010). Secondly, Environmental or biophysical conditions that may mitigate against a surfers' physical health, and theses may include biological impacts (e.g., water quality or nutrient loading), climate change/variability (e.g., temperature change, sea level rise, less or more storms less or more often), amenity of the surrounding built and natural environment, and marine predators (e.g., sharks) (ibid.)

Making a clear connection between ecological health of marine systems and surfing, Shuman & Hodgeson (2009) note that coral reef areas are among the best locations in the world for surfing and stress the significance of increasing knowledge and awareness of the health of coral reefs on a global scale in an effort to actively assist in conservation of these valuable ecosystems:

> Most of the best, most hollow waves in the world break over shallow, living coral reefs. The extreme power of breaking waves constantly erodes and alters the bottom topography. Many surf breaks that border continental land masses rely on sediments transported by rivers and ocean currents to maintain the surf break. In contrast, coral reef breaks

> rely on the continual growth of corals to maintain the bottom topography required for perfect surf.
>
> Shuman & Hodgeson (2009: 132)

Of practical consequence, Butt (2010) identifies a number of ways in which waves can be lost, including the construction solid structures (which are common and permanent), dredging river mouths and canals, chemical pollution and sewage, oil spills, nuclear waste, litter and marine debris, and access. While such impacts and activities prevent surfers from surfing, surfing very rarely stops other people doing the activities they like by taking away their ‗resources' (ibid.).

The Impact of Surfing on the Natural Environment

Fearon et al. (2006) suggests that even though the focus of Australia's obligations for coastal management are on the ecology of the marine environment, there is an urgent need to consider socio-economic aspects of coastal management as these are the key drivers of degradation of coastal and marine systems (in Lazarow, 2010). With regard to the sport surfing, environmental impacts related to the socio-economic increase in touristic activity are not well understood. Despite the broad base of literature regarding surfing, relatively little of it has focused on the environmental impacts of the sport (Hill & Abbott, 2009). As surf tourism becomes a significant economic activity on particular islands, it contributes correspondingly to these impacts, including increased water consumption, pollution of drinking water supplies from waste dumps and landfills, and eutrophication of nearshore reefs and other marine ecosystems from sewage discharge (Buckley, 2002a). In the Maldives, for example, some islands which were previously used only intermittently by local residents now support year-round surf resorts which occupy the entire island (ibid.)

However, Buckley (2002a) notes that surf tourism on islands can contribute to sustainable development in providing an economic and employment alternative to logging and large-scale plantation agriculture depending on how those islands manage commercial surf tourism. Surf tourism has the potential to be an alternative to logging and other destructive practices to the eco systems in tropical areas (Buckley, 2002a; Persoon, 2003).

Artificial Surfing Resources and Ecology

Artificial surfing resources are twofold: those which are entirely man made structure, such as surf parks; the other are Artificial Surfing Reefs (ASR), designed to create surfing amenity as well as improved ecological benefits, including sustainable coastal protection and increased habitat for marine life. From an ecological

perspective, new and potentially negative ecological aspects of surfing features include the construction and maintenance of wave pools or surfing parks, whereby surfing resources are entirely man made chlorinated pools, often many kilometers from the coast. Hill & Abbott (2009) note that no available research has seriously touched on the enormous environmental impacts on surf parks, not to mention the resources that are necessary to power them—not only does the concept of a surfpark inherently rely on the vast consumption of nature, but also it seeks to completely eradicate the natural processes that make surfing so unique. Figure 2.14 is the chlorinated wave pool located at Sunway Lagoon in Kuala Lumpur, Malaysia.

Figure 2.14 Sunway Lagoon, Kuala Lumpur, Malaysia

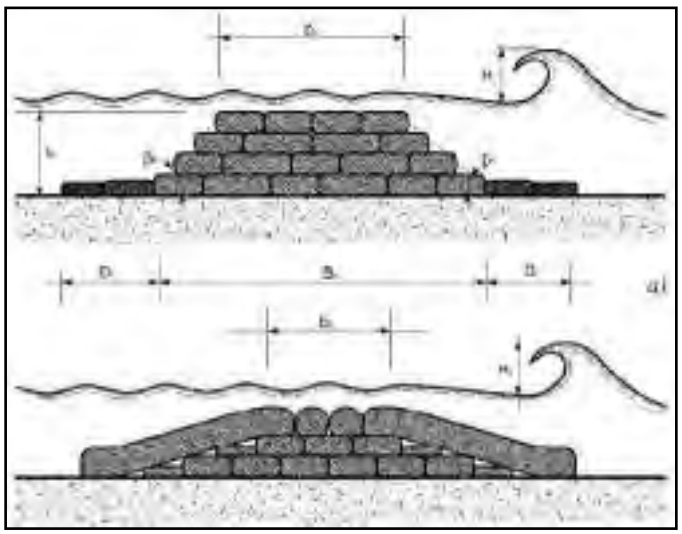
Source: Author (2008)

In contrast to the concept of wave pools and surf parks, ASR development is rooted in the ecological sustainability of coastal areas and the ASR literature is inherently tied to surfing as a coastal resource and the protection and conservation of shoreline areas.

The author has located 86 related pieces of literature on ASR and the following is only a brief introduction. Challinor & Weight (2005) recognize the ecological benefit of constructing artificial surfing reefs whereby monitoring has shown rapid habitat for colonization and occupation by marine fauna that would otherwise be unlikely to persist at that location due to "The high energy hydrodynamic conditions and the sand-dominated substrate to the extent that it has the potential to increase local biodiversity and may contribute to biological productivity at a regional scale" (Edwards, 2004). Slotkin et al (2009) place the discussion of surf tourism in context with the ASR literature and ties surf tourism to coastal management in both physical and social science perspectives. In terms of coastal

ecology in relation to surfing, ASR research is particularly relevant. Burgess et al (2003), suggest that artificial surfing reefs are indeed potential habitat for marine organisms and to improve marine ecological resources, advocating the design of reef structures with limited empty space and increased structural complexity in order to increase species abundance, diversity and biomass.

Figure 2.15 Concept of Artificial Surfing Reef



Source: Marine Biodiversity and Ecosystem Functioning (MarBEF)

2.2.3 Surf Resource Conservation in Thailand Case Review

Martin (2010a, b) identifies the potentiality to create surfing reserves on the Andaman Coast, Thailand within the existing Integrated Coastal Zone Management (ICZM) structure through a beach and survey coupled with recognizing the existing tangential protection afforded by current conservation policies, such as those afforded in Marine Protected Areas (MPAs) (See Appendix I). The research found 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 judicious level of protection to specific and sensitive coastal zones, they circuitously provide a level of sustainability for coastal surfing resources. Table 2.3 identifies the total number of surfing areas for each Andaman 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). In total, 21 surfing areas were identified as being under NP and MPA protection.

Table 2.3 Thai Surfing Areas within National Park Jurisdiction

Province	Total number of surfing 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

Source: Martin (2010a, b)

Martin (2010a, b) identified that given certain limitations of the resource in Thailand juxtapose with the Thailand's large tourism climate, the implications signal for the rationale of _surfing reserves' in Thailand. Following the Australian model of identifying surfing areas for protection and conservation (Farmer and Short, 2007) as iconic surfing reserves, Martin (2010a, b) offered the schema and prioritization for surfing site conservation in Thailand based on independently developed criteria. Table 2.4 represents the first-ever proposal for the rationale and prioritization of surfing reserves on the Andaman Coast of Thailand.

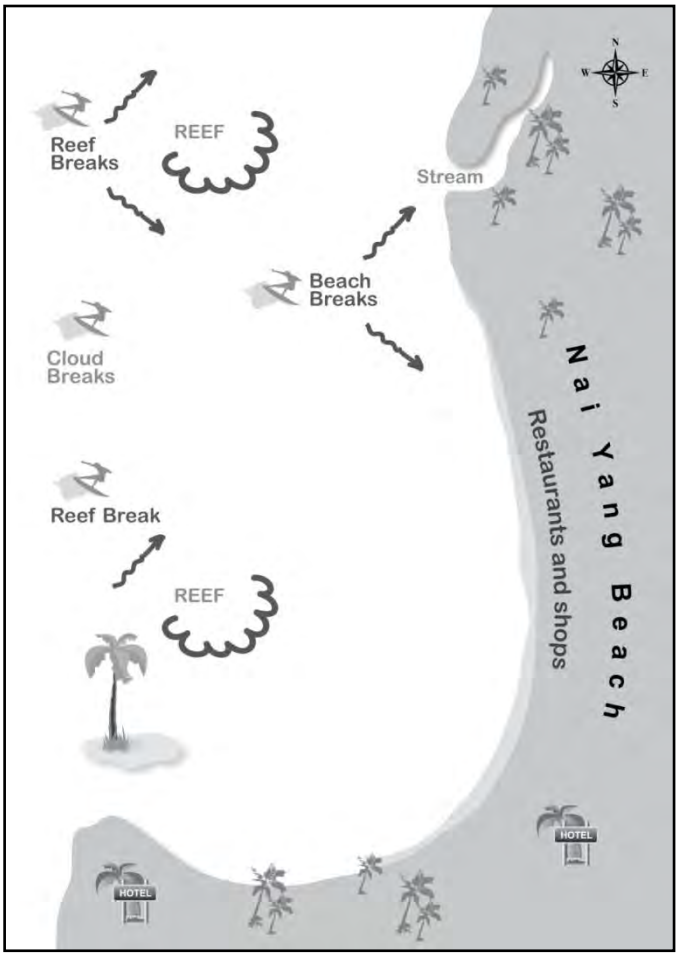
Table 2.4 Rationale and Prioritization for Surfing Reserves in Thailand

province	**surfing area**	**rationale**	**status**	**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

Source: Martin (2010b)

In terms of variety of surfing wave types, including various reef breaks (which are particularly rare in Thailand) and highly favorable seasonality coupled with the National Park / Marine Protected Areas status, Martin (2010a, b) identifies the Nai Yang areas as having the highest potential to become Thailand first-ever surfing reserve. As Bell‘s Beach in Australia was the country‘s first surfing reserve, it paved the way for future reserves (Farmer and Short, 2007; FFLA, 2010). The designation and implementation of a surfing reserve furthers the overall awareness and potential for conservation of surfing resources (ibid.), and therein the affects are beneficial to the wider case. This is to suggest that as the conservation aspect of the _surfing reserve‘ concept is additive to the existing policy and management of coastal areas, the protection of key surfing resources includes the conservation of other, inter-connected habitats. Figure 2.16 illustrates the potential and approximate resources for conservation at Nai Yang.

Figure 2.16 Potential Surfing Reserve Area at Nai Yang



Source: Martin (2010a, b)

2.3 Marine Ecotourism

While ‗marine tourism' is relatively straight forward term, suggesting touristic activities in the marine environment, ‗ecotourism' is a somewhat ambiguous concept to laymen and academics alike, one that is holistically embedded in the pretext of sustainability of natural and cultural resources. The following sub-sections of this review offer clarity for the concept of marine ecotourism through brief explorations into the meaning and contexts of ecotourism, sustainable tourism, and marine tourism. Ultimately, the aim of this section of the review is to determine the position of surf tourism juxtapose to the ecologically-based sustainable tourism in the marine environment. A Venn diagram is offered for the conception of sustainable surf tourism as an emergent field of research as an outgrowth in the graduate academe.

2.3.1 Ecotourism

As early as 1996, the IUCN (today called the World Conservation Union) defined ecotourism as:

> "Environmentally responsible travel and visitation to relatively undisturbed natural areas, in order to enjoy and appreciate nature (and any accompanying cultural features - both past and present) that promotes conservation, has low negative visitor impact, and provides for beneficially active socio-economic involvement of local populations."
>
> Ceballos-Lascurin (1996)

From the IUNC definition, we can that ecotourism is nature-based, yet encompasses cultural heritage, and is proactive toward conservation.

From a touristic point of view, ecotourism is essentially ecologically-orientated tourism. However, (Lindberg et al, 2010) explores the inconsistency in theoretical definitions and operational definition, wherein a conceptual definition may involve sustainability, but when one tries to measure whether someone is an ecotourist or some tourism activity is ecotourism, the criteria used to determine whether the activity is truly sustainable and qualified as ecotourism is ambiguous. The following concepts are proposed:

> (1) the US-based *Ecotourism Society* identifies ecotourism as the "Responsible travel to natural areas that conserves the environment and improves the welfare of local people";

(2) the *Australian National Ecotourism Strategy* defines ecotourism as ―nature-based tourism that involves education and interpretation of the natural environment and is managed to be ecologically sustainable";

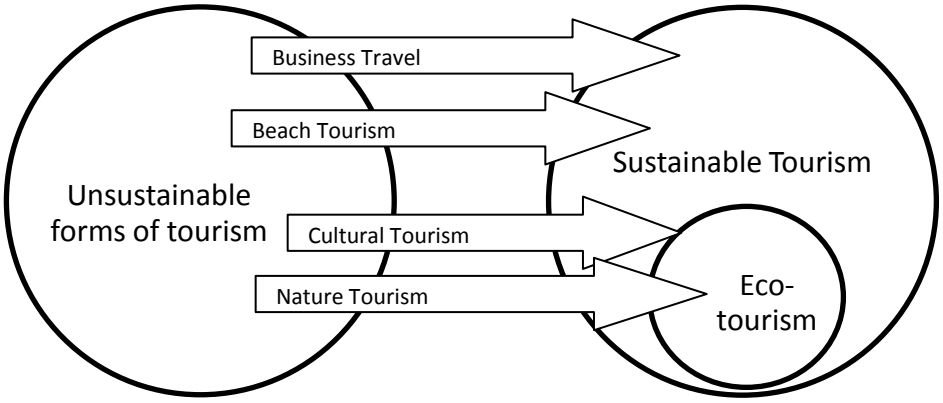
(3) the *Asia-Pacific Forestry Sector* defines ecotourism as simply, ―ecotourism is tourism and recreation that is both nature-based and sustainable."

Lindberg et al. (2010: 10)

In an effort to frame the concept of ecotourism, Wood (2002) discusses several aspects. First, it can be defined as a form of nature-based tourism in the marketplace, yet it can also be framed as a sustainable development tool by NGOs, development experts, and academics. Thus, ecotourism is both a definable concept with a set of principles and a market segment.

If subordinating ecotourism as a sub set of sustainable tourism, it can be juxtapose with ‗unsta inability' in term of the potential to develop various forms of tourism to become aligned with ecotourism principles. Figure 2.17 illustrates the potential, trend, and transition from unsustainable to sustainable/eco tourism. Note that ecotourism is a sub-set of sustainable tourism; nature tourism best integrates into ecotourism; and cultural tourism is on the periphery. Note that these delineations are mainly conceptual and not definitive.

Figure 2.17 Ecotourism in Context



Source: Adapted and Modified from Wood (2002)

2.3.2 Sustainable Tourism

To ensure sustainability in the face of the broad spectrum of tourism environs, a conceptual description by the United Nations World Tourism Organization (UNWTO, 2004) is focused on three dimensions, specifically the environment, economics, and socio-cultural:

> Sustainable tourism development guidelines and management practices are applicable to all forms of tourism in all types of destinations, including mass tourism and the various niche tourism segments. Sustainability principles refer to the environmental, economic and socio-cultural aspects of tourism development, and a suitable balance must be established between these three dimensions to guarantee its long-term sustainability.
>
> (UNWTO, 2004).

By design, sustainable tourism is an industry committed to making a low impact on the environment and local culture, while generating income and employment for local people. Sustainability implies the protection and conservation of resources for future generations, as opposed to current unconstrained depletion (Pizam, 2010). The aim of sustainable tourism is to ensure that development is a positive experience for all stakeholders, such as the local people, the tourism companies, and the travelers and vacationers to whom products are geared for. In this way, sustainable tourism may take into account the culture, politics, and economy of the community and country in a multitude of aspects. The UNWTO (2004) suggests that stakeholders should incorporate the following course of action as the guiding principles of sustainable tourism:

- Make optimal use of environmental resources that constitute a key element in tourism development, maintaining essential ecological processes and helping to conserve natural heritage and biodiversity.
- Respect the socio-cultural authenticity of host communities, conserve their built and living cultural heritage and traditional values, and contribute to inter-cultural understanding and tolerance.
- Ensure viable, long-term economic operations, providing socio-economic benefits to all stakeholders that are fairly distributed, including stable employment and income-earning opportunities and social services to host communities, and contributing to poverty alleviation.

