

Measuring the Conservation Aptitude of Surf Beaches in Phuket, Thailand: An Application of the Surf Resource Sustainability Index

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ABSTRACT

The research seeks to measure the conservation aptitude of nine surf beaches in Phuket, Thailand by employing the *Surf Resource Sustainability Index*, an assessment methodology comprising 27 social, economic, environmental and governance indicators used to frame and quantify attributes for conservation development. The research identifies and documents key areas of concern for the sustainability of the island's coastal surfing resources and distinguishes steps forward to address emergent issues. The study finds that by improving the awareness, legislative status and management of surfing sites, the overall conservation aptitude for the island could be raised considerably. Copyright © 2013 John Wiley & Sons, Ltd.

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INTRODUCTION

Surf sites around the world are under ever-increasing pressures from tourism, coastal development, pollution and other anthropogenic factors; and strategies to protect these resources first came forward from diverse surfing communities, particularly those in Australia, New Zealand and the USA. Influential in the promotion of surf site custodianship, Australian researchers Short and Farmer (2012) suggested the promulgation of 'Surfing Reserves' at international, national and regional levels, whereby sites are recognized and afforded a level of protection, either symbolically or legislatively. Martin and Assenov (2012c) noted that fundamental themes in the twenty-first century surf tourism research literature include the sustainability and conservation of coastal surfing resources. Studies in the sustainable management of surf sites are interconnected with domestic and international tourism, particularly the use and impacts from surfers, tourists and other stakeholders of the coastal zone (Buckley, 2002a, 2002b; Butt, 2010; Farmer and Short, 2007; FFLA, 2010; Lazarow, 2010; Lazarow *et al.*, 2007; Lazarow *et al.*, 2008; Martin and Assenov, 2012a, 2012b, in press; Mead, 2009; Nelsen, Pendleton and Vaughn; Nelsen *et al.*, 2007; Ponting, 2009a; Ponting *et al.*, 2005; Ryan, 2007; Scarfe *et al.*, 2009; Short and Farmer, 2012; Shuman and Hodgeson, 2009; Surfrider Foundation, 2012a, 2012b; Tourism New South Wales, 2009; Wearing and Ponting, 2009). To address these concerns, this research employs the *Surf Resource Sustainability Index* (SRSI), a perceptive index methodology comprised of social, economic, environmental and governance indicators used to measure and frame surf site integrity (Martin and

Assenov, 2012a, 2012b, 2013). The aim of this study is to apply the SRSI in practical circumstances by documenting and rating the conservation aptitude of nine key surf beaches on the resort island of Phuket, Thailand, and subsequently to identify key areas of concern for the sustainability of the island's coastal surfing resources. Although this is a case study of Phuket, the paper serves to illuminate the wider international significance, applicability and replicability of the index.

Rationale

The rationale of the study is threefold. First, it offers a window to the usefulness and versatility of SRSI in a practical setting. Second, it affords an opportunity to apply SRSI methodology to a variety of beaches in a given region and place the index in a cross-sectional context. Third, it provides a means to gauge the potential contribution of the index to sustainability in local context and to understand limitations to its repeatability as a global model.

Surf tourism in Phuket

Phuket is the definitive surfing destination in Thailand based on its natural resources, consistency and quality of waves, and proximity of surf sites (Martin, 2010a, 2010b; Martin and Assenov, 2011). Given that the island has over 700 hotels and an estimated 50,000 hotel rooms (C9hotelworks, 2013), there are countless environmental and sustainability issues raised about the rapid development and urbanization by private and government sectors and in the media. With 23 surf beaches in Phuket, surf tourism is an emergent niche market in the wider beach tourism industry (Figure 1).

The surfing season is earmarked by the rain and winds of the Southwest Monsoon (May through October) of the Andaman Sea region and corresponds with the tourism industry's low season; therefore, surf tourism is a welcome market segment, serving to address various issues of

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Figure 1. Surf beaches of Phuket.

seasonality. Although waves on the Andaman coast are mainly generated by locally-occurring monsoon winds, groundswells from the Indian Ocean occasionally pass through the Great Channel (a corridor between Banda Aceh, Sumatra and Great Nicobar Island) and may deliver clean high quality waves at any time of the year (Martin, 2010a, 2010b).

Foreign travelers in the 1970s and 1980s introduced the sport of surfing to Phuket; and by the early 1990s, a small group of Thais were surfing. Although a number of traveling surfers passed through Phuket, especially Australians, Americans and Europeans, Suchin Aksorndee was probably the first Thai surfer to embrace the sport and lifestyle in Phuket in the 1980s (P. King, personal communications, 22 September 2011). At the dawn of the twenty-first century, a second

generation of young Thai surfers had come of age. On 25 September 1999, Thailand's first international surfing contest was held at Kata Beach in Phuket. Fostered in part by employees from *Cobra*, the world's largest surfboard manufacturing company (located in Chonburi, Thailand), the contest has remained an annual event. Currently, the researchers estimate that there are approximately 300 Thai nationals and 300 expatriate surfers in Phuket and surrounding areas (including those who reside in Phuket only during the surf season).

Surf tourism is cornerstone to viewing surfing resources through a socio-economic lens. Given Thailand's prolific and successful *Amazing Thailand* tourism advertising campaign, which promotes tourism in all its forms (from beach, adventure and ecotourism to luxury hotels and

shopping), surf tourism has been a relatively overlooked market segment (Martin, 2009, 2010a, 2010b; Martin and Assenov, 2011). As many overseas surfers now visit Phuket, the island has emerged as a seasonal yet significant surf tourism destination. This new market has kindled entrepreneurial spirit among Thais in recent five years, evident by the increase in board rental enterprises at local beaches. Figure 2 shows a group of Thai surfers who are directly involved in the local surf tourism industry.

