

Shore & Beach

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— A dedicated issue —
**Shore protection
and surfing**

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One of Southern California's premier natural surf breaks, Lower Trestles is formed by the cobble remnants of a former delta of the San Mateo Creek. Trestles is one of the most heavily used surfing areas in the United States. (Photo: Craig Coppola.)

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Dropping in: A case study approach to understanding the socioeconomic impact of recreational surfing and its value to the coastal economy

By

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ABSTRACT

Surfing is a major recreational and economic activity involving intimate human relationships with diverse coastal environments. Over the past three decades, surfing has expanded both in intensity in traditional locations, and in reach into new environments often in the developing world. As a result, surfing requires an increasing use of coastal resources. Surfing has substantial economic and social value to various regions necessitating a pivotal role in coastal planning and management regimes now and into the future. While there is a growing literature on the value of surfing tourism, especially in the Indo-Pacific region and surrounding the development of artificial surfing reefs, there is little documented evidence of the value of recreational surfing in more traditional locations such as Australia and the United States. Over 2.5 million Australians and 3.5 million Americans are reported to surf on a regular basis. With increasing participation, surfers are likely to be more involved in conflicts with other users and coastal activities. Understanding the value of surfing relative to other recreational activities and resource requirements highlights and can

transparently help resolve such conflicts. This paper describes the types of impacts that might affect surfing and then provides an overview of our current understanding of the socioeconomic value of surfing. Not enough is known about surfing to ensure that surfing issues are adequately considered in coastal planning and management decisions. Results of a study into the market and nonmarket values of surfing at Bastion Point, Kirra, and South Stradbroke Island, as well as a national survey in Australia, and national surveys in the United States and Chile are presented and compared with existing studies. Surfing amenity is found to have significant economic, social and cultural importance. Being able to clearly articulate and measure changes in recreational amenity is paramount for improved decisions over the use of coastal environments. Alongside more familiar costs and benefits, there is a need to consider any negative impacts on surf breaks and the natural environment that may occur as a result of planning, development, and coastal protection works.

A lifestyle by the coast represents something more than the prospect of food, clothing, and shelter — it has become synonymous with the modern dream in so many nations. Indeed, Dutton (1985) writes, “the tradition of Australians at the beach, in its many ways, is of profound importance to the national character.”

Surfing has its origins deep in the roots of a number of Pacific cultures including Hawaii, Polynesia, and Peru, and recorded surfing events date back many hundreds of years (Young *et al.* 1994). Kampion (2003) writes that the history of modern surfing, however, can be traced to Hawaii at the start of the 1900s where after being almost wiped out due to the strict rules of

ADDITIONAL KEYWORDS:
Coastal management, surfing, socioeconomic impacts, Total Economic Value (TEV), market value, nonmarket value, decision-making.

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the Protestant missionaries, surfing found a renaissance thanks mainly due to it capturing the enthusiasm of a number of Haole (white people or foreigners). Kampion (2003) and Young *et al.* (1994) report that surfing was introduced to mainland U.S. (Redondo Beach, California) in 1907 and to Australia (Freshwater Beach, New South Wales) in 1915.

The period after World War II and through to the early 1960s saw an evolution in surfing. The development of lighter materials for board design, including the use of hollow boards, foam, and fibreglass in the construction process as well as the refinement and affordability of both boards and wetsuits made surfing accessible to more people. At the same time, roads were being improved, freeways built, and cars became cheaper, making travel to surf destinations both more affordable and easier. From the early 1960s onwards, surfing was also popularized through Hollywood movies such as “Gidget” and the music of Dick Dale and others. The “fad” of surfing had now become mainstream and crowds

Table 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.	<ul style="list-style-type: none">• Construction of coastal protection/amenity structures (e.g. groins, seawalls, piers, seawalls, river walls, breakwaters, artificial reefs)• Sand management (e.g. beach fill, dredging, sandbar grooming)
Wave frequency	"Surfable" waves measured against an accepted standard	
Environmental	Environmental or biophysical conditions that may mitigate against a surfers' physical health	<ul style="list-style-type: none">• 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)• Legislative/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-fulfilment• Local aesthetic
Experiential	Societal conditions surrounding the surfing experience.	

flocked to the beach to watch and take part in surfing.

While there are a number of studies that describe participation in and the importance of surf tourism in the Indo-Pacific and Central American regions (Buckley 2002a, 2002b; Dolnicar and Fluker 2003; Madrigal Calvo 2006; Ponting 2005) to date, there has been very little academic investigation globally into the socioeconomic value of surfing at major surf destinations by weight of numbers of surfers. A possible reason for this is because surfing is typically viewed as a recreational pastime, one traditionally thought of outside of serious academic consideration. Nevertheless, there are many millions of surfers in mainland U.S., Australia, and Europe whose activities and lifestyle contribute significantly to the socioeconomic well-being of the communities they live in and visit.

This paper focuses on developed areas such as the west coast of the U.S. and the east coast of Australia, where surfing effort is intermixed between both local and visiting surfers and other recreational users of the marine and coastal environment. This is a highly contested space

with many groups and individuals competing for access and preferential use rights to the sand and the nearshore zone and as Table 1 describes, surfing quality or the surfing resource can be impacted on in a number of ways, both environmentally (Challinor 2003; Kelly 1973) and culturally (Booth 1995, 2001; Nazer 2004; Preston-Whyte 2002). These impacts in turn also significantly affect the socioeconomic well-being of communities that have a strong relationship with the beach (Lazarow 2007).

The concept of "surfing capital" was first introduced into the literature by Lanagan (2002) who suggests that it refers to the symbolic ownership of the sport, which has been captured from local surfers and beaches through the commodifying business practices of the global surfwear industry. Surfing Capital, however, can be described more broadly to include a range of issues that may affect surfing and the surfing experience such as: wave quality and frequency (e.g. Challinor 2003; Corne 2007; Nelsen 1996; Scarfe 2007); environmental issues including water quality (e.g. Booth 2001; Chapman and Hanemann 2001; Surf rider Foundation

2007); resource management issues such as recreation demand management (e.g. Manning 1999, 2004) and serious leisure (e.g. Stebbins 1979); and sociocultural issues such as local identity (e.g. Kelly 1973; Nazer 2004; Preston-Whyte 2002). A more comprehensive typology of Surfing Capital is presented in Table 1, which identifies the range of issues and values that should be considered when discussing impacts to surfing.

