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Threshold of tolerability: the impact of management changes to recreational fishing in Ningaloo Marine Park

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Abstract

**Purpose** – The purpose of this paper is to examine a model for conceptualizing the impacts of environmental management strategies on travel and recreation choice making behavior that considers tolerance thresholds in visitor responses to destination change.

**Design/methodology/approach** – A survey involving a sample of 347 regular campers and fishers in the Ningaloo Marine Park, Australia, is analyzed to discern the effect of tolerance thresholds.

**Findings** – Despite widespread dissatisfaction with enlarged sanctuary zones and negative impacts on recreational activities, visitors indicated a high level of satisfaction with their stay. This apparent contradiction is, it is argued, best explained by the threshold of tolerability concept.

**Research limitations/implications** – It is argued that recreational users, planning authorities and other stakeholders have a threshold of tolerability in terms of decision-making concerning management changes. These thresholds mean that changes in management policies, modes of activity and destination travel choices are rarely predictable in their effect, but are bounded by minimal and ideal expectations of destination appeal.

**Originality/value** – The paper introduces an important concept for tourism research that will aid tourism planning and management authorities in the face of growing environmental pressures caused by overpopulation and climate change.

**Keywords** Tourism, Resource management, Economic sustainability, Environmental management, Tolerances, Australia

**Paper type** Research paper

Introduction

It is inevitable that with the growth in outdoor recreation and tourism, together with continuing population growth and competing demands on natural resources, recreational activities that place a high demand on natural resources need to be closely monitored to ensure that environmental well-being is preserved. This is particularly true with pursuits such as recreational fishing and destinations that depend on recreational fishing for tourism. Continued growth in leisure time and disposable incomes in developed countries have increased participation rates in recreational fishing (Kearney, 2002, p. 28). With awareness that commercial fishing has reached unsustainable levels in many parts of the world (Food and Agriculture Organization of the United Nations (FAO), 1999), there is increasing concern that recreational fishing is also resulting in pressures on fragile ecosystems (Lewin et al., 2006). Commercial fishing has long been subject to various forms of management regimes, but recreational fishing has, until recently, been allowed to take place without a great deal of regulation. Such laxity, however, is being replaced in countries such as Canada, Australia and New Zealand with tighter catch limits and the introduction of sanctuary zones to ensure that the sustainability of marine resources is not compromised. One of the critical challenges faced by fishery agencies and environmental management authorities is that such restrictions need to be sensitive to local community needs and tourism markets that depend on recreational fishing as a key driver of tourism. The introduction of sanctuary zones has been particularly contentious in many countries. In Australia, the introduction of sanctuary zones has caused considerable concern about potential detrimental economic effects and lifestyle changes, particularly in destinations that are highly dependent on fishing-based tourism. Hence, while sanctuary zones have been created for
the purpose of environmental resource conservation, questions have often been asked about their potential adverse social and economic consequences. Salz and Loomis (2005, p. 188) remark that “whether the long-term benefits of such protected areas outweigh the social and economic costs associated with reduced fishing access remains one of the most hotly debated marine resource management issues.”

This paper will seek to explore the visitor impacts of an expansion of sanctuary zones in the Ningaloo Marine Park of Western Australia. Through examining the responses of camping visitors to sanctuary zone changes, it is suggested that visitors have a “threshold of tolerability” to change that allows for some degree of tolerance to management restrictions before their preferences for travel destinations are affected. In the case of Ningaloo, it is argued that traditional fishing visitors have crossed the lower threshold level that involves irritation with regulatory regimes, but not the upper threshold where their destination choice is affected. It is argued that the notion of “thresholds of tolerability” offers more flexibility for understanding visitor satisfaction, destination choice behavior and the life-cycle of destinations than previous approaches.

**Approach**

The issue of how visitors respond to destination change has been widely examined in tourism and recreation studies, but it is fair to say that such studies have struggled to account for the intricacies of visitors’ decision-making process in response to destination change. The concept of recreational carrying capacity is one perspective that has been proposed to envisage the way that a build up of recreational users in a specific area can, beyond a certain point, lead to the demise in recreational satisfaction for users. Hence, Mathieson and Wall define carrying capacity as: “the maximum number of people who can use a recreational environment and without an unacceptable decline in the quality of the recreational experience” (Mathieson and Wall, 1982, p. 184). In tourism and recreation research, recreational carrying capacity is usually applied to the “crowding effect” (see Saveriades, 2000) – that is, the limit of visitor numbers before visitors become dissatisfied with a destination and choose not to return. The concept of “limits of acceptable change” (McCool, 1996) was introduced to explain the more incremental nature of change that takes place rather than postulating “breaking points” associated with carrying capacities. Both perspectives have been applied to visitor decision-making through the concept of the recreational opportunity spectrum (Clark and Stankey, 1979), which understands visitor groups as having different limits of acceptable destination change depending on their preferred activities.

The assumption in these approaches has often been that destination conditions are either satisfactory to visitor needs and are therefore accepted, or intolerable and therefore rejected. The intricacies of visitor responses to change have been poorly conceptualized. For example, the differences between minimal levels of satisfaction and ideal levels have not been adequately incorporated into such models. As Shindler et al. (2002, p. 11) point out with respect to the recreational opportunity spectrum:

> A continuing debate is whether standards represent the minimum condition to be provided (i.e. what is minimally acceptable and what society is willing to live with), or if they should represent a more acceptable, more desirable level.