UNWTO (2004)

In the context of sustainable beach tourism, Myles (2009) suggests that the custodianship of the coastal and marine environment is a global imperative:

> Beaches are a key tourism attraction for destinations around the world... In terms of their geomorphology, beaches are considered the most dynamic environments on earth. Successful beach tourism provides a destination with a huge competitive advantage, but it requires robust partnerships across stakeholders to protect the natural resource and use it in the most sustainable way. Clean water and safety features are the two key critical success factors for successful beach tourism development and promotion.
>
> Myles (2009)

As aforementioned, successful sustainable tourism requires the informed participation of all relevant stakeholders. On one hand, the development of sustainable tourism needs strong political leadership which can ensure wide participation and consensus building through the constant monitoring of impacts as an incessant process, along with introducing the necessary preventive and corrective measures; on the other hand, sustainable tourism needs to maintain a high level of tourist satisfaction and ensure a meaningful experience to the tourists, raising their awareness about sustainability issues and promoting sustainable tourism practices amongst them (UNWTO, 2004; 2010).

2.3.3 Marine Tourism

Orams (1999) defines marine tourism to include coastal activities, so long as these activities are focused on the marine environment, including those focused on, in, or under the water: "Marine tourism includes those recreational activities that involve travel away from one's place of residence and which have as their host or focus the marine environment (where marine environment is defined as those waters which are saline and tide-effected.)" For example, surfers who are immersed in the sea or whale watchers who are on a boat are appropriate examples of marine tourists (ibid.). Jennings (2007) suggests water-based tourism (which includes both fresh and saline aquatic environs) is best discussed in the wide categories inclusive of sailing and boating, sport or extreme sport (including surfing), adventure, and sustainability. Orams (1999) places the focal point of marine tourism on associated resources, impacts, and infrastructure: "tourism based on marine resources is the impacts of those tourists' activities and the associated infrastructural developments." Thus, "The basis for analyzing and managing marine recreational activities, including tourism, must be ensuring the sustainability of the resource upon which depend, not only the

recreation, but the health of all living things (ibid.). Jennings (2007) suggests that that water-based tourism should consider the spectrum of tourism, sport, leisure and recreation impacts in the context of four significant issues: (1) carrying capacities; (2) conflicts between user groups; (3) management strategies; (4) and sustainability issues.

The rapid and widespread development of marine-based tourism suggests that it may merely be another form of exploitation of marine resources rather than an agent for marine conservation—yet there are examples where tourism has produced positive results for ‗things marine'—and through visiting and enjoying the marine environment as tourists, people come to view the oceans as worthy of protection (Orams, 1999). Framed in this context, the sport of surfing as a marine touristic activity, is actually driven in the vanguard of movements concerned with water quality through the development of not-for-profit organizations founded by surfers who campaign for clean and safe recreational waters (Ryan, 2007). Citing the case of *Surfers Against Sewage* (SAS), Ryan (ibid.) identifies that the organization's use of commissioned and published research has brought validity and success to conservation advocacy for clean water at surfing beaches.

2.3.4 Marine Ecotourism

Marine ecotourism is complex special interest area of the tourism sector. The implementation and management of marine ecotourism faces any number of common-pool issues across the wide and expansive seascape. Carter and Carter (2007). The open nature and connectivity of the marine environment brings with it significant problems in management as sea currents carry sediments, nutrients, pollutants, and organisms through, and beyond, on location to another. Orams (1999) identifies that as marine tourism takes place in an environment uninhabited by humans, tourists are dependent on equipment introduced to the environment to survive [boats, dive gear, etc.], and this can lead to any number of environmental issues resulting from inappropriate use and handling of technical support and facilities. Carter and Carter (2007) delineate marine tourism from marine ecotourism by first noting a documented environmentally destructive history of marine tourism, including the context of marine nature tourism. Marine ecotourism must embody the criteria of sustainability to be considered as ecotourism occurring in the marine and coastal environment (ibid).

Garrod, Wilson and Bruce (2002) conducted Delphi study to identify and define the concept of ‗marine ecotourism', finding that the field means different things to different people. For example, perspectives on the actual meaning of the term ‗marine ecotourism' are somewhat contested and controversial in the context of

planning and managing, as well as when considering the desirability of achieving and applying an agreed definition (ibid). The study found that the majority of preferred definitions emphasized the need for appropriate management to ensure that the quality of the natural environment in which marine ecotourism takes place is not compromised, and the requirement for local people to benefit from ecotourism (ibid). Overall, aspects most evident in building the parameters to the field of study included: (1) an emphasis toward the educational component of ecotourism and the need to interpret the natural environment for ecotourists; and (2) to strike a balance between the description of ethical consideration and the prescription of flexibility in application. Conversely, less clear dimensions of the definition include those related to: (1) the cultural aspects of ecotourism; and (2) the issue of participatory planning and management by local peoples (ibid.).

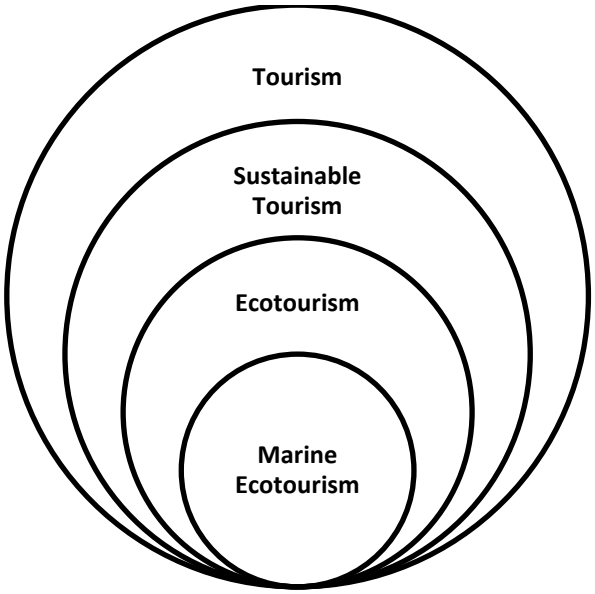
Adapted from Halpenny (2003), the following five key points offer the boundaries of marine ecotourism in terms of travel:

- Travel to a marine or coastal setting that benefits local communities, including involvement and financial returns.
- Travel that helps to conserve the local, cultural, and natural environment.
- Travel that minimizes its negative impact on natural environments and local communities.
- Travel that emphasizes learning and interpretation of the local environment to visitors.
- Travel that motivates visitors to re-examine how they impact the earth and how they can aid local communities and the environment.

Halpenny (2003: 8)

Definitional to marine ecotourism, it is subordinate to ecotoursm, sustainability and to the wider industry of tourism. Figure 2.18 offers a lens into the particular niche-market and practice to represent the definition found throughout this section of the review.

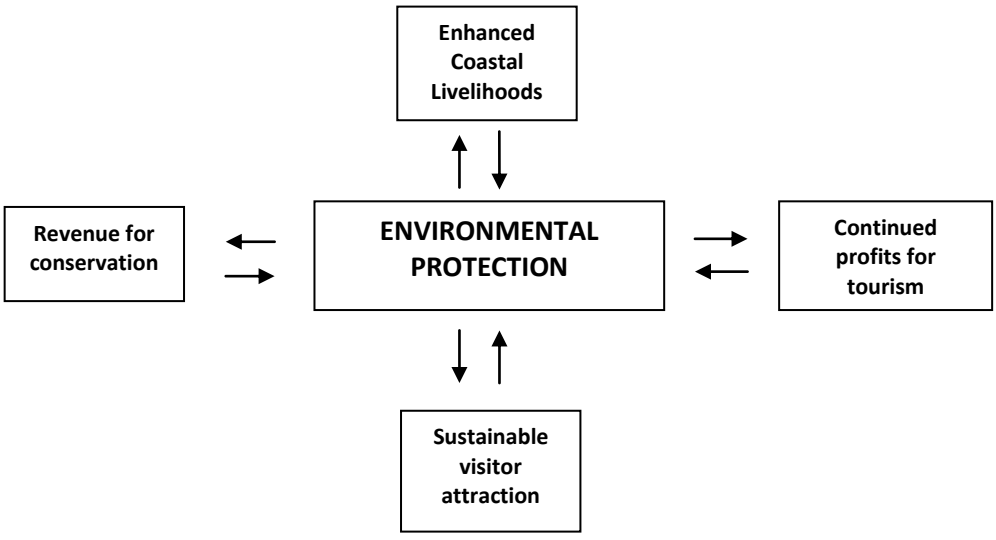
Figure 2.18 The Subordination of Marine Tourism



Source: Author

In terms of environmental protection relative to marine ecotourism, Carter (2002) offers the following conceptual framework and symbolic relationship (Figure 2.19).

Figure 2.19 Theory of Sustainable Marine Ecotourism



Source: Adapted from Carter (2002)

2.3.5 Conception of Sustainable Surf Tourism in the Academe

Graduate and honors research leading to degree conferral were cornerstone to the development of surf tourism research in the areas of eco, sustainable, and marine, tourism. Eleven studies underpin the field and are discussed in chronological order as follows.

(1) Ponting (2001) was among the first research to study the issues surrounding the management of the Mentawai islands and to focus on the private tourism operators, the government, and the host communities involved. Exploring environmental, economic, and social dimensions, Ponting (ibid.) investigates a myriad of management issues faced by the region amidst _neo-colonial' advances of the surf tourism industry in contrast with impoverished local communities; the research seeks to identify the stakeholders and to address the high levels of leakage of the economic benefits of surf tourism away from host communities.

(2) Hageman (2004) considered local residents and surf tourism in Taghazout, Morocco, exploring ecological, economical, and socio-cultural considerations spanning four decades.

(3) Tantamjarik (2004) examined the sustainable issues facing the Costa Rica surf tourism industry in the context of environmental, socio-cultural, and economic issues related to infrastructure, crowdedness, pollution, the government's role, local community involvement, and visitors experience. The study identified that crowding and pollution as the most commonly cited concerns.

(4) Hageman (2006) investigated pro-poor surf tourism on the Indonesian island of Lombok, indicating that although this unique market segment faces obstacles, surf tourists have a high level of spending on local products, as well as a dynamic concern for social and natural environments.

(5) Krause (2007) explored Surf Tourism in Costa Rica through an anthropological perspective, a study centered on touristic activity at Jaco and Hermosa beaches in Costa Rica, identifying that surfers are pathfinders into territories that lack an existent tourism infrastructure, and that they may indirectly set in motion a process of development and foreign investment into areas that are ill-prepared for large numbers of visitors.

(6) Frood (2007) investigated the potential costs and benefits of surf tourism and discusses surf tourism as a possible contributing form of sustainable development for Indonesia. The research contributes an action plan for sustainable surf tourism in Indonesia in light of _surf tourists scouring the globe' to relevant stakeholders and suggests the motivation for researchers and governments must be to find solutions for the sustainable development of surf tourism destinations (ibid.)

(7) Ponting (2008) *Consuming Nirvana: An Exploration of Surfing Tourist Space*, explored the social construction of surfing tourist space in the Mentawai Islands through developing conceptual tools to ensure local communities are empowered to control their destiny as global surf capital extends its reach, including the ownership of property rights in the natural surf resources of waves and related tourism facilities.

(8) Mach (2009) identified the need for ecotourism principles in international surf culture, offering a history of surf subculture and surf tourism, recommending for the promotion of local protectionism in early surf tourism development by engaging stakeholders to understand that indeed they have a vested interest in protecting areas. The study suggest that sustainable development should shift from a strict environmental focus include a community focus whereby an informed civil society and social entrepreneurs are the keys to linking surfing tourism towards sustainability.

(9) Ingersoll (2009) explored Hawaii‘s heritage in the field with through seascape epistemology, looking at Hawaii's „neocolonial‘ surf tourism industry, which collects oceanic literacy into an archive and argues that such epistemology is empowering for native Hawaiians as it validates Hawaiian ways of theorizing, conceiving and constructing knowledge in genealogical, cultural, political, and spiritual relationships with the sea, identifying the diverse aspects of the surf tourism industry in Hawaii.

(10) As aforementioned, Lazarow (2010) offered an interdisciplinary environmental management approach to recreational surfing and found that as our understanding of the coastal environment, new participants and evolving dimensions continue to test institutional arrangements and the capacity of scientists, decision-makers, politicians and other coastal stakeholders.

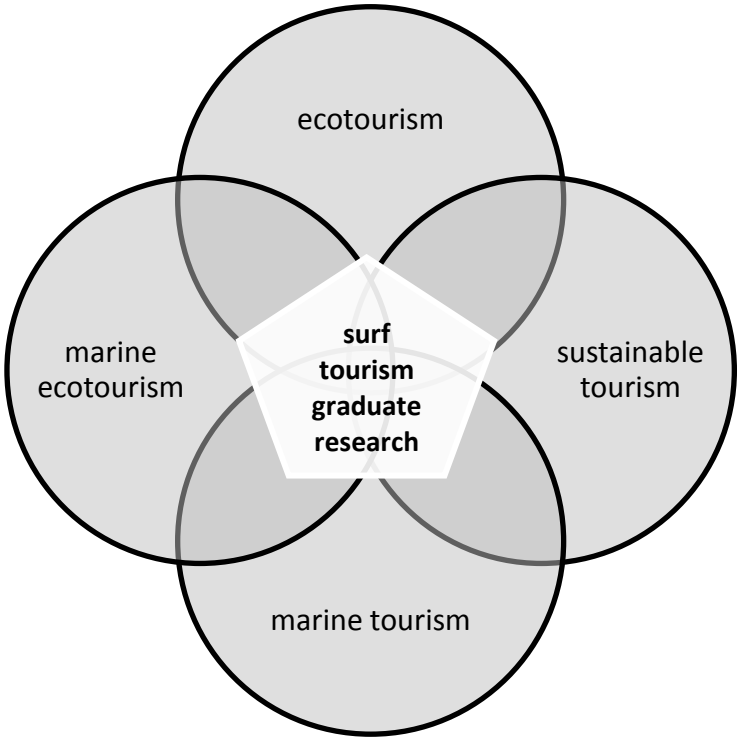
(11) Martin (2010) conducted a coastal resource assessment for surf tourism in on the Andaman Coast of Thailand and found that the resources was limited due to various physical parameters and coupled with environmental issues resulting from a long history of tin mining and tourism. Water pollution and marine debris were found to be problematic, yet the industry was clearly in a prolific state of growth, especially in Phuket. Surfers were also found to be functioning as substitute lifeguards by providing impromptu rescues to tourists.

Spanning eleven graduate studies over ten years, sustainability, ecology, economy, and management are key issues developing in the touristic academe. Field locations were Indonesia (five studies), Costa Rica (two studies), and Morocco (one study), Hawaii (one study), Thailand (one study), and one multi-area research with case studies in Australia, Chile, and Argentina. This suggests that the overall research is considerably limited in term of both location and number. As Indonesia and Costa

Rica are highly prolific surf tourism destinations, it is evident that non-prolific areas less high-powered natural surfing resources, such as Thailand could prove worthy of investigation. Similarly, prolific surf tourism areas of Australia, Hawaii, South Africa, and the Philippines are areas for further graduate field study.

When exploring the development of surf tourism research in the in graduate research around the world, the areas of research reviewed in this section, ecotourism, sustainable tourism, marine tourism, and marine ecotourism, are the predecessors of surf tourism field of study. Thus surf tourism research is an interdisciplinary outgrowth in the academe deeply interconnected with the marine environment and ecology whereby sustainability is a pervasive thread. Figure 2.20 is a Venn diagram to illustrating the interdisciplinarity and sustainability aspects of surf tourism research which are evident in the graduate literature.