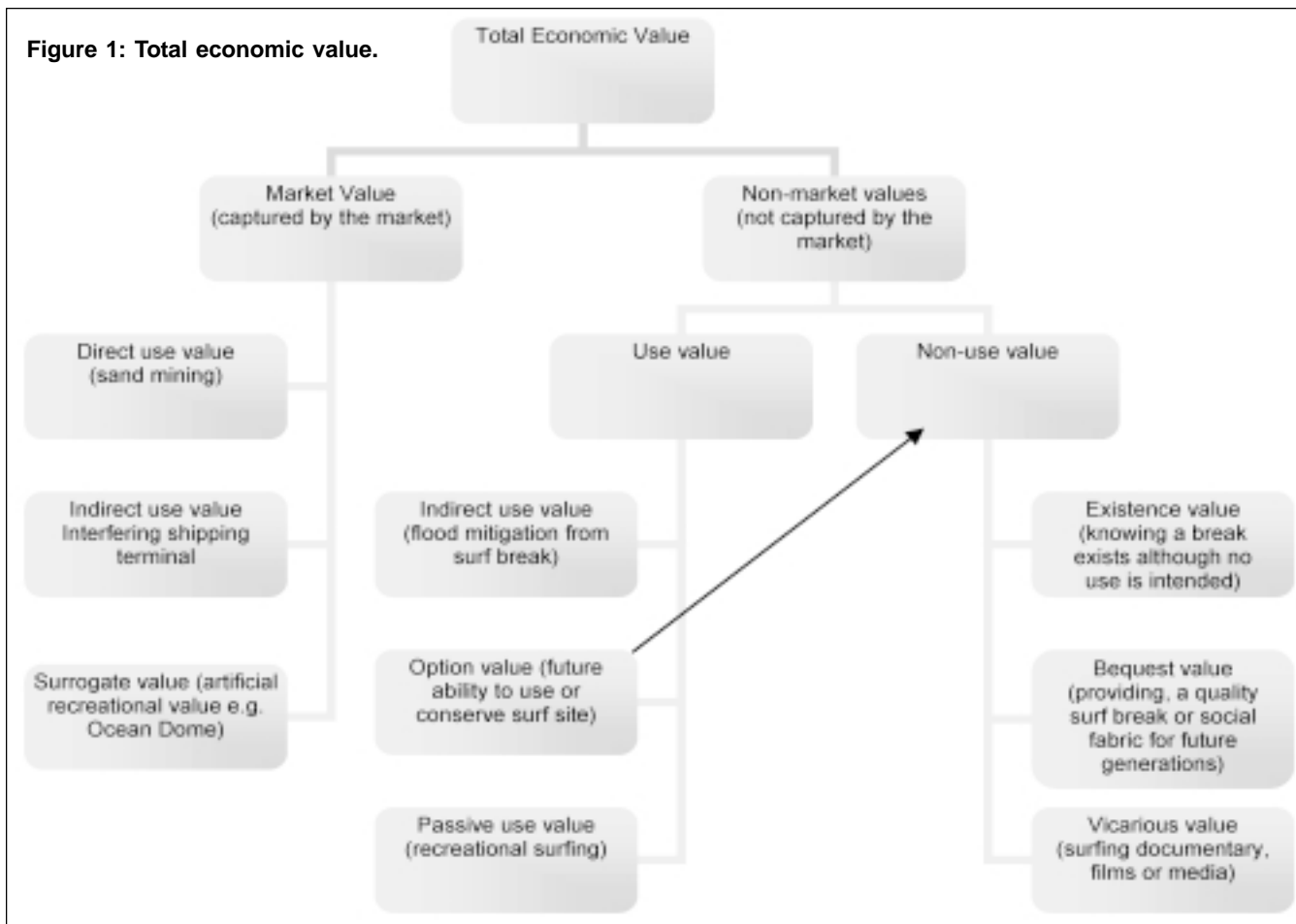
COMPARISON OF FISHING AND SURFING

While there are many similarities in the behavior and activities of fishers and surfers, there are also some differences. These differences have much to do with acceptability; place in society; organisation; culture and orientation; identification of threats or impacts to lifestyle; and broader recognition of the socioeconomic value of each activity. Fishing has been around longer, has traditionally been better connected and accepted by the general population, and has chosen to be better organized and more effective at having their issues heard. In this respect, recreational fishers have been effective advocates for the provision of access and amenities such as boat ramps, wharfs and piers and the modification of the coastline through the training and dredging of river entrances.

The cultural evolution of modern surfing has been well documented by Booth (2001) in Australia and to a lesser extent by Bouillon (2001) in the United States. Johnson and Orbach (1986) in particular present an interesting examination of the differences between surfers and fishers on the east and west coasts of the United States. In this paper, the authors argue that given the significant increase in participation in surfing and the surfing economy over the past 20 years, it may be worth revisiting this latter work.

In Australia, the break from the more regimented and accepted surf-lifesaving movement and the desire not to conform placed surfing firmly in the counterculture camp and surfers as anti-establishment and has been well described by Jaggard (1997), Booth (1995, 2001) and Pearson (1979). In the United States, surfers were for many years publicly associated with a culture of drugs and political apathy (e.g. Wolfe 1968). Today the surf industry is a serious and lucrative business and surfing has very much been incorporated into mainstream cul-

Figure 1: Total economic value.



ture through the popularity of street clothing. On a political level, surfing interests and the benefits of protecting, maintaining or improving surf quality have yet to be considered with the same degree of seriousness as recreational fishing interests. A better knowledge of the value of the coastal economy and surfing's place in it may lead to a more comprehensive understanding of the important role that surfing and the surfing industry has for local economies and communities.