SURF TOURISM RESEARCH

Martin and Assenov (2012c) found two themes most evident in the surf tourism research literature. First, there are the positive and negative effects that surf tourism activities have on the developing world, and studies are mainly directed toward capacity management in relation to social, economic and cultural interaction with impacts on rural host communities (Buckley, 2002a, 2002b, 2007; Ponting *et al.*, 2005; Ponting, 2009a, 2009b; Wearing and Ponting, 2009). Second, there is concern for age-old surfing locations in developed countries in mainly urban settings which experience high-use, high-impact visitation from predominantly domestic surfers seeking recreational space (especially in Australia, the UK and the USA), and this research area is focused on the threats, impacts and negative implications of urbanization (including coastal development), as well as the intricacies of small business developments and the positive aspects of socioeconomics (Shaw and Williams, 2004; Lazarow *et al.*, 2007; Nelsen *et al.*, 2007; Shipway, 2007; Lazarow *et al.*, 2008; Phillips and House, 2009; Marchant and Mottiar, 2011). With respect to the study of urban and rural surfing environments, Martin and Assenov (2012a) drafted the SRSI, an index methodology that identifies surf sites as integral and nonrenewable natural resources. The index is based on the

premise that the sustainability of surfing sites can benefit from the innovation of a conservation-orientated metric framework, particularly in the context of surf tourism. Subsequently, Martin and Assenov (2012b) investigated indicator importance among surfer-stakeholders from diverse backgrounds and identified key areas of concern among this group. For example, the environmental index scored highest in importance, in particular the quality of water and beaches alongside biodiversity.

THE SURF RESOURCE SUSTAINABILITY INDEX

The broad intention of this research is to apply and further develop the SRSI as a systematic and open source method for use by stakeholders from diverse backgrounds – an approach proven particularly effective and widely applicable in conservation field studies wherein the key objective is to create a user-friendly research instrument geared for achieving results rather than exclusively engineering a system of measurement for academics TNC (2007). This research represents the first comprehensive application of the index in a cross-sectional framework.

The SRSI is designed as a perceptive index comprised of 27 indicators framed into four indices: social, economic, environmental and governance. As a modular approach to surf site field assessment, the index provides qualitative and quantitative metrics; a multidimensional framework offering a description of conceptual and analytical values in two layers, qualitative/quantitative for indicators and purely quantitative for the indices. Thus, the micro level forms the qualitative layer on the basis of perceptive and descriptive field observations, and subsequently a numerical value is attached. The generation of qualitative data gathered from field work provides a static snapshot of a site and is foundational to the SRSI design.



Figure 2. Phuket surfing contest, Kata Beach, 2008.

The field assessment measurement scale is based on a 1–5 *Likert Scale* such that high values or qualities reflect a high aptitude for conservation. Whereas previous SRSI tests held the indicator assessment scale at whole numbers, fractioning of the indicator ratings was adapted to include intermediate values (i.e. '.5'); and this was done to increase the assessment accuracy in the cross-sectional context. Thus, the minimum and maximum indicator values are 1 and 5 respectively, and fall into the following five categories: very low aptitude for conservation (1.00–1.80), low aptitude (1.81–2.60), moderate aptitude (2.61–3.40), high aptitude (3.41–4.20) and very high aptitude (4.21–5.00). A reverse scale is applied for two negative indicators (i.e. marine life hazards and physical hazards). Equal weights have been applied in the study of all indicators and indices. This was done to place the focus of the research on the assessment methods, particularly to create a single assessment chart whereby a number of beaches are rated within a given region.

Background information on the criteria and implications of indicators are not provided but are available from Martin and Assenov (2012a, 2012b, 2013). However, a brief description of the applied assessment methods has been provided for each indicator in Table 1. Indicators are listed alphabetically within each index.

ASSESSMENT OF PHUKET SURF BEACHES

Of the 22 surf beaches listed in Figure 1, nine surf sites on eight beaches were selected for this study. Previous research indicated that these sites are focal points for surfing activities on the island based mainly on wave type and quality (Martin, 2010a, 2010b). Field assessments were carried out by the researchers through visiting sites, participant observation, prior knowledge and through personal interviews with surfers. As one of the researchers is a surfer and member of the Phuket surfing community, participant observation was useful in communicating with local surfers on the beach and in the parking area at specific sites, while waiting for waves in the surf line, and through follow-up emails and phone conversations. Prior knowledge was based on life experience and previous research in the region (Martin, 2009, 2010a, 2010b; Martin and Assenov, 2011, 2012a, 2012b, 2013). Seventy-one semi-structured personal interviews were carried out at the Phuket Surfing Contest at Patong Beach, Thailand, in September of 2011 and 2012 with Thai, expatriate and visiting surfers. Interviews were also carried out at local surf sites when possible with surfers and other stakeholders.

As assessment tables comprise several pages of text per site, this paper provides field data only for the centrally-located Surin Beach, and Table 2 offers an example of the descriptive assessment and rating process for that location. Judgments were ultimately made by the researchers and took into account the aforementioned data gained from prior knowledge, participant observation, interviews and repeat visits to each site from April to November 2012.

Indicator assessment chart

The complete SRSI assessment chart is provided in Table 3. The nine beaches are listed in order of their location from north to south, and the assessed values for each indicator at individual beaches are provided. Mean values based on equal weights are calculated for each beach within a given index. Mean values are also provided for each indicator (across the nine beaches) in order to gauge individual beach indicators relative to the island's averages.