Figure 2.20 Sustainability Concepts in Surf Tourism Research



Source: Author

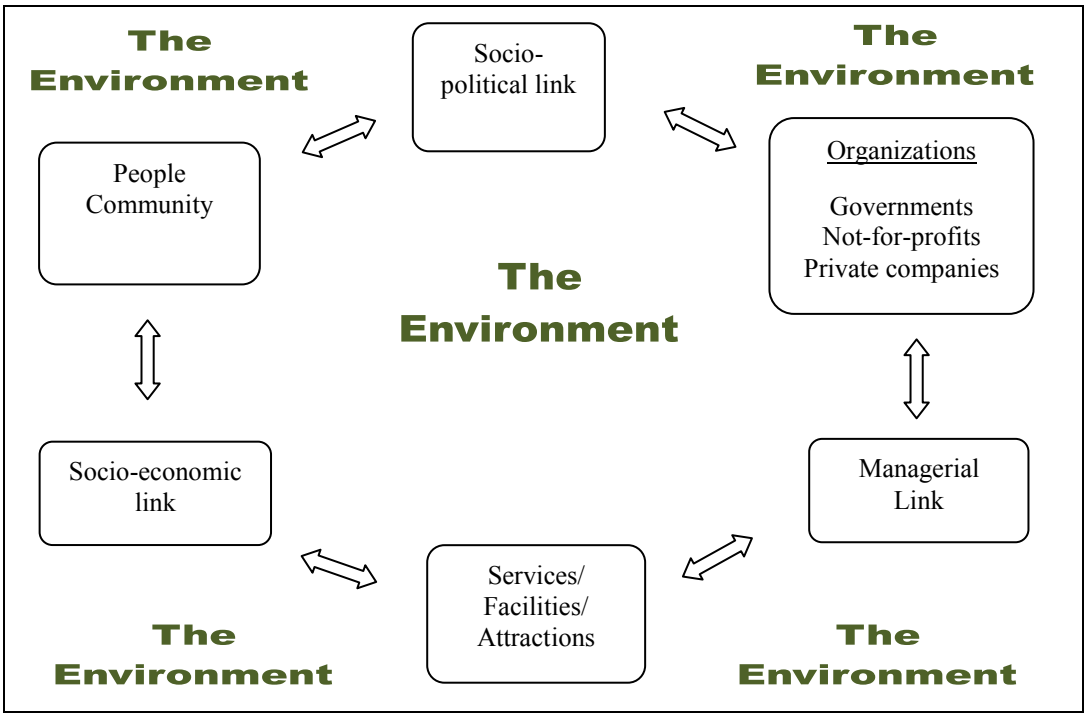
2.4 Coastal Tourism Guidelines

Basic concepts for individual responsibility include disposing of waste properly, leave things where you find them, respect nature and wildlife, and be considerate to stakeholders who share the environment. However, definitional to the responsible conservation and management are theoretical coastal tourism guidelines, discussed herein in the following contexts: tourism and the environment; coastal management; coastal tourism prescriptions; coastal resource management in Thailand; and a brief review of issues on the Andaman Coast.

2.4.1 Tourism and the Environment

Environmentalism is the belief that humans are part of nature and, as a result, they have a responsibility to ensure their existence is considered within the context of their environmental impact (Kay & Alder, 2005). When placing environmentalism in the context of tourism, Broadhurst (2001) suggests that there is a significant need to encourage sustainable leisure and recreation in our planning, and such guidelines for looking at the impacts of recreation focuses our attention on physical, chemical, and biological changes that are perceived and construed. Thus the environment constitutes an intrinsic base which is foundational to the tourism industry as recognized by Veal (2006) as an interdisciplinary framework (see Figure 2.21).

Figure 2.21 Interdisciplinary Framework for Leisure and Tourism



Source: Adapted from Veal (2006)

Tourism and the environment, although fundamentally inseparable, subsist in a paradoxical paradigm. For example, there may little communication between the tourism industry and those who seek to preserve the natural environment where the touristic activities take place. Buckley (2008) explains that "The tourism and conservation sectors exist independently of each other; neither exists to serve the other; and to a large degree they operate with little interaction or overlap. Where they do overlap significantly, however, the interactions between them become critical to both." Broadhurst (2001) argues that the environment must take precedence: "The environment has an intrinsic value, which outweighs its value as a tourism asset. Its enjoyment by future generations and its long-term survival must not be prejudiced by short-term considerations."

Kay and Alder (2005) note that it wasn't until well after the industrial revolution, in the late nineteenth century, that the environment and natural resources came to be considered as finite. This attitude was mainly attributed to the advances in economic theories on supply and demand; the developing realization that society had the ability to destroy the environment, ultimately affecting its survival; social reforms; and studies attempts to plan for resource management (ibid.).

Inevitably, efforts need to be made to manage and conserve the resources for which tourism requires, and as the natural environment is dynamic, made up of ongoing processes and systems, the tourism industry must adopt the responsibility to adapt and conserve the resource. With regard to the environment, Broadhurst (2001) suggests tourism guidelines in a sustainable context:

- Tourism should be recognized as a positive activity, with the potential benefit the community and the place as well as the visitor.
- The relationship between tourism and the environment must be managed so that the environment is sustainable long term. Tourism must not be allowed to damage the resource, prejudice its future enjoyment, or bring unacceptable impacts.
- Tourism activities and developments should respect the scale, nature, and character of the place in which they are sited.
- In any location, harmony must be sought between the needs of the visitor, the place, and the community.
- In a dynamic world, some change is inevitable and change can often be beneficial. Adaptation to change, however, should not be at the expense of any of these principles.
- The tourism industry, local authorities and environmental agencies all have a duty to respect the above principles and to work together to achieve their practical realization.

Broadhurst (2001: 232)

2.4.2 Coastal Management

The ‗coastal zone' or the ‗littoral' are the spatial areas where the land meets the sea; they are dynamic, diverse, and in a constant state of flux. From Latin ‗litoralis', the coast is the intertidal zone, or the area between the high water mark which is rarely inundated to shoreline areas that are enduringly submerged. The Organization for Economic Cooperation and Development (OECD, 1993) suggests that a coastal area is by itself not a line, but a ‗band' in terms of the nature of environment, the interactions of marine and coastal processes, and various management needs. Thus the coast is a complex system expanded on two axes: one is parallel to the shore (longshore); and one is perpendicular to the shore (on/off shore) (ibid.).

Coastal Resource Management (CRM) refers to the study and supervision of the littoral, whereby ‗coastal resource' is a broad term reflecting the mounting interests in the coastal environment. CRM, as a field of study and in practice, takes into account the myriad viewpoints of any number of stakeholders; it considers the interconnectedness of the various ecosystems and encourages cooperation among individuals, communities, and countries. In a wide sense, coastal resource management represents globalization whereby all countries with marine environments share a common and interrelated ocean. Myles (2009) suggests that CRM organizations around the world should prepare for the diverse challenges that impact coastal destinations, including global warming and climate change, beach safety and security, disaster management, clean water, coastal migration, and coastal industrialization.

Coastal zones constitute a dynamic area of natural change and of increasing human use; they contain rich resources used to produce goods and services and are home to considerable commercial and industrial activities. Consequently, human activities originating from the littoral impose an inordinate amount of pressures on the natural environment (land and sea) as well as on human-kind and their cultural systems. In this context, CRM assumes the theory of ‗sustainability' and is inherently tied to the issues surrounding nature conservation, recreational activity, and coastal defense. The National Oceanic and Atmospheric Administration identifies the intricate task of balancing ecosystem health with human use in the context of the ocean and CRM, including, but not limited to: ―aquaculture, climate change, cumulative impacts, habitat, hazards, marine debris, ocean resources, public access, public involvement, special area plans, and water quality" (NOAA, 2010).

A current trend in coastal resource management is an integrated approach, whereby the interconnected natures of coastal ecosystems are well thought-out amid the implications of human actions. Kay & Alder (2005) observe the global trend

whereby governments and international organizations choose to include the word „integrated“ as a prefix to describe their effort in bringing together various elements of their coastal planning and management initiatives into a single and unified system. Olsen and Christie (2000) identify that the interconnected issues which coastal management programs address are remarkably similar across a wide range of societal and geographic settings. In broad terms, they are expressions of anthropogenic change to coastal ecosystems brought by intensifying pressures from human activities that are expressed as:

- The degradation or destruction of important coastal habitats (wetlands, coral reefs, seagrass, estuaries) and the resulting loss of biological diversity;
- The decline of estuarine-dependent fish and shellfish populations and their associated fisheries;
- Declining near-shore water quality and changes to the volume, quality, and pulsing of freshwater inflows to estuaries;
- The inappropriate silting of shorefront infrastructure and their subsequent high vulnerability to the impacts of floods, storms, and erosion/accretion processes;
- Reduced access for traditional users and the public to the shore, wetlands, and fishing grounds.

Olsen and Christie (2000)

Underlying various mandated and voluntary measures is the realization that the natural environment is not static but is itself constantly undergoing change, and that there is a certain hesitation to take full responsibility for introducing sustainability practices. Therein, industries need to develop flexible operational management regimes and enterprises that are responsive to change (Pizam, 2010). The fundamental goal of understanding and managing coastal resources includes the need to balance the intensifying human activities with the changes to ecosystem qualities that they bring. It is currently popular to articulate the goal by casting CRM as a vehicle for progressing toward more sustainable forms of coastal development (Olsen & Christie, 2000). Sustainability has eemerged as the dominant paradime of the world‘s coastal management programs in the late twentieth century, and remains valid today albeit with continued debate over the tangible measures required for sustainable coastal management (Kay & Alder, 2005). While there is a rich history of traditional use of coastal space and coastal resources around the world, responsible usage and management are often neglected when contemporary markets and associated societal behaviors contrary to traditional use and management increase (Olsen & Christie, 2000).

The concept of ‗Integrated Coastal Zone Management' (ICZM) was built upon the coastal resource management concept by broadening the scope in the context of an ‗integrated approach', whereby myriad aspects of the coastal zone, including geographical and political boundaries, are incorporated in an endeavor to realize sustainability. Table 2.5 identifies the elements of ICZM in terms of integration:

Table 2.5 Elements of ICZM in Terms of Integration

Context of integration	Elements of ICZM
All elements of management	From planning and design through implementation, i.e. Construction and installation, operation and maintenance, monitoring and feedback, evaluation over time.
All stakeholders	All aspects of the management process.
Among disciplines	Ecology, geomorphology, marine biology, economics, engineering, political science, law.
Management resources	Agencies and entities involved.
Programs	Various sectors, including fisheries, energy, transportation, water resources management, disposal of wastes, tourism, and natural hazards management.
Programs and plans	Economic development, environmental quality management.
Responsibilities for various tasks	Among the levels of government - local, state/provincial, regional, national, international - and between the public and private sectors.

Source: Adapted from Bower and Turner (1996)

‗Integration' in ICZM suggests an interdisciplinary and interrelated course of action to promote sustainable management of coastal zones; it infers the long-standing stability of environmental, economic, societal, cultural and recreational aims bounded by the limits of coastal resources. The Commission of the European Communities (2000) identifies the principles ICZM:

> Integrated Coastal Zone Management (ICZM) is a dynamic, multi-disciplinary and iterative process to promote sustainable management of coastal zones. It covers the full cycle of information collection, planning (in its broadest sense), decision making, management and monitoring of implementation. ICZM uses the informed participation and co-operation of all stakeholders to assess the societal goals in a given coastal area, and to take actions towards meeting these objectives. ICZM seeks, over the long-term, to balance environmental, economic, social, cultural and recreational objectives, all within the limits set by natural dynamics. "Integrated" in ICZM refers to the integration of objectives and also to the integration of the many instruments needed to meet these objectives. It means integration of all relevant policy areas, sectors, and levels of administration. It means

> integration of the terrestrial and marine components of the target territory, in both time and space.
>
> The Commission of the European Communities (2000: 25)

Research indicates that the level of integration may reflect the level success that ICZM achieves in a given area. Bower and Turner (1996) suggest the hypothesis that "There is a positive correlation between the degree of integration achieved and the probability of achieving the estimated benefits." In theoretical and spatial contexts, the Commission of the European Communities (2000) advocate that ICZM is based on broad and holistic perspectives (thematic and geographic) of coastal zones which are influenced by a myriad of inter-related forces related to hydrological, geomorphological, socio-economic, institutional and cultural systems:

- Successful planning and management of the coastal zone must eschew piecemeal decision making in favor of more strategic approaches that look at the bigger picture, including indirect and cumulative causes and effects.
- There is a need to accept the inalienable long-term interdependence between maintaining the integrity of natural and cultural systems, and the provision of economic and social options.
- The close links (through both human and physical processes) between the marine and terrestrial components of the coastal zone imply the need for consideration of both the marine and terrestrial portions of the coastal zone, as well as the river basins draining into it

  Commission of the European Communities (2000).

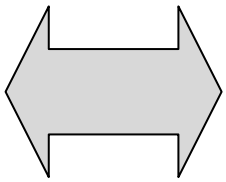
2.4.3 Coastal Tourism Prescriptions

The littoral is a complex zone in a perpetual state of flux. Guiding or managing its stability requires a broad understanding of human actors and environmental systems. Thus there are considerable factors and concerns when approaching the topic of coastal tourism guidelines. Broadhurst (2001) suggests that there is an overall significant need to encourage sustainable leisure and recreation in our planning, coupling the complexities of the development, conservation and enforcement of coastal zone requires comprehensive web of theory and practice. While conceptually, theory and practice are inextricably linked, in application, they are diverse when comparing prescriptive with tangible results. Monitoring, re-evaluating, and enforcement are but a few of the links required in forging an affective system for creating and maintaining coastal tourism guidelines. Inevitably, this trend

of thinking has lead to the development of coastal resource management (CRM) and integrated coastal zone management (ICZM).

Coastal management prescriptions vary widely depending much upon the culture and social structures of a particular coastal nation. Therefore organizational structured for managing any given coast, there are any number of consideration, such as whether a particular society is low-context culture or high-context culture. Kay & Alder (2005) argue that most, if not all coastal programs are influenced by cultural beliefs, while Broadhurst (2001) recommends that when managing any water area to consider the different groups and what they will be expecting. In order to offer a holistic coastal tourism guideline applicable to any number of sociocultural settings, and to synthesize coastal planning and the implementation of coastal planning, Table 2.6 identifies the range of orientation of coastal management programs.

Table 2.6 Range of Orientation in Coastal Management Guidelines

Conservation		Development
Participatory		Technical
Non-Statutory		Statutory/Regulatory
Limited Scope		Comprehensive
Planning		Implementation
Sectoral		Integrated

Source: Scura (1993); adapted by White (1995); adapted by Kay & Alder (2005: 107)

Capacity Building

In an attempt to construct applicable coastal tourism guidelines, ‗capacity building' is a term increasingly employed by the United Nations to describe initiatives which aim to increase the capability of stakeholders to make sound planning and management decisions. A distinction can be drawn between human and institutional capacities: while human capacity building is centered on training and professional development, institutional capacity building is focused on arrangements among businesses, governments, and non-governmental groups and communities (Kay & Alder, 2005).

To better understand the pretext behind capacity building, the following quotes lend insight to the human condition and our need to coexist in the environment:

The ancient Chinese philosopher Lao Tze said:

> *Give a man a fish and he will eat for a day*
> *Teach a man to fish and you will feed him for a lifetime*

A Visayan fisherman who took part in a community-based fisheries management program modernized the proverb:

> *Give a man a fish and he will eat for a day*
> *Teach a man to fish and he will eat until the resource is depleted*
> *Teach a community to manage its fishery resources and it will prosper for generations to come.*
>
> Alix (1989) in Kay & Alder (2005: 168)

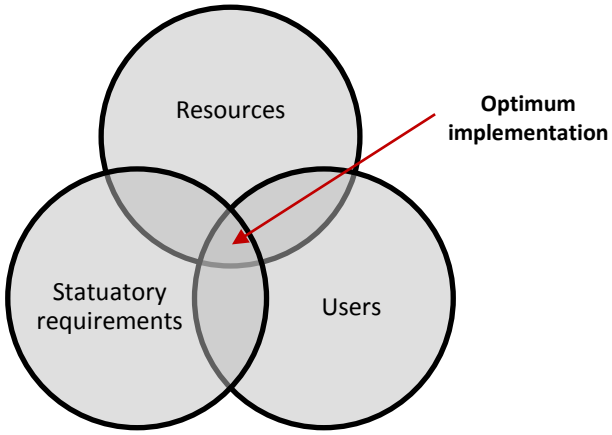
Implementation of Coastal Management Plans

Significant aspects of coastal tourism guidelines are found in the implementation process, which is best thought of a cycle whereby the evaluation stage is fed back into the management process.

- Managing the resources and resource users
- Ensuring that stakeholder expectations are met
- Meeting statutory requirements in a cost effective manner
- Evaluation

In Figure 2.22 identifies resources, users, and requirements. The overlapping areas represent the area where integrated managerial activities exist. Optimum implementation occurs in the center.

Figure 2.22 Interactions of Coastal Management Plans



Source: Kay & Alder (2005: 338)

Mapping Coastal Resources and GIS

As a prescription for coastal tourism and resource management, mapping coastal resources is inherent to the ICZM process; it is at the core of the documentation and assessment of coastal resources and conservation. Currently, a number of organizations, including governmental and non-governmental, employ map making and Geographic Information System (GIS) in the ICZM process. According to the National Oceanic and Atmospheric Administration (NOAA, 2009), spatial representations of coastal issues, namely maps, have long been a critically important tool for CRM. Maps allow for a clearer understanding of an endless variety of coastal issues from population growth to sea level rise to ways that people use coastal resources for recreation and livelihood (ibid.).