There are a number of reasons for the significant differences in "political" behavior between fishers and surfers. This may be traced back to a discussion about the benefits or value of "resource use" compared to "resource extraction." Fishing (both recreational and commercial) has always aligned itself with being a productive activity that generated dollars, either in terms of catch return or money spent on participating in the activity and to this extent, recreational fishing interests (including boating) have for some time dominated the marine and coastal recreation landscape. In Australia, in particular, the federal government has in-

vested significant effort in understanding the value of recreational fishing (Henry and Lyle 2003) and much has been made of the possible impacts that a downturn in the recreational fishing industry might have on the coastal economy. Internationally, similar studies on the value of recreational surfing are very rare (Chapman and Hanemann 2001; Gough 1999; Tilley 2001), and prior to this research the only known Australian studies were undertaken in relation to the development of artificial surfing reefs.

In Australia, recreational fishers have not only formed lobby groups such as Sunfish and Recfish, but fishers have also ventured directly into the world of politics through the establishment of parties such as The Fishing Party, the Australian Fishing and Lifestyle Party and the Australian Fishing and Recreation Party. A common argument run by many in the nongovernment (NGO) sector against the need to organize politically is that it is better to work from the outside and the efforts of the Surfrider Foundation over the past 20 years, in particular in Europe and the United States, and Surfers

Against Sewage in the United Kingdom, are good examples of the powerful role that organised NGOs can have when working towards determining environmental outcomes for surfing. As the following sections of this paper will describe, the increase in participation in surfing in recent decades especially on the east coast of Australia and the west coast of the United States, leads the authors to suggest that perhaps more of a focus on surfing is now necessary.

Without being able to measure surf quality in a formal sense or to demonstrate the economic or social costs of the loss of surfing amenity such as through increasing illness related to water quality problems or the loss of amenity due to the construction of coastal protection or training infrastructure, it has been difficult to prove that there might in fact be significant costs associated with the loss of surfing amenity [the work by Scarfe (2007) on the physical fragility of surf breaks is an interesting and welcome contribution to this discussion]. To date, there has been little formal research exploring and quantifying the "significant" economic and social benefits that surfing provides to specific locales, and,

Table 2: Estimates of the value of surfing at specific locales.

Year/location	Type of study	Value	Context
1973, Oahu, Hawaii, USA	Market	\$13 million	Estimated expenditure on surfing equipment (includes medical expenses but excludes transportation)
1984-1998, El Segundo Reef, California, USA	Market	\$300,000	Mitigation settlement for loss of nearby surf break (funds used to construct world's first artificial surfing reef)
1990-1999, Los Angeles & Orange Counties, California, USA	Non-market (travel costs)	\$16 million (value of all recreational activities at location)	Final settlement for loss of all recreation opportunities for a period of up to 34 days due to "American Trader" oil spill from Alamitos Bay in Los Angeles County to Crystal Cove State Beach in Orange County
1999, Mount Maunganui, New Zealand	Non-market (willingness to pay)	\$NZ500,000 p/a	Annual new expenditure expected to be generated by an estimated 50 surfers per surfable day as a result of the construction of an artificial reef
2001, Pleasure Point, California, USA	Non-market (travel costs)	\$6.2 million consumer surplus (\$8.3 million total)	Travel cost study conducted at Pleasure Point as part of university course
2001, Cornwall, UK	Market	£21 million p/a	User survey to estimate value of surfing to Cornwall region
2004, Geraldton, Western Australia, Australia	Market	\$AUD1.3 million p/a	Estimated value of proposed artificial surf break to town
2006, Costa Rica	Market	\$400 million p/a	Survey of total expenditure of surf-related visitation
2008, RonJon Surfpark, Florida, USA	Construction cost	\$12 million + land + permits	Construction cost for the RonJon Surfpark.

SOURCES: (Chapman and Hanemann 2001; Gough 1999; Kelly 1973; Madrigal Calvo 2006; Nelsen 1996; Ove Arup and Partners International Ltd 2001; Rafanelli 2004; Ron Jon Surfparks 2007; Surfrider Foundation 2002).

unlike other sports such as recreational fishing, surfing has not been able to use the weight of economic or social welfare evidence to argue for the maintenance or improvement to surfing amenity. For example, in the early 1970s, Kelly (1973) estimated that Hawaii's 75,000 surfers spent approximately \$13 million (approximately \$61 million in 2007) over a 12-month period on surfboards and surfing equipment within the Hawaiian economy. The direct income for the government over a 10-year period from taxes levied on surfing activities was estimated to be approximately \$5.1 million (\$24 million in 2007). The only state funds known to have been spent on surfing at any time were \$123,500 (\$580,000 approx in 2007). Kelly compared this to the \$95 million (\$445 million in 2007) spent or planned for construction and improvements of harbours and facilities to improve recreational boating amenity for the state's 11,000 boat owners. While boat owners spend significantly

more than surfers, Kelly (1973) reported that most of the initial money (i.e. boat purchase) was spent out-of-state and that the imbalance in priorities for recreational needs was obvious. With few exceptions this situation remains today.

PARTICIPATION IN SURFING

Over the past decade, a number of attempts have been made to estimate the total number of surfers globally. Estimates range from around 10 million (Buckley 2002a) to 17 million (Atkins 1997). Buckley suggests that participation is likely to be increasing at 12%-16% per annum, which indicates that the global surfing population in 2007 is somewhere between 18 million and 50 million people.

In Australia and the United States there is detailed information about participation in outdoor recreational activities, however, there are large differences between some of the reports. The Aus-

tralian Bureau of Statistics (ABS) estimated the total number of Australians who participated in surf sports for the 2005-2006 year to be 269,700 (Commonwealth of Australia 2007a). Surf sports included surfing and windsurfing but not surf-lifesaving, which is accounted for separately. Based on ABS population census data from June 2006, this equates to approximately 1.7% of the total population. This is a reduction in participation from 2.1% or 290,000 in 2000 (Commonwealth of Australia 2000a, 2000b). Compared to other activities of an aquatic nature in Australia, the ABS reports that participation in surfing is second only to swimming; slightly higher than fishing; and greater than ice and snow sports; waterskiing and power boating; sailing; canoeing or kayaking; scuba diving; and surf-lifesaving, in that order.