When looking at the nine beaches as a whole, the social and economic aptitude is moderate (2.74 and 2.71 respectively). In contrast, the lowest overall outlook for Phuket surf beaches is given to governance (1.90, low). The environmental index fared best overall with an aptitude in the upper-moderate range (3.26). In terms of ranking the beaches on the basis of the SRSI composite index, Kata Yai Beach and Surin Beach have the highest aptitude and rank moderate at 3.23 and 2.86 respectively, and the lowest-ranked sites are Kata Noi and Kalim beaches at 2.21 and 2.40 respectively.

Mean index values

An analysis of the SRSI assessment results and differences between beaches lends insight as to why some of them have higher aptitudes for sustainability. For example, given that conservation is a human construct (Anthoni, 2001), socially-based indicators serve to differentiate site-specific aptitudes. In the case of comparing surf beaches in Phuket at mean index values, Kata Yai Beach (3.69, high) and Surin Beach (2.94, moderate) were the top ranked in terms of social aptitude as well as economic aptitude (4.3 and 3.4 respectively), which can be attributed to the fact that they are both focal points for the Phuket surfing community and rate high in terms of social experience. Both beaches have strong standing in terms of their public safety and socio-psychological carrying capacity. In contrast, Kata Noi Beach rated the lowest in social and economic aptitude, because of the absence of club activities and surf events, low public safety and limited commercial surf activities. Similarly, the Nai Yang beaches were low in economic score (at 2.0), and the reasons for this include the rural atmosphere and the lack of surf tourism, events and commercial activities.

The quality and integrity of the natural environment are key indicators of conservation aptitude. In this respect, the Nai Yang beaches ranked highest (at 3.56), followed by Nai Harn Beach (at 3.5). This is attributable mainly to good water quality, eco-physical carrying capacity and limited foreshore development. Kalim beach was identified as having the lowest environmental aptitude among the beaches surveyed (at 2.69), and this was due mainly to the unhealthy reefs, point-sourced pollution from the local klong (canal), and the seawalls that have caused beach degradation and altered the shape and character of the waves during high tides.

Governance indicators are pivotal in that they target whether an area is afforded any level of conservation policy or management as a straightforward indication of current conservation aptitude. For example, mean values in the governance index show that Nai Yang National Park Reef (Center Reef) was rated highest (at 3.17) due in part to its

Table 1. SRSI methodology applied in Phuket, Thailand

Social indicators	
1. Social indicators – boardriders:	Identified the number of private and public clubs or organizations who access and use each site, including the number of members and activities undertaken.
2. Clubs – lifesavers:	Identified the number of private and public lifesaving organizations and considered the number of members, types of services provided and educational activities for youth or the community.
3. History:	Documented the number of years that each surf site has been surfed and assessed the usage, popularity, number and types of surfing activities occurring over time.
4. Public safety:	Assessed the presence of crime, such as vehicle safety, theft, violence or local gangs, including the past record and present account of public safety at each site.
5. Social experience:	Gauged the societal conditions surrounding the surfing experience at each site, including local ethics and knowledge.
6. Socio-psychological carrying capacity:	Estimated the number of surfers each site can accommodate in terms of crowdedness, including the size of the surfing area and type of wave.
7. Surf community:	Estimated the number of surfers in the community and identified the surfing community-supported activities at each site.
8. Surf events:	Assessed the number and size of contests per year at each site, including the number and types of participants (amateurs and professionals) and the positive and negative social implications.
Economic indicators	
9. Surf amenity and infrastructure:	Accounted for the presence of beneficial amenities at each site, including parking areas, walkways, showers and bathrooms.
10. Surf events:	Identified the key stakeholders' economic interests and relationship with each site, including the short-term and long-term economic contributions.
11. Surf industry and commercial activity:	Identified the 'economic hub' at each site relative to the number of surf shops, clothing outlets or other businesses catering directly to surfers.
12. Surf-related nonmarket values:	Estimated the economic significance of the site in terms of social, cultural, existence, vicarious and other nonmarket values; took into account the host community along with local and tourist surfing populations.
13. Surf tourism:	Estimated the number of domestic and international tourists who interact with each site; took into account the economic impacts related to the surf tourism experience, including hotels available to surf tourists, surf lessons and surfboard rentals.
Environmental indicators	
14. Biodiversity:	Assessed the overall health and vitality of the natural environment, including the condition of the coral reef and the presence of marine life at each site.
15. Coastal engineering:	Identified the significance and effects on the environment of coastal engineering projects or structures and documented physical changes to each site (note: negative effects received lower scores).
16. Eco-physical carrying capacity:	Identified the number of surfers or visitors that each site can accommodate before negative environmental consequences are likely to occur.
17. Hazards – marine life:	Documented the known or reported presence of aquatic life or marine predators, which may pose hazards to site users, including sharks, sea urchins, jellyfish (note: lower hazards received higher scores).
18. Hazards – physical:	Identified the presence of dangerous ocean currents and the presence of near shore and submerged rocks and reefs at each site (note: lower hazards received higher scores).
19. Quality – beach:	Assessed the overall esthetic condition of each site, including cleanliness, presence of beach litter, urbanization, encroachment, erosion or other aspects of degradation.
20. Quality – water:	Identified point and non-point sources of pollution as well as turbidity, nutrient loading and the presence of marine debris and plastics in the water at each site.
21. Surf type and quality:	Documented the local wave types and average wave frequency during the year or season; considered various skill levels of surfers who use each site.
Governance indicators	
22. Beach and water safety:	Estimated the availability and number of lifeguards as well as lifeguard towers and facilities in conjunction with the seasonality of services at each site.
23. Education and interpretation:	Identified the types, number and visibility of signage and interpretation at sites alongside any community meetings, workshops, research or advocacy for site integrity.
24. Legislative status:	Outlined the type or level of governance at each site (i.e. conservation status), including entities or branches of local, state or federal government with jurisdiction.
25. Management:	Identified the existence of guidelines or standards for activities at each site alongside the effectiveness of enforcement.
26. Not-for-profit organizations:	Determined the presence and activity of not-for-profit organizations or other authority at each site.
27. Public access:	Identified the level of accessibility alongside laws or other issues surrounding public right of entry, such as hotels or infrastructure, which inhibit or prohibit entry at particular sites.