CRM agencies often specialize in organizing and depicting spatial information through the use of a Geographic Information System (GIS). The Geo-Informatics Center of Thailand suggests for the implementation of integrated coastal zone management (ICZM) in Thailand to undertake an „overall stocktaking to analyze which major actors, laws, and institutions influence the management of our coastal zone"; and recommends to place ICZM in the context of systematic geography through the use of cartography, GIS and remote sensing (Yumuang, 2010). For example, the Pollution Control Department of Thailand (PCD) has developed comprehensive and operational coastal environment database which serves as a foundation for the classification of coastal environment information in GIS. This allows for the department to collect and collate the existing coastal environment data within the department and from other organizations, and to analyzing how these bodies integrated with each other and identify the gaps, overlaps and opportunities (Tridech, Simcharoen & Chongprasith, 2000).

Cartography and GIS are tools to address environmental problems, pressures and threats to the natural resources and environments of the coastal zone, including social and economic characteristics (Yumuang, 2010). NOAA (2009) put forward the concept of „participatory mapping', whereby individuals, communities, non-governmental organizations, and the government are encouraged to engage in the coastal mapping process. Participatory mapping is tool that can simultaneously serve to create opportunities for stakeholder participation, capture important new information, and help participants make better coastal management decisions; it recognizes the benefits of local and indigenous knowledge sources (ibid).

2.4.4 Coastal Tourism and Resource Management in Thailand

The World Bank (2006) reported that the exploitation of Thailand‘s marine and coastal resources during the past four decades has harmed the environment and affected livelihoods. While the Royal Thai Government, local community groups, and NGOs have undertaken measures to protect and rehabilitate natural habitats, more effective administration and greater cooperation among key stakeholders is needed to ensure a sustainable management of these resources to protect and conserve them for current and future uses. Marine and coastal resources under pressure from tourism are outlined in Table 2.7.

Table 2.7 Environmental Impacts from Tourism on Coastal Habitats in Thailand

Tourism-related activities and events	Environmental impacts
Changes in freshwater runoff and sedimentation from construction and development.	Increased salinity levels impact mangroves; increased sedimentation rates degrade mangroves, sea-grass beds and coral reefs.
Harbor maintenance and boat anchoring.	Destruction of submerged and fringing vegetation; damage to coral reefs from anchors.
Increased freshwater demand.	Water shortages and increased groundwater usage, possibly resulting in land subsidence and increased erosion.
Increased waste generation, sewage, and wastewater disposal.	Pollution of near-shore waters.
Land clearing for construction.	Damage or loss of wetlands, mangroves, and other coastal habitats.
Overfishing to supply restaurants.	Unsustainable fishing practices.
Placement of buildings and other structures on the beach or in coastal waters.	Changes in sedimentation patterns increase erosion and elevate risks during natural disasters.
Sand mining for beaches and construction.	Increased erosion in other areas.
Walking and collection of souvenirs (e.g., on reefs).	Physical damage to reefs and removal of organisms beyond sustainable limits.

Source: Adapted and modified from World Bank (2006)

Lemay and Hale (1991) note that coastal resources in Thailand are a part of the natural resource base that is supporting the economic development now taking place in Thailand‘s coastal zone. A significant quantity and scope of research is available on coastal resource management in Thailand, and the researcher was able to locate hundreds of academic papers and related materials, especially those addressing the aftermath of the 2004 Indian Ocean tsunami. Given the breadth and depth of this body of literature, the review presented herein is only an introduction to related issues and topics pertaining to the background of coastal resource management in Thailand.

United Nations Environment Programme (UNEP, 2005) identifies that coastal zone management in Thailand was first attempted in the 1980s with the establishment of the Coastal Development Division under the Department of Land Development. Lack of guidance on how to integrate the work of the division with the other government agencies, however, led to closure of the division (ibid.). Meanwhile, major developments have taken place in the coastal areas, making coastal zone management more a tool for resolving land use conflicts than a tool for holistic planning that takes into account the needs of all stakeholders (ibid.). At the time of writing, classification of coastal areas in the context of coastal management in Thailand is somewhat precarious as jurisdiction of areas may overlap alongside ongoing issues for the planning, legislation, administration, and governing of specific areas. In 1993, marine national parks were delineated from terrestrial national parks (Marine National Park Division, 2002). At the national level, areas are widely classified as Marine National Parks (MNPs), Marine Protected Areas (MPAs), and Biosphere Reserves. Furthermore, status of these areas may range from those which are official, to those which are operational, to those being ‗proposed' or in a state of ‗surveying' (Setapun, 2001).

Thai Coastal Resource Management Organizations

Placed under the jurisdiction of various Thai ministries, key organizations involved in the discussion on coastal management in Thailand include but are not limited to the examples shortlisted in Table 2.8.

Table 2.8 Shortlist of Thai Governmental Bodies Linked to CRM

Acronym	**Organization**
CORIN	Coastal Resources Institute (Prince of Songkla University)
DMCR	Department of Marine and Coastal Resources
DNP	National Park, Wildlife and Plant Conservation Department
DOF	Department of Fisheries
NAREBI	Natural Resources and Biodiversity Institute
NEB	National Environmental Board
ONEP	Office of National Environmental Policy and Planning
PMBC	Phuket Marine Biological Center
TAT	Tourism Authority of Thailand

Source: Martin (2010a)

The Ministry of Natural Resources and Environment oversees a number of departments related to CRM in Thailand. Milintawisamai (2000) provides four organizations under the jurisdiction of the ministry which are broadly responsible for

coastal resource management. Table 2.9 outlines the roles of the governmental branches related to CRM.

Table 2.9 The Ministry of Natural Resources and Environment and CRM

Department	**Area of responsibility**
Department of Environmental Quality Promotion	Promote the value and significance of conservatory nature in conservation area and environmentally protected area and conduct research to protect environment and conserve natural resources
Department of Marine and Coastal Resources	Formulate and amend managerial policy and planning in order to perform marine and coastal resources rehabilitation and conservation for sustainable uses; encourage research on marine and coastal resources in order to support conservation and rehabilitation including those are rare and endangered flora and fauna
Office of the Natural Resources and Environment Policy and Planning	Propose conservation areas and environmentally protected areas to the National of Environment Board; collaborate in the development of the Natural Environment Conservation Plan; and report on the Natural Environment Conservation Plan development
Pollution Control Department	Investigate and control the quality of environment in the study area. Follow up and investigate activities that may impact on the environment

Source: Adapted from Milintawisamai (2000)

Coastal Resources in Thailand

Widespread damage to Andaman coastal reefs occurred as a result of the 2004 Indian Ocean tsunami. However, well before the tsunami the depletion of coral in Thailand had been occurring. Causes included pollution from tin mining and other sources, hotel construction, and private and commercial coral collection. Imposition of legal control measures were enacted in the 1980s by the Thai authorities to curtail the coral trade, yet the SEPF (1988) reported that "backdoor trade" in corals, on both small and large scale, continued. Lemay and Hale (1991) note that baseline studies in 1988 indicate Thailand has lost extensive and valuable coral reef areas during the previous two decades with serious and negative implications for fisheries and tourism, suggesting that coral reefs have scenic and recreational values which are subject to heavy tourism pressures. One of the major anthropogenic causes is increased tourism activities, which have resulted in localized cases of disturbance and damage to coral reefs. Seenprachawong (2002) considers that damages to coral reefs are caused by man as well as by natural forces. Through measuring the ratio of live to dead corals in the Andaman Sea, The World Bank (2006) reported while 5% of coral reefs were in an excellent state, 12% were good, 33% fair, 27% were bad, and 23% were very bad. This suggests that 50% of the reefs are in a bad to very weak state.

Thailand's foremost coastal resources are fisheries, mangrove forests, sea-grass beds, and coral reefs. In the past decade, largely due to uncontrolled economic activities, all of these have come under the threat of degradation or depletion. For

example, between 1961 and 1993, Thailand‘s mangrove forests were reduced from 367,000 hectares to less than 168,500 hectares when these areas were converted to other uses, such as mining, settlement sites, ports and roads, salt ponds and most significantly, marine shrimp aquaculture. Fisheries on the Thai coast include those which are offshore, those inshore, and the aquaculture projects occurring on land (ibid.).

The World Bank (2006) prepared a detailed report on the status, trends, pressures, institutional capacity, and challenges regarding the management of coastal resources of greater Thailand. Tables 2.10 to 2.12 offer an overview of the many issues faced in CRM planning in Thailand.

Table 2.10 Coastal Resources of Thailand: Pressures

Context	**Demands on coastal resources**
Extractive industries and sand mining	Mineral mining and oil and gas production are important uses of natural resources for Thailand; effective pollution control for all extractive industries is needed; sand mining needs to be monitored to avoid increased erosion.
Fisheries and aquaculture	Fish stocks are not managed sustainably; total catch in Thailand has grown the least compared to other countries; catch per unit effort is decreasing while the amount of trash fish per catch remains high; shrimp farming needs effective management and monitoring.
Illegal activities	Illegal and unregulated activities represent significant loses and pose a threat to the sustainable management of resources.
Marine transportation	The number of ocean going vessels is increasing; port operations and marine transportation continue to be sources of pollution, including from the coating on vessels, the transportation of invasive species, and accidents resulting in oil spills.
Population and economic growth	Thirteen million people, nearly a quarter of the Thai population, live in the 22 coastal provinces (not including Bangkok); economic and population growth in the coastal provinces are higher than the national average; manufacturing is a major industry and has grown rapidly over the past five years.
Tourism and recreation	Tourism in the coastal areas continues to grow and revenue is substantial (10 percent of the national GDP stems from tourism and supporting industries); environmental impacts, however, are also substantial and need to be addressed; tourism revenue may be used for environmental protection.
Urban and industrial development	Development has led to increased demands for freshwater and urban and industrial waste; reliable data on waste generation and treatment are needed.

Source: Adapted and modified from World Bank (2006)

Table 2.11 Coastal Resources of Thailand: Status & Trends

Resource	Current status and trends
Climate change	Global climate change and a resulting rise in sea level are expected to have a strong impact on Thailand‘s coastal areas; Bangkok is a hotspot area.
Coral reefs	Over 80 percent of reefs along the Andaman Coast and over 50 percent of reefs along the gulf of Thailand are in a ―fair", ―bad" or ―very bad" condition and are at risk of continued degradation.
Endangered species	Dugongs continue to be killed for meat or die as a result of inappropriate and destructive fishing practices; dugongs, whale sharks and sea turtles need stepped up protection and law enforcement.
Erosion and natural hazards	Each year, 600 kilometers of coastline experience erosion levels greater than one meter; erosion is causing a loss of land and utilities and affecting local communities; natural hazards also frequently occur and can cause severe damages.
Fisheries and aquaculture	Thailand‘s productive coastal habitats play important roles in the fisheries sector and for coastal aquaculture; in 2003, marine fisheries catch was 2.7 million tons and coastal aquaculture was 0.7 tons, together worth about THB 112 billion; the production of aquaculture has been growing, shrimp farming has reached its area limit, and marine fish stocks are under threat.
Freshwater supply	Freshwater in the coastal areas is limited and average water demand in most regions exceeds average water storage; the use of groundwater as a freshwater source needs to be carefully monitored to avoid land subsidence.
Mangroves	The decline in mangrove coverage, mainly a result from the conversion of mangroves to shrimp farms, has stopped; replanting efforts are ongoing, but the biodiversity value of replanted areas remains unknown; overall status of mangroves in Thailand is better than in other countries in the region.
Sea grass beds	Sea grass beds in Thailand remain healthy; local threats remain.
Water quality and beaches	Water quality in select locations is degraded or severely degraded and red tides are yearly events in Thai waters; beaches in general are in good condition.
Wetlands	Coastal wetlands are under threat; special protection is granted to ten coastal RAMSAR sites

Source: Adapted and modified from World Bank (2006)

Table 2.12 Coastal Resources of Thailand: Institutional capacity

Institutional context	Capacity and management
Coastal and marine area management	Where designated, Thailand‘s marine protected areas are managed reasonably well; only about 6.8 percent of all reefs, however, are under good MPA management.
Community partners	Communities increasingly play a role in the management of resources, especially in the south, community organizations, civil society organizations, and NGOs are active partners for resource management.
Financial resources	budget allocations are complex; potential exist for the use of economic instruments.
National and sector policies	Overlapping and outdated policies and regulations remain the barrier for effective implementation of an integrated management approach; coordination among agencies is needed.

Source: Adapted and modified from World Bank (2006)

Significant challenges faced by Thailand include preventing coastal erosion, establishing sustainable fisheries, stepping up the oversight and monitoring of development activities, increasing local capacity and participation, and strengthening the institutional framework to establish integrated management (ibid).

2.4.5 The Andaman Coast Thailand Case Review

The Andaman Coast has been a dynamic focus for academic research and discussion for some time. Subject matter includes, but is certainly not limited to, tourism development, industrial development, fisheries, aquaculture, water quality, environmental degradation, pollution, coastal erosion, mangrove deforestation, tin mining, and the 2004 Indian Ocean tsunami. In a wide sense, the literature reveals three destructive events in Thai history related to environmental degradation on the Andaman Coast: two were a result of human activity and one was a result of natural calamity. The former were tin mining which degraded seawater quality and damaged coral reefs in Thailand (Ruyabhorn and Phantumvanit, 1988; Changsan, 1988; Wolkersdorfer, 2005) and tourism (World Bank, 2006; SEPF, 1988); the latter was the 2004 Indian Ocean tsunami.

Tin mining and tourism

Tin mining on the Andaman Coast took place on land and at sea and has been cornerstone to the regional economy for hundreds of years. In the advent of tourism in the region, Tisdell et al. (1992) suggest that probably the single most important tradeoffs in Phuket is that between the tin and tourism industries. The study indentifies that the supply curve of tin from Phuket is relatively elastic, while that of tourism is correspondingly inelastic (ibid.). This is to say that comparably, converting an area from tourism to tin mining requires less time and energy than it takes to convert a tin mining area into a tourism area. In contrast, the Laguna Phuket resort complex (a cluster of seven hotels) at Bang Tao, Phuket represents that it is indeed possible to revive a polluted mining area for tourism.

Coastal and maritime tin mining

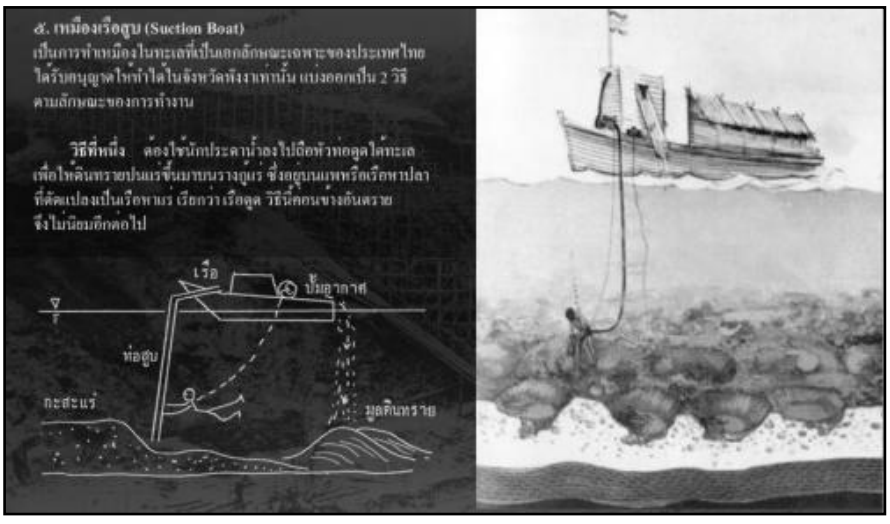
While a number of techniques were employed to extract tin from the land, maritime tin mining was especially distinctive to the Phuket and Phang Nga coast. Primarily, three types of mining vessels were engaged: large bucket dredges (see Figure 2.23), suction dredges, and the much smaller driver-guided suction boats (see Figure 2.24) which were modified from fishing boats and used in the exploitation of near-shore deposits (Changsan, 1988). Discussion on near-shore maritime tin mining and related effects on water quality on Phuket and Phang Nga provinces is somewhat unique to the region given that the first tin mining operation in the world to use

marine vessels for dredging ore from the sea bed commenced in Phuket (when Captain Edward Thomas Miles invented a tin mining boat in 1909) (Sukavaj, 2008). Between 1975 and 1985, the tin mine economy stagnated into a negative growth rate, yet in 1985 there were still 513 tin mines and 183 tin/tungsten mines in Phuket (SEPF, 1988). Changsan (1988) reports that in 1981 there were 6,000 driver-guided suction boats operating on the Phang Nga Coast. With the decline of the mining sector, the government began to look at tourism as an alternative viable source of income. As early as 1973 the Tourism Authority of Thailand (TAT) announced plans to develop Phuket into a major center of tourism (Sukavaj, 2008), essentially shifting the economy of the island from tin to tourism.