Interestingly, the ABS (Commonwealth of Australia 2007a) reports that 27,000 surf-lifesavers participate in organized sports, compared to 8,300 participants in organized surf sports. This contrasts with a zero participation in non-organized sports for surf-lifesaving compared to 242,800 for surf sports. The high number of surfers participating in non-organized sports is important in two respects: firstly, the predominantly unorganized and unregulated nature of surfing means that surfing issues have largely remained invisible in coastal planning and management; and secondly, it casts some doubt on the ability of the ABS survey to fully capture and verify participation in surfing. For example, participation rates reported by the ABS are significantly lower than those produced by the Sweeney Report (Surfing Australia 2006), an independent market research study that specializes in data collection on participation in adventure sports in Australia. The Sweeney Report found that national levels of participation in surfing (as opposed to surf sports) have ranged from 9% to 14% since 1988, when the organization first started collecting data. In 2005-2006, national participation was estimated to be 12%, down from 14% the previous year (Surfing Australia 2006). Based on the population census in June 2006 (Commonwealth of Australia 2007b), this would equate to approximately 2.5 million surfers in Australia. The Sweeney Report only collects data in capital cities and participation in regional Australian centers known to

have significant surfing populations such as the Gold Coast, Sunshine Coast, Newcastle, Wollongong, Torquay and the Margaret River region is likely to be significantly higher than the national average. In response to the consistent differences between the two datasets, the ABS (Commonwealth of Australia 2001) produced a report that presents possible reasons for the observed differences in the statistics. The report concludes that because of the “extensive differences in the scope, coverage, methodology and question wording” of the two pieces of research, there are likely to be differences in the reported results and that “users should determine the value of each in relation to their specific data needs and the questions they want answered” (Commonwealth of Australia 2001).

The U.S. government (Leeworthy *et al.* 2005) has reported that participation in surfing rose from 3.4 million to 3.6 million from 2000 to 2005 and is estimated to grow to 3.8 million by 2010. This equates to a 13.1% increase in participation over the 10-year period, but no overall increase in the percentage of the population that surfs.

At this stage, it is useful once again to compare surfing and fishing. The ABS (Commonwealth of Australia 2007a) reports that more surfers go surfing more often than fishers: 50% of fishers go fishing more than 53 times per year, compared to over 77% of those involved in surf sports. Across the United States, research (Leeworthy *et al.* 2005) indicates that there will be significant increases in both surfing and fishing effort up to 2010, with the number of surfing days growing from 75.2 million in 2000 to an estimated 81.9 million in 2010 and recreational fishing effort growing from 267 million days in 2000 to an estimated 282.6 million days in 2010, the sports increasing by 13.1% and 12.1% respectively over the 10-year period. In California, however, surfing days as a percentage of the total surfing population, is significantly higher than recreational fishing days compared to participation rates. Leeworthy and Wiley (2001) report that in 2001 in California, 1.1 million surfers went surfing 22.6 million times, whereas 2.7 million fishers went fishing 20.3 million times. In perspective though, surfing and fishing make up only 25% of total estimated beach visitation days in California, where Pendleton and Kildow (2006) report that in 2006 there were an

Table 3: Value of a surf session.

■ **Market evaluations**

<u>Year/location</u>	<u>Item</u>	<u>Value</u>	<u>Value descriptor</u>
2006, Trestles Beach	Online survey instrument to determine existing user spending	\$US40.16 spent locally during each surfing season	Expenditures to local city during surf visit, including fuel and food. Does not include gear purchased outside of visit.
2007, Ron Jon Surfpark, Florida	Entrance fee	\$30-\$60	Individual surf session = \$60 for a two-hour session. Annual membership = \$3,000, which gives the user up to 100 sessions. Does not include equipment or travel costs.
2004, Orewa Reef, New Zealand	Estimated new daily expenditure by surfers on goods and services	\$31 approx.*	Approximate daily expenditure by extra surfers drawn to region as a result of construction of reef. Does not include equipment or accommodation costs. However, it is noted that surfers in that area are unlikely to use paid accommodation.
2004 Geraldton, Australia	Existing daily expenditure by visiting surfers	\$118*	Survey to determine existing expenditure and possible future benefit from construction of artificial reef. Includes equipment hire and accommodation costs.
2006, Costa Rica	Estimated new daily expenditure by surfers on goods and services	\$122	Survey of total expenditure of surf-related visitors. No information on expenditure provided.

■ **Non-market evaluations**

<u>Year/location</u>	<u>Item</u>	<u>Value</u>	<u>Value descriptor</u>
1997, Los Angeles & Orange counties, California, USA	Contingent valuation study (travel cost)	\$22*	Non-market evaluation — estimated consumer surplus for surf visitation per person per session (does not include equipment).
2001, Pleasure Point, California, USA	Contingent valuation study (travel cost)	\$122 (approx.)	Non-market evaluation — estimated consumer surplus for surf visitation per person per session (includes equipment).

SOURCES: (Chapman and Hanemann 2001; Gough 1999; Nelsen and Pendleton 2006; New Zealand Tourism Research Institute 2004; Rafanelli 2004; Ron Jon Surfparks 2007; Tilley 2001).

* Amounts have been recalculated as 2007 dollars using the U.S. Department of Labor Inflation Calculator (<http://www.bls.gov/cpi/>)

estimated 150-378 million beach visitation days. No similar work has been undertaken in Australia.

Surfing, however, takes place in many more locations than just Australia and the United States and is expanding both in intensity in traditional locations as well as in reach into new environments often in the developing world. For example, Atkins (1997) stated that surfing was practiced in over 70 countries with more than 2 million surfers in Japan, more than 1 million in Europe and almost 2 million in South America; however, these figures have not been verified.