Table 2. SRSI Surin beach assessment

Social index (SocSRSI)	
1. Social index (SocSRSI) – boardriders: Although no formal boardriders club exist at the site, local surf bars may create an informal club atmosphere and serve as gathering place for boardriders.	1.5
2. Clubs – lifesaving: There are currently no lifesaving clubs or culture. However, surfers perform rescues and respond to aquatic accidents at times. There are officially no lifesaving programs for local youths, but occasional education activities are provided by local expatriates.	2
3. History: Although the site has some degree of surfing history, there has been very little documentation. Prior to the development of roads to the area in the 1990s, which connected the site to southern beaches, surfing activities occurred in isolation.	3
4. Public safety: Interviewees report occasional crime in the parking area and clashes among beach vendors.	3.5
5. Social experience: Interviewees suggest that surfing in the area provides good experience with a relatively low level of localism or other negative social issues.	4
6. Socio-psychological carrying capacity: A variety of peaks spread out over the length of the beach provide a number of spots where surfers gather to catch the waves, providing more surfing space than many other reefs or point breaks in Phuket.	3.5
7. Surf community: Two generations of Thai surfers at the site, with the newer generation comprised mainly of teens. Expatriate surfers are a significant component of the community, serving as role models, lending equipment and offering free surf lessons to the Thai youths.	4
8. Surf events: Little or no surf event activity at the site. Local surfers attend nearby competitions, such as those at Kamala Beach.	2
Economic index (EconSRSI)	
9. Surf amenity and infrastructure: Beachfront parking area and one public bathroom (located south of the car park). There are no public showers in the beach park.	3.5
10. Surf events: Little or no surf event or contest activities at the site.	2
11. Surf industry and commercial activity: Several board rental stands on the beach. Several 'surf bars' which offer food and drinks and serve as a place for surfers to keep their boards. One of the most established surf shops in Phuket is located nearby. Expatriate surfing community may contribute economically through purchasing foods, surf gear, petrol, etc. when visiting the site.	3.5
12. Surf-related nonmarket values: The site serves as a focal point for Phuket surfing culture (second to Kata Beach). Interviews indicate that a number of Thais, expats and tourists frequent the beach because of the reputation and availability of waves, and this has led to an accountable surfing community in the area. Potentially significant existence values and vicarious values attached to the site.	4
13. Surf tourism: Board rentals and surf lessons are offered during the surf season. Interviewees report that surf tourists and surf tourism businesses have increased significantly in recent years.	4
Environmental index (EnvSRSI)	
14. Biodiversity: Tin mining during the previous century resulted in the destruction of many coral reefs in the area. Although studies on the ecological integrity of the site were not conducted before or after the tin mining era, anecdotal evidence suggests that considerable change had taken place at the site.	2
15. Coastal engineering: Although not aimed at coastal engineering <i>per se</i> , decades of dredging from the maritime tin mining industry has altered the coastal area. Given that the area was not surfed prior to the tin mining era, the effect on coastal surfing resources cannot be identified for sure. Interviewees speculate that there were reef breaks at one time, whereas today there are only near shore beach breaks.	3
16. Eco-physical carrying capacity: Surfers cause a relatively low impact at the site in relation to other activities occurring at the beach, such as jet ski rentals and parasail boats. Interviewees suggest that the ecological carrying capacity for surfers is relatively high.	4
17. Hazards – marine life: No shark sightings, sea urchin or stingray problems reported. Occasional jellyfish stings occur. <i>Reverse scale (low hazard received high score)</i>	4
18. Hazards – physical: No cliffs or physical hazards on land <i>per se</i> . Key issues are the shorebreak and ocean currents. The site is known for strong currents. Approximately 4 rip currents form in small to medium sized surf (i.e. head-height waves) and may converge to form 2 large rips during high surf episodes. Rocky area in the center of the beach which may be partially submerged during high tides. Strong currents may be related to loss of reefs. Sharp transition from shallow to deep water. <i>Reverse scale (low hazard received high score)</i>	2.5
19. Quality – beach: Extensive foreshore developments fronting the surfing area and issues of encroachment by beach concessions are well-known (e.g. reported in the Phuket media). Beach litter, while a visible and daily issue, is normally gathered and removed by beach concessions in the mornings. Beach litter is better controlled than at larger beaches (e.g. Karon and Kamala).	3
20. Quality – water: Although there are no major klongs (canals) at the site, urban runoff is suspect and restaurants and hotels may be point sources of pollution. Issues of water quality may be associated with the loss of coral reefs in the past and due to the suspension of mine tailings during the surf season.	3.5