Figure 2.23 Bucket Dredge Operating on the Andaman Coast

Source: Phuketdata.net [digital gallery]

Figure 2.24 Driver-guided Suction Boat Operating on the Andaman Coast



Source: Phuketdata.net [digital gallery]

Coastal Resource and Tourism in Phuket in 1988

In January 1988, the Socio-Economic Policy and Forecasting Unit (SEPF) at Chulalongkorn University completed an in-depth study on coastal resources and tourism in Phuket for Thailand's Office of National Environment Board (NEB). The study surveyed the littoral of Phuket with consideration toward the implementation of tourism planning and infrastructure as a substitute for a previously critical economy, namely tin mining. Fisheries (including aquaculture) and agriculture (mainly rubber, coconut, and pineapple) were found to be complimentary to tourism inasmuch as they provide seafood and produce for hotels and restaurants on the island.

Of significance to the current research, the Chulalongkorn University report classifies the various types of coastal resources in Phuket as ~~th~~he beaches, islands, capes and bays and the fishing sites" (SEPF, 1988). Discussed in the context of tourism, the SEPT study assesses the coastal resources of Phuket from geographical, spatial, and logistical points of view, while placing the leading prospects for development alongside beach safety and environmental issues. Coastal ecological issues include water quality, sources of pollution, coral reefs, and conservation; beach issues include crime and hazardous ocean conditions (ibid.).

In 1988, surf tourism per se had yet to be recognized as a market segment in tourism literature, thus the SEPF report makes no mention of the sport whatsoever; rather it describes and discusses surf beaches, such as Surin Beach as, ~~to~~o steep and too rough during the adverse climated conditions to ensure safe swimming and ocean activities" (SEPF, 1988). Although the report identifies Surin Beach as ~~n~~ot very suitable for any water activities" due to a history of documented drowning, it does bring to light the inherent safety issues at Phuket surf beaches during the monsoon season when waves are most frequent. Safety issues are a reoccurring theme in the SEPT literature alongside issues of beach littering and pollution. Similarly, Martin (2009; 2010a) identifies issues of safety, litter and pollution in the Thai littoral as a negative impact on surf tourism. The SEPF (1988) asserts that littering on the beach through carelessness is one of the causes of beach pollution. In addition, the problems associated with waste disposal at hotels, bungalows, and restaurants are acknowledged.

The 2004 Indian Ocean Tsunami and Coastal Research

The level of devastation in the six Andaman provinces varies significantly depending upon a number of natural parameters including bathymetry, slope, elevation and presence of natural barriers, as well as man-made factors such as thode for coastal land-use and development. In account of a host of factors behind the magnitude of the tsunami-related damage in Thailand, the United Nations

Environment Programme (UNEP, 2005), suggested that if anything positive can be gained from the disaster, it was clearly the opportunity it offers for Integrated Coastal Zone Management (ICZM). The tsunami event is behind a considerable growth in research focused on the Thailand‘s Andaman Coast. In regard to mental health, research in coastal areas indicates that among tsunami survivors in southern Thailand, elevated rates of symptoms of post-traumatic stress disorder (PTSD), as well as anxiety and depression, continued among individuals and communities in the region long after the event (Griensven et al., 2006; Thienkrua et al., 2006).

International Organizations Operating on the Andaman Coast in 2011

The 2004 Indian Ocean tsunami was an unprecedented event which affected Andaman coastal resources as never before anticipated; it also brought the establishment of a new and progressive era for coastal resource management and the coordination among stakeholders to the Andaman Coast. The Thai government, along with governments and non-governmental organizations (NGOs) from around the world began to assess the damages, study the effects, launch new programs aimed at conservation, and develop new policies and funding strategies. In this context, the impact of the tsunami was not only on the physical environment; it also impacted institutional establishments. International aid organizations involved in coastal resource management in post-tsunami Thailand include but are not limited to the following examples listed in Table 2.13.

Table 2.13 International CRM Organizations Operating on the Andaman Coast

Acronym	**Organization**
AFD	France Development Agency
AUSAID	Australian Cooperation Agency
BOBLME	Bay of Bengal Large Marine Ecosystem Project
CHARM	Coastal Habitats and Resources Management
DANIDA	Danish Cooperation Agency
GTZ	German Cooperation Agency
IRD	French Research Institute (Cooperative w/Chulalongkorn University)
IUCN	International Union for the Conservation of Nature
SAMPAN	Strengthening Andaman Marine Protected Areas Networks
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
USAID	United States Agency for International Development
WWF	World Wide Fund for Nature

Source: Martin (2010a)

CHAPTER 3

KNOWLEDGE MAPPING

The concept of knowledge mapping includes recognizing opportunities to leverage existing knowledge. Distinctive knowledge maps and descriptive texts have been developed to synthesize and frame the nature, content, and trends in the academe. As identified by the researcher, the synthesis of key literature concerning the value and conservation of coastal surfing resources identifies 120 pieces of research for critical review, the generation of bibliometric data, and the definitive outcome of knowledge mapping. The heart of this exercise was to first identify the most relevant research to the topic area and needle the literature to pinpoint disciplines, topic areas, and significant trends.

The purpose of this exercise in knowledge mapping is took look across the research field and identify disciplines and fields of study, areas and trends in the research, and to provide an in-depth look at the topic area. As an ultimate aim, the exercise seeks to provide a critical analysis, to identify knowledge gaps in the field of study, and to pose potential research questions in lead to further inquiry (see Chapter 4).

3.1 Value and Conservation Research Knowledge Map

A comprehensive body of surf tourism-related literature was first systematically defined and compiled by Assenov and Martin (2010) and expanded by Martin and Assenov (2011). 80 pieces of research were chosen by the author (selected from the 120 pieces in Marin and Assenov (2011)), and listed as highly relevant to the discussion on the value and conservation of coastal surfing resources. All 80 pieces of academic research we reexamined and content analyzed in order to produce the first-ever knowledge map of research literature focused on the value and conservation of coastal surfing resources framed in the touristic academe. Therein, Figure 3.1 provides a typology of research which identifies disciplines of study alongside related topics and research areas correspondent to the authors and their particular works. Individual pieces of research may be listed in more than one category. References are listed alphabetically within each section.

Table 3.1 Surf Resource Value & Conservation Research

Disciplines	Research Areas	References
economics; socioeconomics; surf economics;	value of surfing areas; evaluation study; market & non-market values; tourism values; value to surfers or non-surfers; social & economic impacts	Buckley (1999); Buckley (2000); Buckley (2002a); Butt (2010); Fluker& Hageman (2006); Frood (2007); Hageman (2004); Hageman (2006); Krause (2007); Lazarow & Tomlinson (2009); Lazarow (2006); Lazarow (2008); Lazarow (2009); Lazarow (2010); Lazarow, Miller & Blackwell (2007a); Lazarow, Miller & Blackwell (2007b); Lazarow, Miller, Blackwell (2008); Murphy & Bernal (2008); Murphy (2007); Nelson & Pendleton (2006); Nelson et al. (2007); Nelson, Pendleton & Vaughn (2007); O'Brien (2005); Pendleton (2002); Ponting (2002);Rafanelli (2004); SAS (2009); Slotkin (2008); Tilley (2001); Tourism Resource Consultants (2002); Weigh (2003)
environmental management; coastal resources; sustainability	coastal surfing resources; surfing reserves; conservation; coastal management (CRM & ICZM); water quality; pollution; marine debris; sustainability; environmental impacts on surf areas (climate change, natural disasters, cyclones, earthquakes; tsunamis);	Ahmed, Moodley & Sookrajh (2008); Assenov & Martin (2010a,b); Buckley (2002b); Butt (2010); La Tourrette (2010); Farmer & Short (2007); FFLA (2010); Fluker & Hageman (2006); Frood (2007); Hageman (2004); Hageman (2006); Hugues-Dit-Ciles, Findlay, Glegg & Richards (2004); Krause (2007); Lazarow & Castelle (2007); Lazarow (2008); Lazarow (2009); Lazarow (2010); Lazarow, Miller & Blackwell (2007b); Lazarow, Miller, Blackwell (2008); Martin & Assenov (2008a); Martin & Assenov (2008b); Martin (2009); Martin (2010a,b); O'Brien (2009); Persoon (2003); Ponting (2001); Ryan (2007); Scarfe (2008); Scarfe, Healy & Rennie (2009); Scarfe, Healy & Rennie, Mead (2009); Slotkin, Chambliss, Vamosi & Lindo (2009); Tantamjaric (2004)
environmentalism; ecology; marine ecotourism	environmental quality concerns; anthropogenic impacts; interaction with the environment	Hageman (2006); Hill & Abbott (2009); Mean & Black (2002); Persoon (2003); Poizat-Newcomb (1999b); Ponting (2009b); Ponting, McDonald & Wearing (2005); Ryan (2007); SAS (2009);
tourism planning; destination management	tourism development plans; action plans; marketing; capacity management commercialization; corporate interests; media impacts; exploitation;	Ahmed, Moodley & Sookrajh (2008); Augustin (1998); Buckley (1999); Buckley (2000); Buckley (2002a); Buckley (2002b); Farmer & Short (2007); FFLA (2010); Hageman (2004); Hageman (2006); Halsall (1997); Hugues-Dit-Ciles, Findlay, Glegg& Richards (2004); Ingersoll (2009); O'Brien (2009); Phillips & House (2009); Ponting (2001); Ponting (2006); Ponting (2009b); Ponting, McDonald & Wearing (2005); Ryan & Cooper (2004); Tantamjaric (2004); Tourism New South Wales (2009); Wearing &Ponting (2009)
history	Background of surf tourism and recreational surfing	Assenov & Martin (2010); Farmer & Short (2007); Fluker (2003); Hageman (2004); Ingersoll (2009); Ponting (2006); Ponting (2007); Ponting (2008);

Table 3.1 Surf Resource Value & Conservation Research (continued)

Disciplines	Research Areas	References
anthropology	history, community, behavior	Ingersoll (2009); Krause (2007); Leonard (2006); Marchant (2010);
media & marketing	commodification; films; magazines; merchandise; clothing; destination image enhancement;	Cochetel (2006); Desmond (1999); Dolnicar & Fluker (2003b); Martin (2009); O'Brien (2007); Orams (1999); Ponting (2002); Ponting (2006); Ponting (2007); Ponting (2009); Ponting, McDonald & Wearing (2005)
sociology; psychology; surfer profile	history; behavioral trends; social psychology; surfer's experience, perceptions, motivations; social conflicts and resolution (surfer-to-surfer, surfer-to-host community); surfing subculture; social conflict and localism; socio-cultural benefits; impact on local communities; demographics; lifestyle; surfing space	Augustin (1998); Buckley (2002a); Dolnicar & Fluker (2003a); Dolnicar & Fluker (2003b); Dolnicar & Fluker (2004); Fluker (2003); Hugues-Dit-Ciles, Glegg, Findlay, Carroll & Hatton (2003); Nelson, Pendleton & Vaughn (2007); Nelson, Pendleton & Vaughn (2007); Ntloko & Swart (2008); Phillips & House (2009); Poizat-Newcomb (1999a); Ponting (2008); Ponting (2009); Ponting, McDonald & Wearing (2005); Preston-Whyte (2001); Preston-Whyte (2002); Ryan & Cooper (2004); Shipway (2007); Wearing & Ponting (2009)
industry; manufacturing	clothing; surfing equipment; technology;	Buckley (2003)
entrepreneurship	lifestyle of entrepreneurs	Marchant (2010); Shaw & Williams (2004)
event studies	economic impact studies; social impact studies; hallmark events; event leveraging	Ahmed, Moodley & Sookrajh (2008); Breedveld (1995); Burrell (2005); Cochetel (2006); Ernst & Young (1995); Ernst & Young. (2003); Getz, O'Niell & Carson (2001); Halsall (1997); Kamstra (2004); Markrich Research (2007); Murphy & Bernal (2008); Ntloko & Swart (2008); O'Brien & Chalip (2007); O'Brien (2005); O'Brien (2007); O'Niell, Getz & Carson (1999); Orams (1999)
coastal engineering; physical processes	coastal protection; surf amenity; groynes, piers, marinas, seawalls, breakwaters, sand replenishment	Mean & Black (2002); Scarfe (2008); Scarfe, Healy & Rennie (2009); Scarfe, Healy & Rennie, Mead (2009)
artificial surf reefs	socioeconomic impact; environmental impact; feasibility studies; construction of	Mean & Black (2002); Rafanelli (2004); Slotkin (2008); Slotkin, Chambliss, Vamosi & Lindo (2009); Tourism Resource Consultants (2002); Weigh (2003);
surf parks and artificial waves	artificial surfing environs; construction, use, impacts	Hill & Abbott (2009)

Source: Author (2011)

3.2 Surf Tourism Research Development Map

Table 3.2 identifies 120 pieces of research for the period evaluated (1997-2010). Almost one-third of these were journal publications, and the rest were book sections or chapters, conference papers, academic projects (mainly Ph.D. dissertations and Master theses) and non-refereed papers prepared for or by local authorities, corporations and not-for-profit organizations. It took the first ten years of the period examined to produce as many research papers as during the last four years, signaling a significant acceleration in the publications frequency. Table 3.2 identifies the development of the research over time, differentiating the types of literature.

Table 3.2 Surf Tourism Research Statistics by Type of Publication, 1997-2010

Year	Journals	Book Sections	Conference Papers	Graduate Studies*	Non-refereed Studies**	Total
1997	0	0	0	1	0	**1**
1998	1	0	0	0	0	**1**
1999	3	2	1	2	0	**8**
2000	0	0	1	1	0	**2**
2001	2	1	0	2	0	**5**
2002	3	0	2	0	2	**7**
2003	3	0	4	0	1	**8**
2004	2	1	2	2	1	**8**
2005	3	0	1	2	0	**6**
2006	0	1	4	3	0	**8**
2007	6	3	4	2	4	**19**
2008	3	0	2	3	6	**14**
2009	9	4	4	2	3	**22**
2010	1	0	4	2	4	**11**
Total	**36 (22)*** **	**12 (7)**	**29 (29)**	**21 (15)**	**21 (8)**	**120 (81)**

* Includes Master theses, Ph.D. dissertations and graduate and undergraduate academic projects
** Papers prepared for or by local authorities, corporations and not-for-profit organizations
*** Numbers in parentheses show the number of papers by publication dedicated to surf tourism.

Source: Martin & Assenov (2011)

3.3 Commissioned Surf Tourism Research Map

Research produced as a result of commissioned studies forms a significant component to the field, wherein 17 out of 21 total pieces of research were produced in the recent 4 years. These works are mainly reports and studies generated by or for the nonprofit sector and government agencies. Five reports for non-profit organizations (NPO) are dedicated explicitly to surf tourism and the conservation of surfing

resources, while three government reports are dedicated to surf tourism management and impacts. *Save The Waves* (STW) and *Surfers Against Sewage* (SAS) are the most active NPOs with three and two reports respectively. Inclusively, government studies tend to be focused on tourism development, impact studies and management, while nonprofit studies are aimed at the economic impacts of tourism and sustainability issues. Of the 12 government-sponsored reports, seven are Australian, including three on the Gold Coast, the most researched location in this category. The other two most researched countries are the UK and the USA, each with four commissioned works.