The number of surfers visiting a particular beach or surf break at any given

time can be calculated in a number of ways: by asking surfers how many other board riders they see when they surf; by counting surfers manually or beach visitors electronically (cameras or laser counters); or by using local authority (usually lifeguard) information where that is available. To suggest that it is relatively simple to count the number of surfers at a beach, however, says little about the cost, logistics or accuracy involved in generalizing the data over time (e.g. a season or a year) or across localities. Perhaps the best example of an investigation into participation at the regional level is the use of nonmarket methods to estimate the value of lost recreational opportunities, which included surfing, as

Table 4: Average annual expenditure per surfer (\$)

Location	Sample size (N)	Equipment (wetsuit, board, leash, wax, deckgrip etc.)	Travel (accommodation, camping, travel, fuel, food)	Total
Gold Coast, Australia	162	\$877	\$2,211	\$3,089
Australia	207 (includes Gold Coast data)	\$888	\$2,460	\$3,349
USA	169	\$700	\$2,197	\$2,897
Chile	52	\$509	\$1,319	\$1,828
Buckley (2002a)	-	\$300-\$500 (2007=\$350-580)	\$300-\$500 (2007=\$350-580)	\$700-\$1,160*

* Estimation only

a result of the American Trader oil spill off Los Angeles in 1990. Throughout the ensuing court case significant attention was given over to the techniques surrounding how beach usage and “lost recreational opportunities” were calculated. For example, Chapman and Hanemann (2001) write that the defendant contested the plaintiff’s figures on beach visitation and recreational activities that were supplied by the city lifeguard service on a number of grounds. Ultimately, the plaintiffs undertook what they describe as a “careful, ground-based count of beach attendance using observers to count people as they arrived.” The researchers included a number of sampling techniques, including specific counts for surfers to avoid double counting and to account for repeat visitors on the same day. When compared with the lifeguards data overall for all beaches, it was found that the lifeguard count for beach attendance exceeded the surveys by 9.4%.

At the local scale three studies report on surfing effort at individual beaches. Tilley (2001) reported that there are approximately 60,000 individual surfing days per year at Pleasure Point (Santa Cruz, United States). Nelsen (Lazarow and Nelsen 2007) reported approximately 330,000 surfers visited Trestles (San Clemente, United States) in 2006. As part of this research project into surfing effort on the Gold Coast, a survey of surfing effort at South Stradbroke Island (Gold Coast, Australia) was undertaken. Surfers were asked to estimate how many surfers they saw each time they surfed at this beach and on average how many surfers they estimated surfed at the beach each day. At South Stradbroke Island, it was estimated that 11,500 individual surfers visit the beach approximately 64,000 times per year specifically to surf. At each of these three surf breaks, the researchers report that it is not uncom-

mon for over 400 surfers to visit the surf break each day when conditions are favourable.

PLACING A VALUE ON THE ENVIRONMENT, THE BEACH AND SURFING

As a standalone activity, Buckley (2002a) suggests that there are three techniques that could be used to ascertain the value of the surfing: the value of the surf-wear industry; manufacture of equipment; and surf travel. While the categories are vital to understanding the value of surfing, for the purposes of coastal planning and management and identifying and managing the surfing capital issues listed in Table 1, it is necessary to capture a broader set of values — and this can be done using the Total Economic Value (TEV) framework, as described in Figure 1. Only in recent years have scholars and government turned their attention to understanding the full market and non-market value of coastal and marine resources. A standout example of this is Costanza *et al*’s. (Commonwealth of Australia 2002) use of the TEV framework to conduct an assessment of the value of the globe’s marine and terrestrial ecosystems (e.g. existence value and bequeathment value of resources). The principle behind TEV is that environmental goods and services have both market and nonmarket values and that both should be taken into account when attempting to manage coastal resources.

Pendleton and Rooke (2006) write that market impacts are usually assessed by examining how much money people contribute to the economy through spending related to access, equipment and goods and services in a particular area. Commonly, the focus of market based studies is on gross expenditures. Nonmarket valuations, as described in Figure 1, are generally collected in two

ways: either through revealed preference or stated preference models. Revealed preference models rely on behavior or activities that have already taken place, that is, what people spent while undertaking a particular activity. Stated preference (or contingent valuation) models are opinion based, that is they rely on a stated rather than a revealed preference. On the positive side of things, this means that contingent valuation studies are able to capture both use and non-use values such as the existence value of a particular mountain or surf break, however, the techniques have been criticized for this also.

Some uses related to the environment, the beach and surfing are viewed in market terms, even though a market for these goods and services does not really exist. Some goods and services do not have a market value or have a value to society that cannot be adequately expressed in market terms. Some of these are crucial to the maintenance of a healthy society and its economy. Surfing is one of these. Even where an individual does not surf, they may see the benefits to others and to future generations and society from doing so. These values may be termed non-use values and include option, bequest, existence and vicarious values. As can be seen in Figure 1 much of the value of surfing is not and may never be translated through use values or market values.

For example, Pendleton and Kildow (2006) point out that while the market expenditures by beachgoers in California could substantially exceed \$3 billion each year, the value that day users place on access to the beach beyond what they pay in terms of travel costs, parking fees and tolls (the nonmarket value) is substantial and is estimated to range from \$2.25 billion to \$7.5 billion dollars annually. Similar estimates in Australia for beach recreation values at Mooloolaba beach in Queensland have been estimated at between \$AUD153 million and \$AUD862 million annually (Blackwell 2007). The non-use, nonmarket values are yet to be estimated for beaches and surf breaks in Australia.

While scholars in the United States have made significant progress in determining the market and nonmarket value of the coastal economy through the National Ocean Economics Program (National Ocean Economics Program 2007)

and at a more local level, the Southern California Beach Valuation Project (National Oceanic and Atmospheric Service 2006), formal knowledge of the non-use values of beaches is generally poorly understood and considerably lacking in Australia and is seldom used in the decision-making process.