21. Surf type and quality: Multiple-shifting beach breaks. Surfable waves at all tides. Favorable sand bars develop for surfing during the surf season (May to October). However, the off season sees unfavorable sand bars for surfing (i.e. sand re-deposits on the foreshore). Waves are particularly vulnerable to onshore winds (i.e. the beach is not sheltered from the wind).	
Governance index (GovSRSI)	
22. Beach and water safety: Unstable lifeguard contracts (unpredictable presence of lifeguard services). Interviewees note significant issues of ungoverned mixed-use area (i.e. the surf zone is shared with swimmers, surfers, jet ski, etc.). Area is notorious for tourist drownings. Surfers regularly perform rescues.	2.5
23. Education and interpretation: One warning sign in the parking lot. Information at hotels and from other sources is nonexistent or very limited. Lifeguards may post red or yellow flags; however, tourists of various nationalities may not understand the meaning of warning flags or signage.	2
24. Legislative status: Although the area is well-known as a key surfing destination in Phuket, interviewees report that there is currently no legislation or governance of surfing resources or other activities, including the environmental protection of the site.	1
25. Management: The key issue at the site remains the unmanaged mixed-use area. Interviewees report that existing guidelines or standards, if any, are not enforced, particularly those pertaining to development and encroachment.	1
26. Not-for-profit organizations: Although not-for-profit activity is uncommon at the site, occasional beach cleanups may be organized by local not-for-profit and hotel-supported organizations. However, these efforts are mainly temporary remedies with limited long-term effects.	1.5
27. Public access: Access is provided by a beachfront parking area and a narrow park located in the center of the beach. The beach park is easily accessible here; however, much of the beach is overwhelmingly clustered with restaurants and hotels, which inhibit use and access.	3.5

location within the Surin National Park. Kalim Beach and Kata Noi Beach were rated equally as the lowest in governance in Phuket (1.42), performing poorly for most indicators in the index. Overall, governance scores ranked the lowest of all four indices in Phuket, with legislative status, management and not-for-profit activities rated as very low for many of the beaches, particularly at Kalim, Karon, Nai Harn and the two Kata beaches.

Figure 3 offers a diagram of the social, economic, environmental and governance indices for the nine Phuket surf sites assessed in this study.

Mean indicator values

An analysis of mean indicator values revealed strong and weak attributes in each index (Figure 4). Within the social index the weakest point is the lack of boardrider and lifesaving clubs, which normally advance communication and collaboration among surfers as stakeholders in the resource base as well as provide educational activities for youth and the community. In contrast, the strongest attribute is social experience, and this suggests that the overall practice of surfing is favorable as a conservation attribute. Surf history, which is foundational to surf site protection strategy (Farmer and Short, 2007; Short and Farmer, 2012), rates moderately, suggesting an opportunity for research and documentation in order to improve the conservation aptitude in this regard.

The economic index for Phuket indicates that the surf industry and commercial activity at sites could be better developed, particularly alongside the areas of surf amenity and infrastructure and the organization of events. Surf tourism rates moderately, suggesting an opportunity to recognize and bring awareness to this particular market segment. As the highest-ranked indicator in this index, surf-related nonmarket values should be recognized given the significant resident surfing population, particularly the expat community as identified by Martin (2010a) and Martin and Assenov (2012b, 2013).

Environmental indicators point to a relatively strong eco-physical carrying capacity at most sites alongside minimal hazards in terms of marine life, such as sharks, and these attributes indicate a relatively conducive environment for surfing activities. Beach and water quality were rated moderately, and this area is in need of improvement considering the overall high importance attributed to these indicators by Phuket surfers as identified by Martin and Assenov (2012b).

As the lowest-ranked group of indicators in the Phuket assessment, governance emerges as a key area of concern. Although management is the lowest rated, the significance of this indicator is inexorably tied to surf site legislation (Martin and Assenov, 2012b), and this suggests a need for increased attention to surf sites at an institutional level. Similarly, the lack of surf site-related not-for-profit activity and of education and advocacy for site integrity signal that there may be a knowledge gap in the understanding of the value and significance of coastal surfing resources in Phuket.

Table 3. SRSI Phuket assessment chart

	Nai Yang (Park Reef)	Nai Yang (Island Reef)	Surin Beach	Kamala Beach	Kalim Beach	Karon Beach	Kata Yai Beach	Kata Noi Beach	Nai Ham Beach	Mean
Social index (SocSRSI)										
(1) Clubs – boardriders	1.5	1.5	1.5	2.5	1	2.5	3	1	1	1.72
(2) Clubs – lifesavers	1	1	2	1.5	1	1	1	1	1	1.17
(3) History	2	2	3	3	3	2	4.5	3	3	2.83
(4) Public safety	4	4	3.5	3	4	4	4	2	4	3.61
(5) Social experience	5	4.5	4	3	3.5	4	4	3	3.5	3.83
(6) Socio-psychological carrying capacity	2	4	3.5	4	4	4	4.5	3	3	3.56
(7) Surf community	2	2	4	3	3	3	4.5	3	3	3.06
(8) Surf events	1	1	2	2.5	3	2	4	1	2.5	2.11
Mean	2.31	2.5	2.94	2.81	2.81	2.81	3.69	2.13	2.63	2.74
Economic index (EconSRSI)										
(9) Surf amenity and infrastructure	3	2	3.5	2.5	2.5	3	4	2	2	2.72
(10) Surf events	1	1	2	2.5	3	2	4	1	1	1.94
(11) Surf industry and commercial activity	2	2	3.5	2.5	2	2	4	1.5	2	2.39
(12) Surf-related nonmarket values	3	3	4	3.5	3.5	3.5	4.5	2.5	4	3.50
(13) Surf tourism	1	2	4	3	2.5	3.5	5	3	3	3.00
Mean	2	2	3.4	2.8	2.7	2.8	4.3	2	2.4	2.71
Environmental index (EnvSRSI)										
(14) Biodiversity	4	3.5	2	2	1	2	2	2	2.5	2.33
(15) Coastal engineering	4	4	3	3	2	3	3	2	3	3.00
(16) Eco-physical carrying capacity	2	4	4	4	3	4	4	4	4	3.67
(17) Hazards – marine life (<i>reverse scale</i>)	3.5	3.5	4	4	4	4	4	4	4	3.89
(18) Hazards – physical (<i>reverse scale</i>)	3	3	2.5	3	3	3	3	3	2.5	2.89
(19) Quality – beach	3.5	3	3	3	2.5	3.5	3	3.5	4	3.22
(20) Quality – water	4.5	3.5	3.5	3	2	3	2.5	4	4	3.33
(21) Surf type and quality	4	4	3.5	3	4	3	4	4	4	3.72
Mean	3.56	3.56	3.19	3.13	2.69	3.19	3.19	3.31	3.5	3.26
Governance index (GovSRSI)										
(22) Beach and water safety	2.5	1	2.5	2	1.5	2.5	2.5	2	2	2.06
(23) Education and interpretation	2.5	1	2	2	1	2	2	1.5	2	1.78
(24) Legislative status	4	4	1	1	1	1	1	1	1	1.67
(25) Management	2.5	2	1	1	1	1	1	1	1	1.28
(26) Not-for-profit organizations	3.5	1.5	1.5	2.5	1	1	1	1	1	1.56
(27) Public access	4	3	3.5	2.5	3	3	3	2	3.5	3.06
Mean	3.17	2.08	1.92	1.83	1.42	1.75	1.75	1.42	1.75	1.90
Composite index mean	2.76	2.54	2.86	2.64	2.40	2.64	3.23	2.21	2.57	2.65