Table 3.3 Surf Tourism Commissioned Research

Year	Commissioning organization	Type of research	Researched area
		Non-Profit Organizations	
2002	Environmental defense, Surfer's Environmental Alliance, The Surfrider Foundation	Value of coastal tourism	Rincon, Puerto Rico
2007	Save The Waves Coalition	Economic impact of surfing	Mundaka, Spain, & Costa Rica
2008	Corepoint and local authorities	Physical, ecological and socio-economic impact study	Cornwall, UK
2008	Waikiki Improvement Association	Economic impact analysis	Waikiki Beach, Hawaii, USA
2008	Hawaii Coral Reef Initiative	Recreation carrying capacity and mgt	Kailua Beach Park, Hawaii, USA
2008	Save The Waves Coalition	Economic impact study	Mundaka, Spain
2009	Surfers Against Sewage	Environmental impact assessment	UK beaches
2010	Surfers Against Sewage	Resource report	Global, UK beaches
2010	Save The Waves Coalition	Surfing and sustainable tourism	global
		Government and corporate reports	
2002	Opunake Artificial Surf Reef Committee & South Taranaki District Council	Economic and social impact of artificial surfing reefs	Opunake, South Taranaki, NZ
2003	Cornwall County Council	Historic report	Newquay, Cornwall, UK
2004	Back Beach Improvement Group	Socio economic impact study	Back Beach, Australia
2007	Ontario Ministry of Tourism et al.	Profile report	USA and Canada
2007	Maui Land & Pineapple Company, Inc.	Recreational carrying capacity	Honolua Bay, Hawaii, USA
2007	Gold Coast City Council	Surf quality and coastal mgt	Kirra, Gold Coast, Australia
2008	Gold Coast City Council	Best practice research report	Gold Coast, Australia
2008	Brevard County, FL	Feasibility study of artificial surfing reefs	Florida, USA
2009	Gold Coast City Council	Surf industry review and economic contributions assessment	Gold Coast, Australia
2009	Tourism New South Wales	Surf tourism action plan	New South Wales, Australia
2010	Surf Coast Shire	Surfing reserve coastal mgt plan	Bells Beach, Australia
2010	Central Coast Tourism	Destination mgt plan	Central Coast, Australia

Source: Martin & Assenov (2011)

3.4 Surf Tourism Field Research Map

Surf tourism field research locations cover most continents. In some cases, a single research was conducted in more than one location, or offers discussion on more than one location. Table 3.4 provides a detailed account of field research sites whereby the category –global" identifies research findings with discussion in a global context. In the case of countries with research carried out in various regions, such as Eastern or Western Australia, various islands in Indonesia, and states or territories of the United States, the data have been segmented for purposes of clarification. The most popular research venues are Australia, the US and Indonesia, where the former two benefit from the presence of universities with scholars interested in the topic. In contrast, Indonesia is the third most researched area in the world, yet not a single English language research is attributed to an Indonesian university. The Mentawai Archipelago is the most researched surfing realm in the world (taking into account that data presented here for Australia actually encompasses the southern and eastern seaboards from Bells Beach to the Great Barrier Reef; as well as the Indian Ocean coast of Western Australia).

Table 3.4 Surf Tourism Field Research Locations

Country/region	Location	Sub-total	Total
Global/General			**21**
Australia	general	11	**34**
	East and South	17	
	West	6	
New Zealand			**7**
United States	general	3	**23**
	California	9	
	Hawaii	5	
	Florida	3	
	Puerto Rico	3	
Indonesia	general	2	**20**
	Mentawai	14	
	Bali	2	
	Lombok	2	
Europe	United Kingdom	9	**16**
	Spain	4	
	France	1	
	Ireland	1	
	Portugal	1	
Oceania	general	4	**10**
	Fiji	2	
	Samoa	1	
	Papua New Guinea	1	
Africa	South Africa	5	**6**
	Morocco	1	
Central America	Costa Rica	4	**5**
	Mexico	1	
Others	Thailand	5	**12**
	Maldives	1	

Source: Martin & Assenov (2011)

3.5 Trends and Developments in the Research

Looking across 120 pieces of research into surfing activities outlined in the fields of recreation and tourism and originally compiled through systematic review (Assenov & Martin 2010; Martin and Assenov 2011), the research can be framed into three periods: an early period (1997-2000); a formative period (2001-2006); and a progressive period (2007-2010). This assumption is based mainly on the types and quantity of publications (see Tables 3.1 to 3.3), and according to disciplines, topics and relevant content (see Table 3.1).

The Early Period (1997-2000)

The early period (1997-2000) marked the first works which are largely descriptive, social science-based, and identified surf tourism as a new field of research. Hall (1997) recognized the significance of an international surfing competition on a rural community in Western Australia. Augustin (1998) discussed the development of land-based resorts around surfing in France while Poizat-Newcomb (1999a, b) distinguished the early stage surf tourism development in Puerto Rico and raises issues on environmental and ecological concerns. Along with Reed‘s discussion on the commodification of surf travel (1999), the research carried out before the turn of the twenty-first century indicated that the global reach of surf tourism was eminent well before the development of academic inquiry into the field.

The Formative Period (2001-2006)

The formative period (2001-2006) defined the nature of the literature. Buckley (2002a, b) noted that prior to 2002, there had been very little practical or theoretical investigation into surf tourism and therefore research trailed well behind the growth and changes in the industry itself. Fluker (2003) offered a definition for surf tourism and identifies areas for further research. Indonesia‘s Mentawai Archipelago emerged as a key research location (Ponting 2001; Buckley 2002a, b; Persoon, 2003; Ponting, McDonald & Wearing 2005). Over a six-year period field research was carried out in the Mentawai Archepeligo, Indo-Pacific islands (which includes the Mentawai islands), the United States, South Africa, Puerto Rico, Morocco, Costa Rica, the United Kingdom, and Western Australia. Primary data collected from the Surf Travel Company in the early period by Ponting (2000) subsequently provided Dolnicar and Fluker (2003a, b; 2004) with data for their quantitative studies. Ponting (2001) produced the first-ever master thesis on sustainable surf tourism management and Buckley (2002a, b) pinpointed management as a key area of surf tourism research.

During this formative period, surf tourism research expanded across the globe and work by graduate students involved a variety of disciplines.

The Progressive Period (2007-2010)

The progressive period (2007-2010) is identified by a flurry of research, at the graduate level the journal level, and through commissioned works involving government agencies and not-for-profit organizations. In 2007 alone, 19 studies encompassing 12 countries were produced. Half of the total literature was produced in just four years with 65 studies conducted, marking a genesis in both the types and sources of research. A milestone in the literate came when Tourism New South Wales (2009) produced the first-ever surf tourism action plan to consolidate the State's position as Australia's premier surf destination. Similarly, the nonprofit *Surfers Against Sewage* (2009; Butt, 2010) produced extensive reports identifying surfing waves as natural resources. This period was earmarked by socioeconomic studies (Nelson, Pendleton & Vaughn, 2007; Nelson, Lazarow, Bernal, Murphy & Pijoan, 2007; Lazarow & Castelle, 2007; Lazarow, 2007; Lazarow, Miller, & Blackwell, 2007; Lazarow, Miller, & Blackwell, 2008; Lazarow & Tomlinson, 2009) and the emergence of physical sciences in the discussion of surf break management (Scarfe, 2008; Scarfe, Healy & Rennie, 2009; Scarfe, Healy, Rennie & Mead, 2009) (although much earlier studies on artificial surfing reefs (ASR) had appeared in the natural science literature).

Milestones appear in the research literature with Farmer and Short (2007) who proposed the conservation of surfing areas in Australia through the formation of national _surfing reserves' as designated and protected surfing areas in the government legislature; and FFLA (2010) revealed the official Bells Beach Surfing Reserve Coastal Management Plan. Surfing reserves increase habitat protection and enhance natural resource values; retain existing social, cultural, economic, and environmental values; and provide a strategic framework to address current and future user and management needs and issues (ibid.).

The 2007-2010 period ushered a new era in graduate studies aimed at surf tourism, encompassing the completion of four master theses (Krause, 2007; Frood, 2007; Kelly, 2008; Mach, 2009) and three doctoral dissertations (Ponting, 2008; Ingersoll, 2009; Lazarow, 2010). Ponting (2008) produced the first ever dissertation dedicated to surf tourism which was centered on spatial and management issues; while Ingersoll (2009) offered an epistemological approach to Polynesian knowledge and the integrity of surfing (from a cultural point of view) as a base upon which _tourism' is placed. Of particular and contemporary concern, Lazarow (2010) steers the field toward interdisciplinary studies in five theoretical and practical perspectives:

(1) the relationship of surfers and surfing to coastal environs; (2) the socio-economic impact and value of recreational surfing to particular locales; (3) the importance of local knowledge in coastal communities, including the role of individual and especially organized surfers; in shaping environmental perceptions, policy and management; (4) the challenges for incorporating local or lay knowledge into public policy; and (5) our capacity for social and institutional learning through improved monitoring and evaluation of ICM." In addition, Scarfe (2008) presented a dissertation defending the case for surf break management, conservation, and value set in the context of the physical sciences. Such graduate research underpins the drive toward understanding the nature, sustainability, value, management, and ultimately the conservation of surfing resources by the eco-centric touristic academe.

CHAPTER 4

RESEARCH ANALYSIS, GAPS AND QUESTIONS

4.1 Critical Analysis of the Research Area

The value and conservation of surfing resources and marine ecotourism are emergent topics in the research literature. Although marine tourism and ecotourism have appeared in the academe and developed as specialized fields of study for several decades, surf tourism and value and conservation of surfing resources, as a legitimate field of academic inquiry was first framed in the late 1990‘s. Holistically, as a new and developing area of research, outgrowths over the previous decade indicate a trend toward placing value on surfing areas as a leveraging tool to champion conservation of the resource.

In terms of human geography, two theoretical areas of impact are most evident; one are the affects, both positive and negative, that surf tourism activities are having on the developing world; the other are issues surrounding age-old surfing locations in developed countries (especially the USA and Australia), in rural and urban settings, which experience high-use, high-impact from mainly domestic surfers seeking recreational space. Whereas research in the former is directed toward surfing space in terms of capacity mangement in relation to social, economic, and cultural interaction and impacts with rural host communities; research in the latter is focused toward the threats and impacts of urbanization in term of coastal development with negative implications for the resource, as well as acute and visible environmental impacts, such as marine litter, urban runoff, and other aspects of pollution and environmental degradation.

In recent years, the author has reviewed in the area of 3,000 pieces of research, including textbooks, books, and particularly research articles in the topic areas of coastal, marine, and environmental planning and management. Coastal surfing resources, the broader term ‗surfing‘, or other related references to the value or conservation of surfing resources are entirely absent from the academic literature, save for the recent and specialized surf tourism works detailed herein, particularly those of a socioeconomic nature, such as: Lazarow (2007; 2010), Nelson, Pendleton & Vaughn (2007), Lazarow, Miller, Blackwell (2008), etc.; those of a oceanographic and science-based nature, such as Scarfe (2008), Scarfe, Healy & Rennie (2009), and Scarfe, Healy & Rennie, Mead (2009); and those discussed in various sections of this report including those in the knowledge mapping exercises (see table. Further aspects of this research are provided in Appendix II, a *Statistical Review of Surf Tourism Research*.

Lazarow (2010) produced the first-ever in-depth research into social and environmental planning and management frameworks of surfing resources; a first-pass assessment of the progression towards Integrated Coastal Zone Management (ICZM) at the state and national levels in Australia alongside case studies in north and south America. This is theoretically very significant for two reasons: first, the study revolutionizes the understanding of coastal systems, community and sustainability, including the role of social science in ICZM framed in the context of the value and conservation of coastal surfing resources; secondly, the stage is now set employ such multidisciplinary mixed-methods approaches in further developing this dynamic new research area in locations throughout the world.

4.2 Knowledge Gaps in the Research Area

Knowledge gap is a term used to identify the absence of empirical research and understanding of a given area. Knowledge gaps may be evident in theoretical or practical areas of inquiry, including methodologies. Presented herein is the knowledge gap relevant to the value and conservation of surfing resources and marine ecotourism.

- Overall, surf-related activity is progressive and expanding far beyond the reach of academic inquiry and publication. This is to say that the sport of surfing and surfing-related touristic activities are expanding at a faster rate relative to academic knowledge in the subject area. For example, although surfing occurs in as many as 159 countries (wannasurf.com), and is officially and organizationally represented in 69 countries (ISA, 2011) peer-reviewed research has been conducted in only 18 countries (Martin & Assenov, 2011).
- Research has for the most part been conducted by graduate students seeking degree conferral rather than specialized theoreticians. However, in recent years there has been a shift in the research area in three ways (1) the source of the materials being produced; (2) quantity of research materials being produced; (3) type and specificity of materials being produced. This indicates the immaturity of the field and the opportunity to forge new areas in research.
- Research which clearly frames coastal surfing resources and surf resource management in the discipline of environmental management are limited in the literature, although related topics have emerged in the recent three years. Lazarow (2010) identifies: ~~I~~n an era of increasing emphasis of stakeholder engagement in environmental management, and of focus on the crucial importance of the marine and coastal zone, the actual and potential role of marine and coastal communities and stakeholders has been little documented

or analyzed." There is considerable room for research development in this area.

- Non-prolific surfing destinations are under-researched or not recognized by institutions, agencies, or organizations in those countries or regions. Therefore, surfing-related activities and resources are not appropriately addressed or afforded legal protection.
- Established frameworks and methodology in the conservation of coastal surfing resources has yet to be clearly defined and developed in the research literature, and this is especially evident in non-prolific surfing areas, such as those in continental South East Asia.
- Very few research articles identify, quantify, or describe the impacts of surfers on the environment; and therein management prescriptions to reduce impacts have yet to be drawn regarding water, waste, energy, transport, etc. Conversely, although the positive impacts of surfers on the environment is apparent mainly in literature produced by the not-for-profit sector (i.e. *Surfrider Foundation*, *Surfers Against Sewage*, *Save the Waves Coalition*, etc.) there has been very little theoretical inquiry into this area.
- Identification measures for settings which increase the comparative value and attractiveness of surfing locations through low environment impact access (i.e. hike in, walk in, sail in) are lacking in the academe.
- Although research indicates that world populations continue to increase—and with this so too increase the numbers of individuals with the time money and energy to participate in leisure activities (Broadhurst, 2001)—there has been very little research into the current or future demands for surfing resources.
- Prescriptive mapping (including GIS) which indicates or describes the distribution of environmental issues related to surfing areas is not yet developed or practiced.
- Surfing activities and the value and conservation of the surfing resources are not clearly integrated into the field of environmental management. Similarly, there is a knowledge gap in the use of technology to this end, i.e. the aspect of the internet and technology, such as Geographic Information Systems (GIS) as research instruments for surf area conservation.
- Research into the drivers of environmental change relative to surfing resources are not well defined in the literature, such as coral reef degradation and the sources of plastic and pollutants at surfing areas.
- Independent research into the successes or failures of surf-related not-for-profit organizations and their works on environmental issues related to surfing areas (save, for example, by Ryan, 2007).

- Climate change and coastal surfing resources—there is currently no theoretical or practical research into the effects of climate change on coastal surfing resources.

Thailand-specific

- Regarding Thailand in particular, coastal surfing resources not yet acknowledged in terms of environmental management and conservation. For example, even the most basic knowledge of the location of surfing resources has yet to be documented, save for the research produced by Martin and Assenov (2008a, b) and Martin (2009; 2010a; 2010b).
- Research has not previously been conducted on the benefits, implications or impacts of Phuket's annual international surfing competition.

4.3 Potential Research Questions

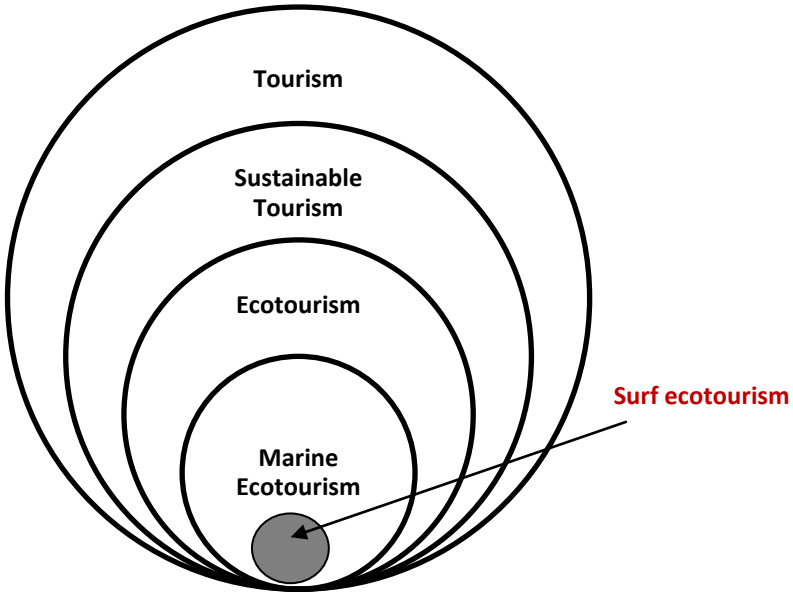
After reviewing the literature and determining various knowledge gaps, the following research questions have been formed and grouped with an objective to develop suitable knowledge applicable to good policy making and management of coastal surfing resources. Subsequently, the research questions are structured as follows.

- What are the potential links between environmental management, economic drivers, and political organizations in Thailand relative to coastal surfing resources?
- What are the observable environmental conditions relative to surfing (i.e. weather patterns, wave types, seasonality)?
- What are the safety concerns, such as rip currents, water quality or other identifiable hazards in a nation-wide context?
- How can the assessment of the Thai coastline for coastal surfing resources form a baseline to establish the manner, nature, and conservation of the resource and offer appropriate evidence for future discussion on recreational surfing and surf tourism in Thailand?
- Can new research clearly delineate the stakeholders and explore conflicts within and between various groups—and seek possible areas of cooperation?
- What role might the government, non-governmental organizations, and other stakeholders play in conservation of coastal surfing resources?
- In line with the *Amazing Thailand* marketing campaign and the effort of the Tourism Authority of Thailand (TAT) to develop tourism in the monsoon

season, can the monsoon be rebranded as a _surf season‘, and if so, what are the potential implications and consequences?