In an interesting study that attempted to estimate the loss to both the California and U.S. economies should beaches cease to exist in California, King and Symes (2004) argued that with no beaches, California would lose \$5.5 billion in gross state product annually, while the U.S. economy would lose \$2.4 billion in gross national product annually. This indicates that while there would be some substitution amongst users of other beaches within the United States, there would still be significant losses to both the state and national economy as “beach lovers” seek out “beach” experiences in other countries. The direct losses in annual tax revenue to California are reported by King and Symes to be \$509 million compared to an estimate of \$12 million to \$18 million per year for shore protection works (it is not clear whether “shore protection works” would have a neutral, positive or negative impact on surf quality). The concept of substitution in this form, however, has been challenged by Buckley (pers. comm. 2007), who suggests that over time a different type of recreational user is likely to replace the “lost” beach user resulting in much lower levels of substitution.

THE VALUE OF THE SURF INDUSTRY

As well as the established markets in the United States, Europe and Australia, there is strong anecdotal evidence to suggest that surfing is making headway into emerging or growing markets in Asia and also South America through the growth of surfwear and equipment sales. While there is no global dataset that provides an indication of the value of the surf industry, a number of approximations can be made from what data there is publicly available. The Surf Industry Manufacturers Association (SIMA), the trade association of competing surf industry product suppliers in the United States, reports that the (U.S.) surf industry had grown from \$6.52 billion in 2004 to \$7.48 billion in 2006 (an increase of 14.5%) (Surf Industry Manufacturers Association 2007). Of the surfwear companies, it is commonly assumed that Quiksilver,

Table 5: Socio-cultural consequences resulting from the loss of a surf break.

- Decrease in trust in government and loss of local sovereignty.
- Increased negative social impacts on other already crowded surf breaks.
- Increase in criminal behavior with bored youths.
- People may turn away from surfing and aspects of a healthy lifestyle, which would mean increased longer-term health costs for the community.
- Surfing provides a significant mentoring and intergenerational co-learning experience.
- Loss of self-worth and potential opportunities.
- Negative impact on local and visitor perceptions.
- A local surf break may be the only recreational amenity facility that youth can access quickly and safely.
- Beaches and surf breaks often present the only access to “public space” in highly urbanized areas.

Billabong, Rip Curl and O’Neill hold the majority of the market share. Both Quiksilver and Billabong are now publicly listed companies, Quiksilver in the United States and Billabong in Australia. Billabong’s 2006-2007 financial report states that revenue from continuing operations was \$1 billion and total consolidated assets are valued at \$1.25 billion (O’Neill 2007). For the 2005-2006 period, Quiksilver’s net revenue was approximately \$1.8 billion and their total assets were valued at approximately \$US2.1 billion (McKnight Jr. 2006).

In 2005-2006, Quiksilver Inc.’s sales distribution was reported as being 46% in the Americas, 43% in Europe and 11% in the Asia-Pacific region (McKnight Jr. 2006). In 2006-2007, Billabong’s sales distribution was 49%, 21.5% and 29% for the same regions respectively (O’Neill 2007). Based on these figures, it is conceivable that the market outside of the United States is at least equal to if not larger than the U.S. market, which would place a conservative estimate of this component of the surf industry alone at close to \$15 billion.

As well as the surfwear industry, a number of attempts have been made to understand the value of the surfing (equipment manufacturing) industry in particular locations, for example the Gold Coast and Newcastle in Australia; however, the studies mainly focus on the capacity of industry to consolidate and then upscale, and the information on actual production remains somewhat limited and is often not publicly available (Australian Sport International Limited 2002; Giles Consulting International P/L 2002). In addition, there are now over 70 registered surf schools as well as a growing number of surfari tours on the

east coast and in the southwest of Australia. The value of these businesses should not be discounted.

TRAVEL AND EXPENDITURE STUDIES

Buckley (2002a) suggests that expenditure by individual surfers can be divided into two broad categories, money spent on equipment and money spent on travelling. This expenditure can take place locally or when a surfer travels some place else to go surfing, or both. Where surfers travel within or between major continental destinations which are popular for a wide range of visitors including beach visitors, Buckley (2002a) states that this travel is generally not differentiated specifically as surf tourism, so its economic scale and value remain hard to determine. This can be differentiated from travel to destinations, which have been established to cater specifically for the surf tourist, including surf charters or surfaris.

Two broad types of travel and expenditure studies have been undertaken to date: studies that are concerned with describing the value of surfing in particular locales (see Table 2) and studies that describe the value of a surfing session (see Table 3). A surfing session is a one-day activity and its value includes the costs associated with going surfing on any particular day. This generally involves going to one location on one day, but may also involve going to multiple locations on one day. This latter phenomenon is characteristic of a surfer who regularly travels to multiple locations on any given “surfing day” in order to search out the best waves or surfing experience, which may for example involve lesser quality but more uncrowded waves or be in response to prevailing weather and tide conditions.

While many of the studies are worthwhile, comparisons between locations, with other possibly competing activities or over time is made difficult because there is often a lack of consistency in the way in which data is collected or it is reported in a nonstandardized manner. Pendleton and Kildow (2006) argue similarly in their comparison of nonmarket valuations of beach visitation studies in California. For example, the study by Kelly (1973) considered both market expenditures and taxation revenue raised through surfing related purchases on Oahu (Hawaii), whereas the El Segundo (California) and American Trader (California) studies attempted to place values on lost recreational opportunities and what an appropriate mitigation value might be, albeit in quite different ways. These latter two cases in particular demonstrate that in the United States at least both the state and private organizations are willing to take legal action in the event of damage and destruction to surf breaks.

At El Segundo, Surfrider Foundation opposed a permit granted by the California Coastal Commission for the construction of the El Segundo Groin by Chevron Corporation, arguing that the groin would negatively alter the surf in the area. The Coastal Commission took this objection into consideration and held Chevron liable for the surf conditions by adding a condition to the permit that required monitoring and mitigation if the surf was degraded. Surfrider Foundation was able to demonstrate a decline in surf quality and it was determined that Chevron was to be responsible for a surfing enhancement project that would attempt to restore a surf break in the project area by creating an artificial reef. The mitigation agreement at El Segundo represented a value specifically for surfing and was the estimated cost of constructing an artificial reef as a trade-off for the surf break that was destroyed due to the construction of a groin to protect an oil pipeline. By agreeing that restoration of the surf required the construction of a reef to mitigate for the loss of surf resulting from the construction of the groin, the California Coastal Commission recognized surf as a natural resource with recreational potential worth preserving. The reef has been mostly unsuccessful as a surf break and raises questions about whether mitigation, in the form of providing a new "artificial" surf break, should be considered an acceptable trade-off in the interests of other development priorities.