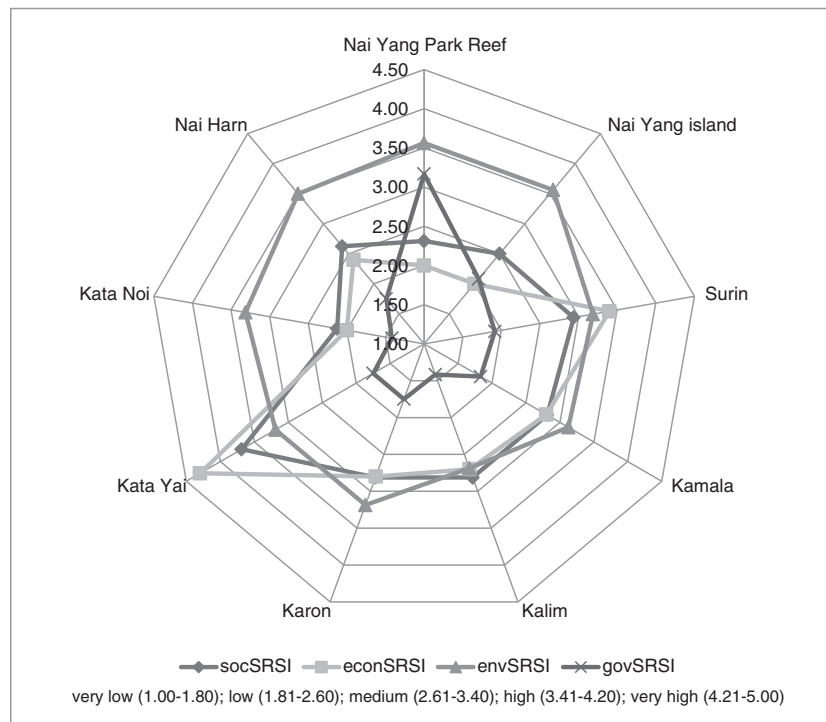


Figure 3. SRSI for nine Phuket surf sites.

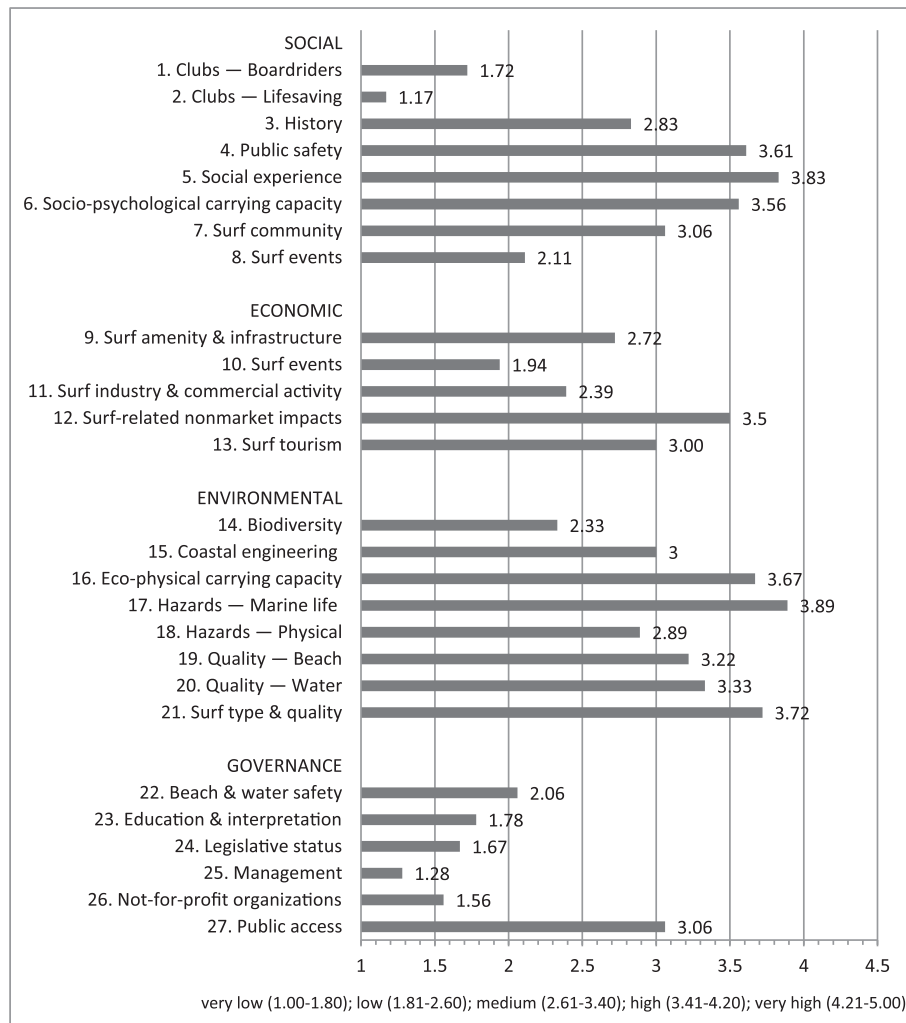


Figure 4. SRSI mean indicator values for Phuket surf sites.