- What types of waves and ocean conditions occur along Thai coastlines? What are the carrying capacities are specific surfing locations in Thailand? Are there adequate waves for surfers -- and are the waves and conditions really suitable for recreational surfing and/or surf tourism in Thailand, especially those found outside of the Phuket area?
- Can an appropriate methodology for the conservation of coastal surfing resources be developed and established in two contexts: one that is Thailand-specific and one in global in perspective?
- What are the significant issues in a scenario to develop _surfing reserves‘ in Thailand?
- Can _surf ecotourism‘ be developed as a niche market in a coordinated manner with Thailand‘s National Parks or Marine Protected Areas (MPAs) in a way that benefits our understanding and conservation of the resource? Figure 4.1 places _surf ecotourism‘ as a niche market in context and relative to the wider tourism industry—Could Thailand develop this concept?

Figure 4.1 Surf Ecotourism as a Niche Market



Source: Author

The following four research questions are adapted and modified from Lazarow (2010: 21) (the concept of _Surfing Capital‘ is identified in Table 2.1, in the section on the value of coastal surfing resources):

- What are the decision-making processes for the management, use and conservation of coastal surfing resources through the relationship of surfers, the public, and the government involvement processes?
- What are the challenges for incorporating the interests of surfers and other stakeholder knowledge into coastal surfing resource planning and management?
- Can the concept of *Surfing Capital* be developed and applied in Thailand?
- What strategies are available to advocate for the protection, improvement and maintenance of *Surfing Capital* in Thailand relative to other uses?

CONCLUSION

This qualifying report serves as an academic review for the value and conservation of surfing resources and marine ecotourism; it offers the essential background for civil society and the government to acknowledge and conserve natural surfing resources by providing the foundational basis for future research. The documentation and recognition of the value and conservation of surfing resources and marine ecotourism has the potential to spawn the conservation of the resource. Scarfe, Healy, Rennie and Mead (2009) recommend the appreciation of surfing areas as valuable natural resources:

> 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).

The documentation of surfing resources and recognizing 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, future research is 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.

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APPENDICES

APPENDIX I

CONSERVATION OF SURFING RESOURCES IN THAILAND: THE ANDAMAN SEA

Research Presented at the ICENR International Conference at Mahidol University, Bangkok, Thailand, Nov. 10-12, 2010

APPENDIX II

A STATISTICAL ANALYSIS OF SURF TOURISM RESEARCH LITERATURE

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APPENDIX I

CONSERVATION OF SURFING RESOURCES IN THAILAND: THE ANDAMAN SEA

Research Presented at the ICENR International Conference at Mahidol University, Bangkok, Thailand, 2010

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.

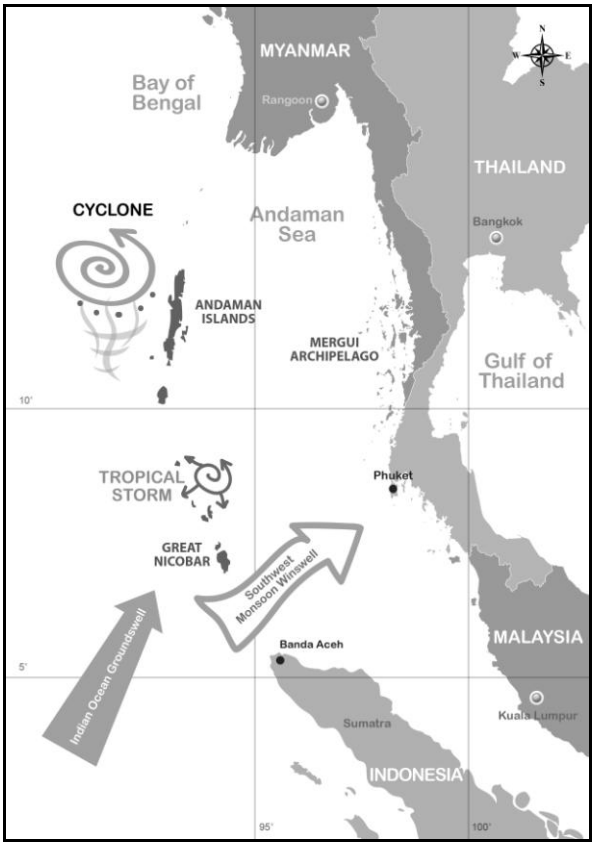

Figure 2: Surf Meteorology of Thailand"s Andaman Coast

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).

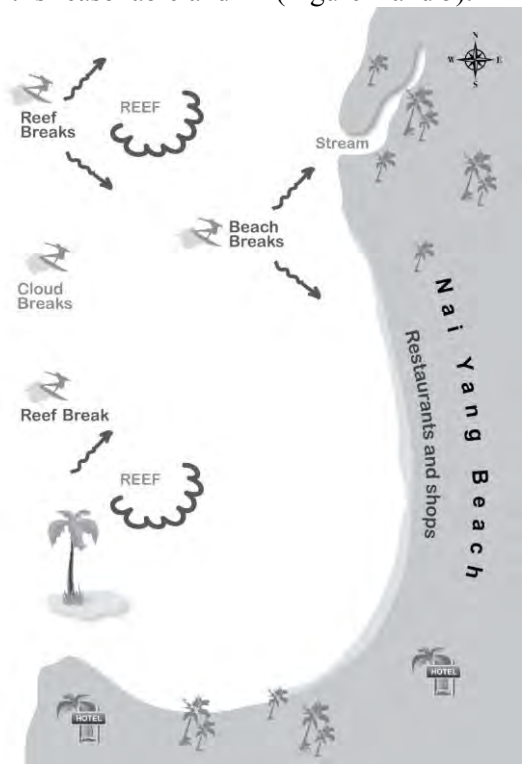

Figure 4: Prospective Surfing Reserve, Nai Yang Beach, Phuket Province

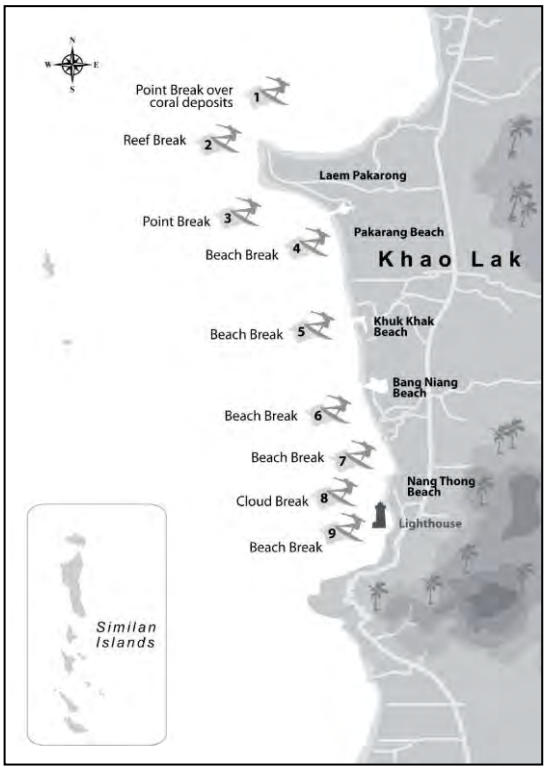

Figure 5: Prospective Surfing Reserve, Laem Pakarang, Phang Nga Province

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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APPENDIX II

A STATISTICAL ANALYSIS OF SURF TOURISM RESEARCH LITERATURE

(in press)

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Prince of Songkla University, Phuket, Thailand.

A Statistical Analysis of Surf Tourism Research Literature

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Abstract

Surf tourism is a rapidly expanding market segment of the wider tourism industry and the purpose of this study is to provide an analytical representation of surf tourism research literature. Tracing the development of surf tourism research produced from 1997 through 2010, published and unpublished materials were collected through a mixture of inquiry, including the search of a wide range of academic journal databases and communication with authors in the field. A systematic review was employed to identify and statistically analyze the nature and types of research emerging, including the gray literature, journal publications, institutional contributors, and graduate studies leading to degree conferrals and repeat authorship. The study identifies the genesis of surf tourism research as a new body of literature in the touristic academe and serves to frame the history and nature of the field. We find that this new subfield of research has arisen, not by well-known theoreticians writing about it, but by graduate students and consultants first, and academics later, and this is evident in the gray literature and degree conferrals leading to a variety of publications in the field. More than fifty percent of the total research has been produced in the previous five years. Key topics in surf tourism include coastal research, ecotourism, sustainable tourism, tourism management, and socioeconomics, wherein sustainability, management and surfing events are the most prolific areas under discussion to date. An appendix provides a bibliography of 118 pieces of research included for review.

Key words: surf tourism; systematic review; interdisciplinary; sustainability; management

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1. Introduction

Although surf tourism is a globally expanding market segment, limited material has been published with reference to the field of study. A wealth of surf tourism research published in the recent decade provides the impetus for the collection and review of relevant material. The purpose of this research is to construct an epistemic advance in surf tourism as an academic field of study. Surf tourism research literature is an outgrowth of research literature related to the activity of surfing and framed in the discipline of tourism. As research into this field is little more than a decade old, this study traces its development from 1997 through 2010. This paper incorporated a variety of techniques to locate and compile a comprehensive inventory of material for methodical review; and each piece of research was content-analyzed to identify and categorize the nature and types of research emerging in the field, including gray and published literature. The benefits of a statistical analysis include that the information related to research contribution, while satisfying the natural curiosity of those in the discipline, may also be useful to future research, prospective graduate students, and faculty [1]. General

knowledge of research productivity can help academic institutions evaluate and set standards for scholarly output [1]. As a contribution to this emergent field, this study outlines the development of surf tourism research literature and presents a seminal body of work in the English language. In all, 118 pieces of research, were located for systematic review and a complete bibliography is provided.

2. Methods

A systematic review encompasses a comprehensive search for relevant studies on a specific topic, and those identified are then appraised and synthesized according to a pre-determined explicit method [2]. The key to systematic review is that the criteria for the inclusion or exclusion of studies in the review is explicit from the outset, and while others may not agree with the inclusions, the criteria for such inclusions, and thus the scope of the review, are clearly delimited [3]. In contrast to single studies taken in isolation, the systematic and statistical summary of a determined body of research results in a ―research synthesis" or ―evidence synthesis", a methodology which is progressive [4]. Evidence-based syntheses are not new and the systematic literature review is increasingly employed as a scientific tool [4].

The collection of the literature spanned a period of four years (2007-2010) and encompassed three broad approaches: (1) extensive and ongoing internet search using a variety of advanced search techniques on *Google* and *Google Scholar* and a wide-range of academic databases, including *Science Direct, Emerald, JSTOR* and *EBSCOhost*; (2) following the references provided from related books, journal articles, research papers, and master theses and doctoral dissertations; and (3) identifying and contacting scholars in the topic area, whereby personal communication and collaboration greatly assisted in the location of related materials. All papers were methodically searched for key words, including _surf‘ and _tourism‘ and reviewed through reading and interpretation of content as it pertains to surf tourism as a field of research. The literature was synthesized in order to look across its development and identify patterns. The research was engineered to follow the progression of the literature across time and to examine the interdisciplinary nature of the field as it pertains to tourism alongside the social and natural sciences.

2.1 Inclusion of studies

This research presents surf tourism research as a new field of study, framed in the touristic academe within an established criteria—including conference papers, master theses and doctoral dissertations, book sections or chapters, government reports, commissioned research by not-for-profit organizations and other relevant literary works. Inclusive are 118 select papers found to be integral to the subject area and to make a significant contribution to surf tourism research. The focal point of many of these works is not necessarily surf tourism per se; however, given the infancy of the field, papers with discussion of the subject matter were included. Of this body of research, 79 papers can be said to be clearly dedicated as surf tourism research. Overall, any research which discusses the visitation of surf sites for leisure and tourism in the context of, for example, surfing space (as a psychological construct), surfing events, coastal and environmental management of surf break sites, valuation studies of surfing areas, as well as the socioeconomics, ecotourism, sustainability, and conservation of surfing locations has been included. Of special consideration is the somewhat technical artificial surfing reef (ASR) literature, of which only those studies with discussion on surf tourism were included. The literature has developed across time and there may be several versions of related research by the same author. To ensure inclusiveness, such layers of research have been presented as individual studies.

2.2 Exclusion of studies

Excluded from this study were the following: the numerous books and travel guides on surfing; surf tourism research literature in French, Spanish, and Portuguese

(approximately ten studies identified thus far); materials found in surf magazines, web media, and newspapers; the wide body of social science works related to surfing (the _surfing literature‘); technical-based artificial surfing reef literature (the _ASR‘ literature); and the wide body of scientific works related to surfing (the _surf science literature‘). However, the topic of surf break management as a physical science, particularly those works by Scarfe (2008), Scarfe, Healy & Rennie (2009), and Scarfe, Healy, Rennie & Mead (2009), have been included. Surf event economic impact studies, particularly those prepared for corporations, contest sponsors, or surfing organizations were not included in the study due to lack of access and availability in the public domain, and because they are not generally considered peer reviewed research.

3. Results

Findings include the following: identification of the quantity and types of research under development in surf tourism; the outgrowth of journal articles; institutional contributors; degree conferrals; repeat and prolific authorship; the unique body of commissioned research; a survey of field research locations across the globe; and the identification of surf event research as a particular feature in the nature of the body of research.

3.1 The Development of a New Body of Research Literature

We were able to identify 118 pieces of research for the period evaluated (1997-2010). Almost one-third of these were journal publications, and the rest were book sections or chapters, conference papers, academic projects (mainly Ph.D. dissertations and Master theses) and non-refereed papers prepared for or by local authorities, corporations and not-for-profit organizations. It took the first ten years of the period examined to produce as many research papers as during the last four years, signaling a significant acceleration in the publications frequency. Table 1 identifies the development of the research over time, differentiating the types of literature.

Table 1. Surf Tourism Research Statistics by Type of Publication, 1997-2010

Year	Journals	Book Sections	Conference Papers	Graduate Studies*	Non-refereed Studies**	Total
1997	0	0	0	1	0	**1**
1998	1	0	0	0	0	**1**
1999	3	2	1	2	0	**8**
2000	0	0	0	1	0	**1**
2001	2	1	0	2	0	**5**
2002	3	0	2	0	2	**7**
2003	3	0	4	0	1	**8**
2004	2	1	2	2	1	**8**
2005	3	0	1	2	0	**6**
2006	0	1	4	3	0	**8**
2007	6	3	4	2	4	**19**
2008	3	0	2	3	6	**14**
2009	9	4	4	2	3	**22**
2010	1	0	4	1	4	**10**
Total	**36 (22)*** **	**12 (7)**	**28 (28)**	**21 (14)**	**21 (8)**	**118 (79)**

* Includes Master theses, Ph.D. dissertations and graduate and undergraduate academic projects

** Papers prepared for or by local authorities, corporations and not-for-profit organizations.

*** Numbers in parentheses show the number of papers by publication dedicated to surf tourism.

3.2 Appearance in Academic Journals

Academic journals began to recognize and publish surf tourism related studies as early as 1998 and the number has grown to encompass thirty six journal articles to date (see Table 2). Of the twenty six journals with surf tourist-related publications, *Journal of Coastal Research* has been the most prolific, with five publications, followed by *Journal of Sport and Tourism* and *Reef Journal*, with three each, and by *Journal of Sustainable Tourism, Shore and Beach* and *Tourism Management*, with two publications each. A number of disciplines are represented, including coastal research, ecotourism, sustainable tourism, geography, tourism management, and others in the social sciences.

More than half of the journal articles have been published in the previous 4 years (2007-2010) and represent an outgrowth of graduate research (to be discussed in section 3.4 of this study). As journal articles represent the development of research areas and are a significant factor in defining disciplines of study, surf tourism is an emergent field of research (see Table 2) in the academic world.

Table 2. Research Articles by Journal

Journal	**All articles**	**Dedicated articles**
Journal of Coastal Research	5	3
Journal of Sport & Tourism*	3	3
Reef Journal	3	0
Journal of Sustainable Tourism	2	2
Shore & Beach	2	2
Tourism Management	2	1
Africa Insight	1	1
European Sport Management Quarterly	1	1
Geografiska Annaler	1	1
Journal of Travel Research	1	1
Managing Service Quality	1	1
Society & Leisure	1	1
South African Journal for Research in Sport	1	1
The Geographical Review	1	1
Tourism Analysis	1	1
Tourism in Marine Environments	1	1
Tourism Review Intl	1	1
Annals of Tourism Research	1	0
Event Management	1	0
Film & History	1	0
Geography Compass	1	0
Journal of Ecotourism	1	0
Qualitative Market Research: An Intl Journal	1	0
Revista de Turismo y Patrimonio Cultural	1	0
Tourism Geographies	1	0
Total journal articles	**36**	**22**

* Previously (until 2006) known as *Journal of Sport Tourism*.