In the American Trader case, surfing

was considered a significant recreational activity to have been affected as a result of an oil spill for which the state of California sought compensation. The court case is well described by Chapman and Hanemann (2001), and saw in favor of the state of California with a final settlement in the amount of \$16 million (approx \$20 million in 2007) for the loss of recreational use (of which surfing was a part) and enjoyment of a section of the Californian coastline that had been affected by the oil spill. The costs for environmental damages were settled out of court.

The studies from Cornwall (United Kingdom), Geraldton (Australia), Orewa (New Zealand) and Costa Rica used face-to-face surveys to collect market information to estimate the value of surfing at those locations and this information was then used to make approximations of the value of surfing for the areas under consideration. At Cornwall, 69 surfers at four different locations were interviewed about their spending habits in relation to surfing and this information was used to estimate the value of surfing to the Cornish economy. In Geraldton 229 people were interviewed, of which there were 111 local and 27 "out of town" surfers. At Orewa, a total of 464 beach users were surveyed, however, only 20 people indicated that they had come to the beach to surf. At Pleasure Point (Santa Cruz, United States) 111 face-to-face surveys were completed as part of a nonmarket evaluation and at Trestles (San Clemente, United States) almost 1000 interviews were collected using a Web-based survey. Nelsen (pers. comm. 2007) believes that by targeting surfers through an online survey, the strategy may have automatically excluded a particular section of the demographic.

In a survey of visitors through two of its three international airports, the Costa Rican Tourism Institute (Madrigal Calvo 2006) reported that in the first half of 2006, more than 100,000 visitors came to Costa Rica with the intention of surfing. Each visitor stayed an average of 17 days and spent an average of \$2,074, generating a total of \$207 million over the six-month period, equivalent to \$414 million over a year. Murphy (2007) however, suggests that there may be some discrepancies in the way the data on visitation was reported as it is not clear whether there were 1,076 visitor surveys in total or whether the total number of surfers interviewed was 1,076, however, this is

currently unsubstantiated. Information on the total value of the tourism industry to Costa Rica for 2006 is currently unavailable; however, the total value for the 2005 year is estimated to be \$1.6 billion (Camara Nacional de Turismo 2007). This suggests that surfing related activities account for approximately 25% of Costa Rica's tourist economy and makes surfing more valuable than coffee (\$232 million) and slightly less than the banana industry (\$481 million) in terms of its importance to Costa Rica.

As can be seen from the information presented in Table 2, a key determinant in comparing information on the value of surf sessions is being able to understand the data collection strategy and the reliability of the information. Even when survey strategies are standardized, there may still be problems with the manner in which the data is reported. For example, there is \$100 difference per surfer per session in consumer surplus between the Pleasure Point and American Trader studies which arguably take place in areas where the user demographic is quite similar. Furthermore, data may be collected in a format that makes it incomparable with other activities.

ARTIFICIAL REEFS AND SURFPARKS

As well as the market studies described above, there has been a tendency for artificial reef proposals to be described in terms of a benefit to cost ratio as this provides a snapshot of the overall significance of a project that has a range of physical, environmental, social and economic impacts (New Zealand Tourism Research Institute 2004; Weight 2003). This method was first used by Raybould and Mules (1998), who summarised the benefit to cost ratio for the Narrowneck artificial reef (Gold Coast, Australia) as being 60:1. In other words for every dollar spent on constructing and maintaining the reef, approximately \$AUD60 would be returned to the economy through increased visitor expenditure. Raybould and Mules, however, did not quantify the benefit to the economy as a result of improved surfing conditions at Narrowneck, nevertheless many proponents of artificial reefs have used this reported value as an industry standard when promoting new surfing reefs.

An interesting comparison that the artificial reef studies make is the approxi-

mate number of new surfers that might be attracted to the region for each new surfable day. At Mount Maunganui, Gough (1999) reports this figure as 50, whereas Rafanelli (2004) reports that the reef at Geraldton will attract a total of 24,600 new surfers to the region each year. As well as this, many of the existing 67,850 visitors are expected to want to try out the reef. There are, of course, other quite direct benefits from the construction of artificial reefs such as naming rights and projected revenue from competitions and these are described in the Western Australia study. As well as the direct benefits, that study also described a number of indirect economic benefits associated with the construction of the reef such as nearby property price increases, new business opportunities (mainly in the service industry) as well as a series of social benefits associated with the creation of new public good recreational amenity infrastructure such as increased recreational and healthy lifestyle opportunities (see Table 5). Few, if any, negative impacts are reported. This is common to many of the artificial surfing reef proposals (Lyll Bay Surf Reef 2003; New Zealand Tourism Research Institute 2004; Rafanelli 2004).

The RonJon Surf Park in Orlando, Florida, is due to open in 2008. The total cost of the project is approximately \$15 million (Black pers. comm. 2007) and provides an interesting benchmark as to the value of a surf break. Entry costs for the park, as described in Table 3 are priced to compete with nearby theme parks and not the cost of going surfing; however, prices fall within the range described in Table 3.

BENEFITS OF STANDARDIZED DATASETS

The wide range of data collection techniques and reporting methods make it difficult to attempt to compare many of the reports on the value of surfing at various destinations. In the American Trader case, both parties agreed that nonmarket valuation methods were the correct tool to measure the loss, however there was disagreement on the particular technique and the interpretation and reliability of data. The final ruling on this case provides a high level of confidence in terms of reliability of standardized data collection strategies and the estimated values as there was significant scrutiny over both the methods used and the data reliability, which are consistent with

many other nonmarket (non-surfing) studies.

At the local level both market and nonmarket studies have been undertaken. Table 3 describes the value of individual surf sessions and an attempt has been made to represent the data in 2007 dollars so that comparisons can be made where possible. The values range from \$22 to \$122. There are a number of reasons for this, including the nonstandardized data collection strategies used across the studies, as well as the different costs of participation in various locations. This study has attempted to deal with both issues through the development of a standardized data collection strategy across regions.