IMPLICATIONS

Application of the SRSI was beneficial in two particular areas: one being the results for the conservation aptitude of nine surf sites on the resort island of Phuket and the other being the critical analysis of the SRSI method and design. Tangible benefits of the study include the potential to foster conservation policy and to discuss the potential for future applications and adaptability of the index.

Phuket case trial

Although this research provides the first in-depth application of the SRSI, the study was limited to the resort island of Phuket and therefore lacks a wider and global scope. The researchers acknowledge that small islands have an eco-system of their own, and the impacts are not similar to large coastal regions. However, as island destinations are particularly vulnerable to tourism impacts, and many islands rely on surf tourism as part of their growth strategy for adventure tourism (Buckley, 2002a, 2002b, 2006), this case was chosen as a starting point for index case trials and development.

The Phuket case application found that the assessment in a cross-sectional context (i.e. rating one beach in context with another) and fractioning of the rating scale to half numbers (i.e. '.5') afforded the assessors an opportunity to rate beaches more accurately, whereby minor variances between beaches could be discerned, and this detail could be significant when trend analysis is employed.

A significant outcome of the research is the generation of relevant qualitative and quantitative data on coastal surfing resources in Phuket. The paper designates the strengths and weaknesses in aptitude at the indicator level for individual beaches, and this knowledge can aid coastal resource managers and policy makers to better understand key issues at particular sites and take actions accordingly. For example, Kalim Beach received the lowest assessment for water quality among the nine beaches, which serves as a signal for the need to address the issue if tourism activities at the site are to continue and be sustainable. As another example, the research indicated that lifesaving clubs – which normally supply education for youths – are all but absent in Phuket, which is an indication for policy makers to seek improvement in this area.

At the index level, the research identified that the conservation aptitude of surf beaches in Phuket is only moderate in socio-economic and environmental contexts. The low rating for the governance index, which includes the key indicators for education, legislation and management, identifies that Phuket surf beaches are in less than sustainable situation – this may also be a sign that the future trend is less than favorable unless these and other indicators are adequately addressed.

The research illuminates surf sites in Phuket as integral components to the tourism industry and provides evidence of the growth of surfing activities on the island. In contrast, the awareness and understanding of the resource in Phuket trails behind the myriad issues raised by the SRSI analysis.

Methodological issues and limitations

The process of rating beaches relative to each other led the researchers to identify the need for a high level of familiarity with the physical and human attributes of each site. Although interviews with surfing community members and other stakeholders at individual beaches helped considerably in the research process, an in-depth and holistic understanding of field sites is paramount and could take several surfing seasons or years to gain. This judgment is based on the researchers' own experience, which included a five-year study of the sites listed in this research, and it is unlikely to get similar results without this level of familiarity. Thus, if assessments are undertaken by researchers with limited experience at study sites, extensive and in-depth local knowledge should be sought. This approach was developed by Lazarow (2010) who examined the importance of local knowledge and surf breaks to coastal communities. His study indicates that surfers are inevitably vital players when seeking to evaluate and manage coastal surfing resources. However, perceptive surveys based solely on surfers could lead to potential bias. In cases where previous experience and knowledge are limited, the method can be adapted to capitalize on any available knowledge from direct and tangential stakeholders, including surfers, fishers, local residents, communities and businesses. A focus group and comprehensive consultation with diverse stakeholders could prove to be productive, providing participants are familiar with the surf sites and their attributes and significance in various contexts.

When taking into account that data collection and qualified judgments for a perceptive index is extremely dependent upon the knowledge of the researchers and their approach to public surveys, key issues include the subjectivity and usefulness of the model in future applications by other researchers in alternative locations. To address this issue, the descriptive layer of the index can serve to document site attributes and aptitudes for review by third parties and can provide clarity in pinpointing the quantification process in future studies. In order to reduce subjectivity, a more detailed account is needed of exactly how judgments are made in terms of assigning numbers to each of the factors listed.

As the index encompasses 27 indicators framed in four different contexts, its complexity is a possible limiting factor in terms of the usefulness and global applicability of the model. The authors acknowledge that the exact approach adopted in this study may not be ideal when conducting research at large coastal areas or at sites that are isolated in terms of amenities and access, such as surf tourism sites accessible only by charter boats in the developing world. Thus, further research and case trials in new and diverse locations can foster the applicability and adaptability of the SRSI.

Although this study recognizes the distinct need for objective and insightful data collection and analysis, manageability of the method is foundational to the SRSI design, whereby keeping the research process relatively straightforward is central in facilitating future research to take place and expand at surf sites around the world.

Future applications and adaptability

The research indicates a need for conservation planning and codes of best practices if Phuket surfing resources are to be managed and preserved for future generations. For example, a strategy to develop 'Surfing Reserves' similar to those in Australia and the USA (Farmer and Short, 2007; Short and Farmer, 2012) could be developed for some of the surf beaches outlined in this study. The case of Australia has shown that once the surfing reserve process is initiated, petitioning new sites for protection can follow (Farmer and Short, 2007; Short and Farmer, 2012), and the SRSI could provide new impetus for policy makers to consider this type of approach. For example, given that Kata Beach has the highest social and economic aptitudes of any surf beach in Phuket, the data could provide impetus for the promulgation of the island's first surfing reserve (see Figure 5). Such designation could also spotlight indicators, which received low SRSI scores for the site, such as the governance indicators for management and legislation and the environmental indicator for water quality, and this could increase aptitudes directly as well as indirectly through increased awareness.