3.3 Institutional Contributors to Journal Papers

A considerable amount of research is attributable to graduate studies and researchers affiliated with academic institutions. Segmentation by country indicates that Australia leads in journal articles attributed to universities, with just over a third of all articles (13), followed by the United States and South Africa (4 each), and the United Kingdom, and New Zealand (3 each). Griffith University, Australia, is by far the leader in surf tourism research (7), followed by the Australian National University and University of Waikato, New Zealand (3 each). Although Hawaii is the undisputed origin of surf tourism, there have been no journal articles from universities in Hawaii (albeit there have been other research works); while Indonesia, one of the most prolifically researched surfing destination in the world, has not yet surf tourism research attributed to an Indonesian university. Table 3 outlines institutional contributors by country and sub group‘s universities and other institutions within each country by contribution and alphabetically. Data was compiled based on primary authorship.

Table 3. Institutional Contributors to Journal Articles

Country	Institutional Contributors	Pieces of Research	Year of First Publication
	Universities		
Australia	Griffith University	7	2002
	Australian National University	3	2007
	Edith Cowan University	1	1999
	University of Technology, Sydney	1	2005
	University of Wollongong	1	2003
United States	San Diego State University	1	2009
	Stetson University	1	2009
	University of California, Berkeley	1	2009
	University of California, Los Angeles	1	2007
United Kingdom	Manchester Metropolitan University	1	2005
	Swansea Metropolitan University	1	2009
	University of Exeter	1	2005
South Africa	University of Natal	2	2001
	Cape Peninsula Univ. of Technology	1	2008
	University of KwaZulu-Natal	1	2008
New Zealand	University of Waikato	3	2004
Canada	University of Calgary	2	2001
France	Univ. Michel de Montaigne-Bordeaux III	1	1998
Netherlands	University of Leiden	1	2003
Portugal	Instituto Superior Tecnico	1	2009
Spain	Universidad de La Laguna	1	2010
	Other Organizations		
New Zealand	ASR Marine Consulting and Research	1	2009
Australia	National Surfing Reserves	1	2007

For papers with authors from different institutions, only the first author affiliation has been accounted for. One author was not affiliated with any academic institution.

3.4 Degree Conferral in the Research Area

Research clearly dedicated to surf tourism and carried out in fulfillment of honors and masterate requirements encompasses 12 theses to date; while dedicated research at the doctoral level accounts for two dissertations. However, if considering all honors and graduate studies which significantly contribute to surf tourism there are currently 21 works (see Table 4). Degree conferral in the research area includes graduate reports, honors studies, and one Capstone project for Bachelor of Science. Australian researcher Jess Ponting (2000, 2001, 2008) was the first in history to graduate from research in surf tourism at both the Master and Ph.D. levels. Graduate studies accentuate the interdisciplinary development of the field (i.e. surf tourism research in context with other fields of studies) with degrees conferred in planning, geography, management, leisure and tourism, anthropology, environmental studies, oceanography, political science, and other fields. Graduate studies contributed to the outgrowth leading to journal publications found herein. Encompassed in the 21 studies listed as contributors to the surf tourism field, management and sustainability are the key areas of research. Comprising the bulk of degree conferrals, eight studies are attributed to Australian universities and seven to United States universities.

Table 4. Degree Conferral in the Research Area
(Honors work, Theses and Dissertations)

Year	Degree Conferred	University	Country
1997	Graduate Diploma in Urban & Regional Planning (planning report)*	Curtin Univ. of Tech.	AU
1999	Master of Arts in Geography (thesis)	San Diego State Univ.	USA
1999	Honors Degree in Social Sciences (Directed Research Project)	Univ. of Waikato	NZ
2000	Master of Mgt (Tourism Mgt) (graduate report)*	Univ. of Tech., Sydney	AU
2001	Master of Mgt (Tourism Mgt) (thesis)*	Univ. of Tech., Sydney	AU
2001	Bachelor of Science (Capstone Project)*	Calif. State Univ., Monterey	USA
2004	Master of Science in Travel Industry Mgt (thesis)*	Univ. of Hawaii	USA
2004	International Tourism Mgt & Consultancy (thesis)*	NHTV Univ. of Prof. Educ.	NL
2005	Doctor of Philosophy (dissertation)	Murdoch Univ., Perth	AU
2005	Doctor of Philosophy (dissertation)	Univ. of Wollongong	AU
2006	Master of Science in Leisure, Tourism & Environment (thesis)*	Wageningen Univ.	NL
2006	Ph.D. in Anthropology (dissertation)	Australian National Univ.	AU
2006	Master‘s Degree of Technology: Marketing	Durban Univ. of Tech.	SA
2007	Master of Arts in Anthropology (thesis)*	San Diego State Univ.	USA
2007	Master of Arts in Ecology & Sustainable Development (thesis)*	Murdoch Univ., Perth	AU
2008	Master of Science in Oceanography/Coastal Zone Mgt (thesis)*	Florida Institute of Tech.	USA
2008	Ph.D. in Leisure and Tourism (dissertation)*	Univ. of Tech., Sydney	AU
2008	Ph.D. in Earth and Ocean Sciences (dissertation)	Univ. of Waikato	NZ
2009	Ph.D. in Political Sciences (dissertation)*	Univ. of Hawaii	USA
2009	Master in Natural Resources & Sustainable Development (substantial research paper)*	American Univ. Wash. DC	USA
2010	MBA in Hospitality & Tourism Mgt (thesis)*	Prince of Songkla Univ.	TH

*Research dedicated to surf tourism

3.5 Shortlist of Repeat Authorship

Publications associated with the pursuit of an academic degree are evident in the works of Lazarow, Ponting, and Scarfe. Table 5 identifies four Australian authors, Buckley, Lazarow, Ponting and O'Brien, which account for 31 of the total examined studies, constituting over 25 percent of the extant surf tourism literature to date. Similarly, they account for 11 journal articles, constituting 33 percent of the total articles to date.

As of August 5, 2011, Buckley is the most cited scholar in the field based on data retrieved from *Google Scholar*. The high citation numbers for Getz and Preston-Whyte may be somewhat misleading as these works also include topics other than surf tourism.

Ponting and Lazarow have the highest number of pieces of research, followed by Buckley. Given the originality of the surf tourism field of research and the limited studies to date, Buckley, Lazarow, Ponting, and O'Brien are clearly driving the field of study and their works are instrumental in defining the research area. Personal communications (Buckley, 2010; Lazarow, 2010; Ponting, 2010; O'Brien, 2010) identifies that these researchers are surfers and consequently, surfers are guiding the field. Table 5 is far short of an exhaustive account; rather it offers a general sample of the prolific researchers, specifically those who served as a common link across multiple studies. The table excludes some authors, such as Martin (6 publications) and Fluker (5 publications), who, despite presenting at conference proceedings and publishing research, do not have primary authorship of journal articles.

Table 5. Shortlist of Repeat Authorship

Authors	Journal papers (primary authorship)		Other research**	Total pieces of research
	Total papers	Citations (Google Scholar)*		
Buckley	4	79	3	**7**
Lazarow	4	27	6	**10**
Ponting	2	10	8	**10**
Getz	2	67	1	**3**
Scarfe	2	3	1	**3**
Poizat-Newcomb	2***	5	0	**2**
Preston-Whyte	2	44	0	**2**
Dolnicar	1	16	2	**3**
O'Brien	1	15	3	**4**
Nelsen	1	10	2	**3**

* As of 5 August 2011

** Includes secondary journal authorship (Getz only), graduate work, book sections, conference papers and non-refereed papers

*** Constitutes a single article published in two parts

3.6 Commissioned Research

Research produced as a result of commissioned studies forms a significant component to the field, wherein 17 out of 21 total pieces of research were produced in the recent 4 years. These works are mainly reports and studies generated by or for the nonprofit sector and government agencies. Five reports for non-profit organizations (NPO) are dedicated explicitly to surf tourism and the conservation of surfing resources, while three government reports are dedicated to surf tourism management and impacts. *Save The Waves* (STW) and *Surfers Against Sewage* (SAS) are the most active NPOs with three and two reports respectively. Inclusively, government studies tend to be focused on tourism development, impact studies and management, while nonprofit studies are aimed at the economic impacts of tourism and sustainability issues. Of the 12 government-sponsored reports, seven are Australian, including three on the Gold Coast, the most researched location in this category. The other two most researched countries are the UK and the USA, each with four commissioned works.

Table 6. Commissioned Research

Year	Commissioning organization	Type of research	Researched area
		Non-Profit Organizations	
2002	Environmental defense, Surfer‘s Environmental Alliance, The Surfrider Foundation	Value of coastal tourism	Rincon, Puerto Rico
2007	Save The Waves Coalition	Economic impact of surfing	Mundaka, Spain, & Costa Rica
2008	Corepoint and local authorities	Physical, ecological and socio-economic impact study	Cornwall, UK
2008	Waikiki Improvement Association	Economic impact analysis	Waikiki Beach, Hawaii, USA
2008	Hawaii Coral Reef Initiative	Recreation carrying capacity and mgt	Kailua Beach Park, Hawaii, USA
2008	Save The Waves Coalition	Economic impact study	Mundaka, Spain
2009	Surfers Against Sewage	Environmental impact assessment	UK beaches
2010	Surfers Against Sewage	Resource report	Global, UK beaches
2010	Save The Waves Coalition	Surfing and sustainable tourism	global
		Government and corporate reports	
2002	Opunake Artificial Surf Reef Committee & South Taranaki District Council	Economic and social impact of artificial surfing reefs	Opunake, South Taranaki, NZ
2003	Cornwall County Council	Historic report	Newquay, Cornwall, UK
2004	Back Beach Improvement Group	Socio economic impact study	Back Beach, Australia
2007	Ontario Ministry of Tourism et al.	Profile report	USA and Canada
2007	Maui Land & Pineapple Company, Inc.	Recreational carrying capacity	Honolua Bay, Hawaii, USA
2007	Gold Coast City Council	Surf quality and coastal mgt	Kirra, Gold Coast, Australia
2008	Gold Coast City Council	Best practice research report	Gold Coast, Australia
2008	Brevard County, FL	Feasibility study of artificial surfing reefs	Florida, USA
2009	Gold Coast City Council	Surf industry review and economic contributions assessment	Gold Coast, Australia
2009	Tourism New South Wales	Surf tourism action plan	New South Wales, Australia
2010	Surf Coast Shire	Surfing reserve coastal mgt plan	Bells Beach, Australia
2010	Central Coast Tourism	Destination mgt plan	Central Coast, Australia

3.7 Field Research Locations

Surf tourism field research locations cover most continents. In some cases, a single research was conducted in more than one location, or offers discussion on more than one location. Table 7 provides a detailed account of field research sites whereby the category —lobal" identifies research findings with discussion in a global context. In the case of countries with research carried out in various regions, such as Eastern or Western Australia, various islands in Indonesia, and states or territories of the United States, the data have been segmented for purposes of clarification. The most popular research destinations are Australia, the US and Indonesia, where the former two benefit from the presence of universities with scholars interested in the topic. In contrast, Indonesia is the third most researched area in the world, yet not a single English language research is attributed to an Indonesian university. The Mentawai Archipelago is the most researched surfing realm in the world (taking into account that data presented here for Australia actually encompasses the southern and eastern seaboards from Bells Beach to the Great Barrier Reef; as well as the Indian Ocean coast of Western Australia).

Table 7. Surf Tourism Field Research Locations

Country/region	Location	Sub-total	Total
Global/General			**21**
Australia	general	11	**34**
	East and South	17	
	West	6	
New Zealand			**7**
United States	general	3	**23**
	California	9	
	Hawaii	5	
	Florida	3	
	Puerto Rico	3	
Indonesia	general	2	**19**
	Mentawai	13	
	Bali	2	
	Lombok	2	
Europe	United Kingdom	9	**16**
	Spain	4	
	France	1	
	Ireland	1	
	Portugal	1	
Oceania	general	4	**10**
	Fiji	2	
	Samoa	1	
	Papua New Guinea	1	
Africa	South Africa	5	**6**
	Morocco	1	
Central America	Costa Rica	4	**5**
	Mexico	1	
Others	Thailand	5	**12**
	Maldives	1	

3.8 Surf Tourism Event Research

Surfing events are a reoccurring theme in the research, mentioned in nearly 45 percent of the papers reviewed. Table 8 identifies surfing events as a highly significant topic in the literature. As aforementioned, economic impact analyses on surf events prepared for corporate sponsors were not included in the review. Although ten of the 118 papers were dedicated to surf events, there were an additional 42 papers (over one third of the total research reviewed) which included some discussion on surfing events. Many of these papers can be more broadly defined as papers on the socioeconomic impact of surfing, which underscores the economic importance of surfing events and form a significant component to surf tourism literature**.**

Table 8. Surfing Event Research

Focal Point of the research	Pieces of research
Dedicated surf event research	10
Includes discussion on surfing events	42

4. Discussion

Surf tourism research literature is a new and rapidly expanding area in the touristic academe. The literature reviewed herein reflects the interdisciplinary nature of surf tourism in context not only within tourism as a professional field, but within sociology, economics, and coastal studies in terms of ecology, environmental and coastal management, and the concern for the custodianship and conservation of surfing areas. From academic and developmental perspectives, as the research increased, it expanded in scope and crossed disciplines. This is identifiable at the graduate research level by the diversity of disciplines represented in an array of unpublished theses and dissertations, in book sections and chapters, and in academic journals. Surf tourism research appears across a wide spectrum of touristic fields, including sport tourism, adventure tourism, marine tourism, water-based tourism, sustainable tourism, coastal tourism, tourism marketing, tourism management, recreational management, travel industry management, coastal zone management, event management, and tourism planning. Social science disciplines include human geography, anthropology, economics, sociology, psychology, and political science. Natural science disciplines include ecology and oceanography.

For the most part, early research in surf tourism began with attention to artificial surfing reefs, surfing events, recreational capacity, marine tourism, and tourism marketing data. Surf tourism as a research area emerges through field studies in France, Puerto Rico, and Indo-Pacific Islands, especially the Mentawai Archipelago. At the turn of the twenty-first century, honors and graduate studies contributed greatly to the overall field, while journal articles brought the ‗international tourism' discussion. The domestic tourism argument followed, especially with valuation studies of surf sites and various government examinations and assessments. Emergent trends in the literature include the call for social and physical management set in the context of sustainability and conservation, recognizing the economic benefits of surfing breaks, and the need for considering the protection of surfing areas in the coastal management decision process. Among the research community there is an evident call to sustain and manage surfing resources around the world.

Overall, more than fifty percent of the total research has been produced in the previous five years and Australian graduate students and related universities are in lead of the field. Furthermore, a surge in commissioned research in the recent five years, especially among governmental bodies and the not-for-profit sector, highlights the development of the field of study. Globally, this new subfield of research has arisen, not by well-known theoreticians writing about it, but by graduate students and consultants first–and academics later–and this is evident in the gray literature and degree conferrals in the field.

5. Conclusion

This study serves as the first-ever formative body of surf tourism research literature compiled for future inquiry. However, given the limitations of locating the gray literature, and despite the best efforts of the authors, it is possible that the list is less than exhaustive.

Based on this research, recommendations include trend and content analyses of the studies found herein in order to identify emergent themes, theories, methods, and contributions to the field of study. For example, as fifty-two pieces of research included some level of discussion on surfing events, this topic is cornerstone to the field and deserves further investigation. Foreign-language works are in need of review, including those in French, Spanish, and Portuguese. Given that the majority of the existing English-language research is on prolific surf tourism areas in Australia, Indonesia, and the United States, this suggests an opportunity to conduct research in new or less-publicized surf tourism destinations, such as much of coastal and insular Africa, South America, India, and Southeast Asia outside of Indonesia and Thailand.

With the growth of the international and interdisciplinary field of tourism, and given the increased petition for empirical research by graduate students and faculty, surf tourism research offers a new and dynamic area and element of inquiry. A key observation of this research is the genesis in little over a decade of a body of literature set in the context of globalization in terms of exploration, activity, and diversity amidst natural and political borders and backgrounds of authorship and disciplines.

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APPENDIX

Surf Tourism Research Included in the Systematic Review

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