Table 4 presents results from a three-year project using mixed-mode (face-to-face and Web-based) surveys (see Dillman 2007) across multiple locations and scales to collect data on the socio-economic value of surfing to particular areas. The face-to-face surveys were collected using a random data collection strategy at specific locations, and the Web-based surveys were self-selected by participants who were contacted using a range of online advertisements including email and targeted Web site promotions. The comparative annual cost of participating in surfing per surfer at various locations is estimated and the results suggest that there are some differences in the average annual cost of participation (cost of equipment, travel patterns and the cost of travel) across regions, which may also indicate differences in the cost of living at these locations. The findings also indicate that Buckley's 2002 estimates undervalue participation; however, travel and expenditure patterns may have changed significantly in the five years since that research was published. These results provide an important step in understanding the value of surfing. Further data and a more detailed analysis of the results is required in order to determine differences at the local scale, where it is often of most relevance to coastal managers (see Nelsen's paper in this issue), these results provide an important step in understanding the value of surfing.

SOCIOCULTURAL VALUES

As described in Table 1, there are many issues that affect surfing capital and from a strategic planning and management perspective sociocultural issues are equally as important as the economic is-

ues. For example, significant changes or the loss of surf breaks such as Kirra (Gold Coast, Australia), Trestles (California, United States) or Mundaka (Spain) have implications not just for a local community, but also for surfing more generally and may be likened to putting a freeway through the middle of Yankee Stadium or the Melbourne Cricket Ground. On a different scale, but no less important, the loss of a surf break like Bastion Point (Mallacoota, Australia) could have significant well-being issues for a specific community that may not be realized for many years to come. The issues listed in Table 5 were collected through a series of interviews, focus groups and surveys at Trestles (United States), South Stradbroke Island (Australia) and Bastion Point (Australia) and are broadly representative of many of the social and cultural consequences that communities face where surf breaks are considered to be under threat. These issues can have significant effects on the social fabric of a community, yet have seldom been considered serious or worthy of investigation.

For example, at Mallacoota, an isolated coastal village of approximately 1,200 people in the far east of the state of Victoria (Australia), a local council plan to construct a 150 m long concrete breakwater to improve boat launching facilities will result in the main town surf break being cut in half. Bastion Point is only surf break within 100 km of Mallacoota that can hold surf when the wind and swell comes from the southwest, the dominant wind and swell direction, as the breaks are protected from direct southerly winds. It is also the only surf break that is within walking or cycling distance from the center of town. The potential loss of this surf break then has significant social consequences for the local community, especially youth. These sociocultural impacts may also lead to a drain on resources and longer-term economic costs.

WHERE TO FROM HERE?

Since the study by the University of Hawaii (Kelly 1973), there have been no further academic studies that 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 develop-

ments that may impact or have impacted on surfing. While significant attention has been given to our understanding of the dynamics of waves in recent years, until very recently the same could not be said of the socioeconomic aspects of surf breaks and surf quality. Even the legal requirement to maintain and improve recreational amenity (Kirra Point, Gold Coast) has seen one of the world's best surf breaks significantly (negatively) altered through a beach nourishment program (see Government of New South Wales 1995; Hyder Consulting P/L *et al.* 1997). Similarly, the surfing industry has been largely ineffective and possibly disinterested in such issues to date. Much of this can be put down to the fact that many people believe surf quality to be an unchanging variable. This is clearly not the case. Increasingly, environmental issues and infrastructure development (often for coastal protection) have destroyed and continue to threaten many surf breaks and their associated economic, social and environmental values.

Beaches are a significant and highly profitable open-space resource (Pendleton and Kildow 2006), the true value of which we are only beginning to understand. For example, recent work by Raybould (2005) and Shivlani *et al.* (2003) on visitor/user willingness to pay for beach nourishment and the growing interest in the artificial surfing reef industry indicate that more than ever, beach users, surfers and coastal managers, businesses and coastal property owners have

an interest in beach management and the management, maintenance, improvement and provision of recreational amenity. Nonmarket studies, which can identify consumer surplus, perhaps more truly reflect the value of the beach or surfing to an individual or community over and above the actual cost of participation and it is in this area that surfing socioeconomic studies are now being undertaken.

At the heart of this discussion lie some fairly serious coastal planning and management questions. The major challenges for coastal planning and management in Australia are discussed in detail in Lazarow *et al.* (2006) and provide a useful companion for framing this discussion. Climate change predictions for frequent and more severe storms combined with rising sea levels over time pose significant challenges for coastal managers. This is compounded, at least in Australia, by a shrinking budget for natural resource management, a loss of human capital from coastal resource agencies, an increasingly litigious society and a growing coastal population with increased pressure on coastal resources.

CONCLUSION

Surfing interests have seldom been considered in the scheme of recreational activities in a manner similar to organized sporting activities such as football, pool swimming or basketball, and the surfing community, while organizing itself as an effective lobby group for environmental issues over the past two decades, has not

made the same progress on issues such as wave quality, wave frequency and associated sociocultural issues. The number of people participating in surfing and the number of people estimated to participate in surfing compared to other aquatic recreational activities suggests that surfing is a legitimate and important stakeholder for coastal issues.

Understanding the value of coastal resources, who uses them and how they can be impacted upon, is vital for sound coastal management. This paper consolidates and advances the emerging trend to identify and measure the socioeconomic value of surfing in a transparent manner. This paper identified the types of interventions including wave quality; wave frequency; environmental; and experiential issues, which may positively or negatively affect surfing. Our knowledge of the significant socioeconomic value of surfing is immature, but this paper brings together the literature and adds a new study on the socioeconomic value of surfing. Key insights into ongoing research are the importance of surf breaks to local communities, the need to be able to identify and quantify the value of surfing and the potential threats (or improvements) to surfing capital and the benefits of standardized data collection strategies. The development of an improved framework on the socioeconomic value of surfing will lead to better protection, maintenance and improvement of surf quality and more robust and integrated coastal management.

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