While surf-activism for the protection of sites was born in the not-for-profit sector, such as the *Surfrider Foundation*, *Save the Waves Coalition* and *Surfers Against Sewage* (Martin and Assenov, 2012c), governmental surf break conservation strategy is a relatively new construct. For example, at the time of writing, the first-ever 'Surf Management Plan' was put into legislative development by the Gold Coast City Council (2013), Australia, under their *Draft Gold Coast Ocean Beaches Strategy 2013–2023*:

The Surf Management Plan will recognize the importance of surfing to the City's lifestyle and economy. The plan will be developed in consultation with the community, businesses and key interest groups. It will identify and prioritize surfing research, prioritize actions to improve surf etiquette and surf tourism, celebrate our surf economy and facilitate growth in surf related information, education, recreation, management and investment. (p. 12)

As sponsor of the 2013 Global Surf Cities Conference, Gold Coast Surf City, Inc. recognized the SRSI methodology as a plausible approach to foster surf site research and policy

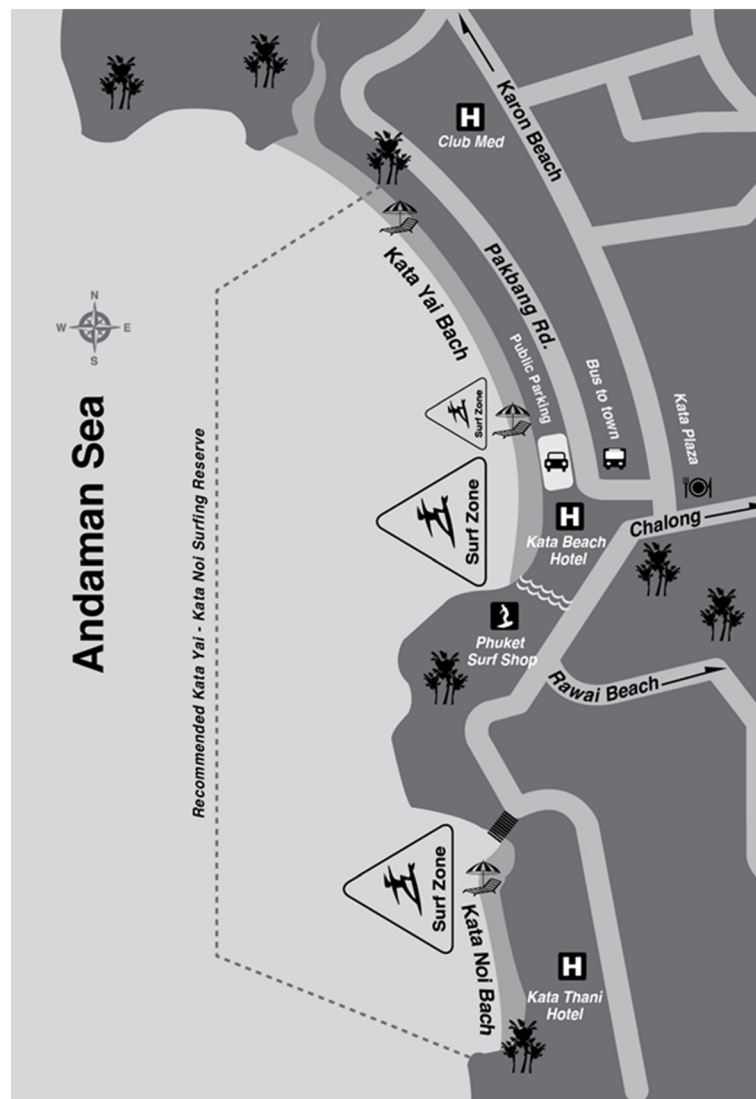


Figure 5. The Recommended Kata Beach surfing reserve.

development (Martin, 2013), whereas other potential areas of integration include collaboration with the newly formed *Center for Surf Research at San Diego State University* (SDSU Center for Surf Research, 2013). The center develops best practices in surf tourism sustainability and provides access to the SRSI methodology.

CONCLUSION

The SRSI process can provide qualitative and quantitative assessment of surf site conservation aptitude. In new and developing surf tourism destinations such as Phuket, the systematic rating of surf beaches through the SRSI framework is a plausible approach to developing conservation knowledge of coastal surfing resources. This is due in part to the recent development of surfing activities on the island and given the relatively low level of awareness for the research base at local government and community levels. Through appraisal of the 27 key surf site attributes at nine beaches in Phuket, relative strengths and weaknesses become visible and signal opportunity to address a variety of sustainability issues. Thus, the data-driven SRSI methodology offers a pragmatic and objectively-arrived way of generating qualitative and quantitative information placed into an easy-to-manage framework.

The conservation of coastal surfing resources has the potential to spawn cultural heritage, protect habitat, improve coastal resource management and offer immediate benefits to the physiological and psychological wellbeing of individuals. In this way, the community and the tourism industry benefit greatly from recognizing and appreciating surfing resources. Conversely, increased use, crowding, pollution and coastal development all pose significant risks, which if not proactively addressed will degrade these resources. The attributes and risks to surf sites have been highlighted in this research alongside opportunities to maintain and enhance surfing resources through innovative research design in environmental management, such as the SRSI. By working cooperatively with various stakeholders to identify, document and measure coastal surfing resources and to recognize and seize conservation opportunities, surf management planning can help Phuket and other surfing destinations to maintain surf site integrity, to benefit local communities and to support the wider tourism industry.

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