Such one-dimensional approaches are also characteristic of approaches that have specifically focused on destination choice processes. Random utility models, for example, postulate that sites are chosen based on their intrinsic characteristics. For example, Hunt (2005, p. 156) notes that the following attributes of a destination determine choice of a recreational fishing site: costs, fishing quality, environmental quality, facility development, encounter levels, and regulations. Both the travel cost model and the random utility model imply that a destination can be objectively valued based on its travel distance or intrinsic features. If these attributes change, then visitor behavior changes as well. Most destination life cycle models, such as those of Butler (1980), also fall in the category of intrinsic attribute approaches. Conjoint analysis or discrete choice modeling, on the other hand, measures subjective valuation, and is
based on the choices made between alternative destinations (often using scenario modeling) rather than the attributes of a single destination (Aas et al., 2000; Gillis and Ditton, 2002; Oh et al., 2005). However, both models of choice-making behavior often carry the assumption that decision-making operates along a smooth continuum of increasing and decreasing value of activities and destinations or in simplistic either-or terms.

Only a few studies have considered the relevance of factors such as habit or ‘‘inertia’’ in sustaining activity patterns despite declines in destination value (Hunt, 2005, p. 162), or other variables such as place attachment. Cantillo and Ortúzar (2006), for example, note the relevance of ‘‘thresholds’’ in choice-making behavior made by travelers, whereby minor changes may be tolerated because they fall within the limits of: habitual behavior; the perception of users; or a certain allowance for change in attributes before alternatives are preferred. Such factors work against models that postulate predictable changes in travel decision-making as a result of destination change.

Through analysis of a visitor survey exploring responses to changing environmental regulations at a popular wilderness destination in Western Australia, it will be shown how a threshold approach can be employed to understand visitor attitudes and behavioral responses to environmental management regimes that resists any straightforward attitudinal or behavioral response model. It will be shown how such an approach enables otherwise contradictory findings regarding attitudinal and behavioral responses to destination change to be more satisfactorily explained. In particular, the importance of understanding the relevance of minimal satisfaction and ideal expectation levels is highlighted.

Ningaloo Marine Park, Western Australia

The Ningaloo Marine Park is located in central Western Australia near the townships of Exmouth and Carnarvon (Figure 1).

Figure 1 – Location of Ningaloo Marine Park
The Ningaloo Marine Park is traversed by the Tropic of Capricorn, and contains one of the longest fringing coral reefs in the world. It is widely recognized for its environmental significance and is currently being prepared for nomination as a World Heritage Area.

The original 1991 sanctuary zone scheme for Ningaloo Marine Park allocated approximately 10 percent of the Marine Park to sanctuary zones. The Western Australian State Government’s key environmental conservation agency, the Department of Environment and Conservation (DEC), adopted the sanctuary zone scheme as a way of protecting areas that it deemed sensitive to significant ecological damage from recreational use. DEC authorities note:

At that time there was limited understanding of the ecology of NMP and the configuration, size and location of sanctuary zones needed to protect the biodiversity of the Park. Furthermore, fishing was the main reason most visitors came to the area and, as such, there was strong opposition from recreational fishers to the establishment of “no fishing” zones. The combination of limited scientific understanding and opposition from a major user group resulted in a compromise sanctuary zone scheme being adopted for the 1989-1999 management plan (CALM, 2003, p. 8).

With growing visitor use of the Marine Park, the initial management plan came under question from various quarters as being too conservative. In November 2004, the State government of Western Australia took the decisive step to substantially increase the sanctuary zones in the Ningaloo Marine Park from 10 to 34 percent (see Figure 2).

The present study was commissioned by DEC and Tourism Western Australia (the State government’s agency for tourism promotion) to determine what effect, if any, the expansion of the sanctuary zones had affected visitor activities in the Marine Park and, more broadly, whether visitation rates to the region had changed as a result.

**Methodology**

A survey was carried out with 347 camping visitors to the Ningaloo Marine Park, most of whom were long-term repeat visitors to the region. Campers were surveyed during the peak tourism season in 2006, one-and-a-half years after the expansion of the sanctuary zones. It is estimated that most – if not all – station campers at Warroora and Ningaloo stations (the largest of the four pastoral stations on the Ningaloo coast) were surveyed during the survey periods. While it is possible that there was an overrepresentation of respondents in the survey who had strong views about the value of the sanctuary zones, the possibility of response bias is not deemed problematic for this particular paper. This is because the interest of the current discussion is in the correspondence between attitudes towards the sanctuary zones and destination preference, not on the prevalence of attitudes per se.
Figure 2 – 2004 expanded sanctuary zone scheme (source: Department of Conservation & Environment)
Results

Approximately 90 percent of campers fished during their stay. A total of 60.9 percent of the station campers (Ningaloo and Warroora combined) rated fishing as extremely important to the enjoyment of their visit, while another 30.3 percent rated fishing as being of some importance. Not surprisingly, the majority disapproved of the sanctuary zone changes, as shown in Table I.

**Table I. Opinion regarding sanctuary zone expansion**

<table>
<thead>
<tr>
<th>camping area</th>
<th>opposed</th>
<th>neutral</th>
<th>supportive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ningaloo</td>
<td>79.6%</td>
<td>13.0%</td>
<td>7.4%</td>
</tr>
<tr>
<td>Warroora</td>
<td>45.9%</td>
<td>17.6%</td>
<td>36.5%</td>
</tr>
</tbody>
</table>

However, there was a significant association between opposition to expanded sanctuary zones and place of camp ($\chi^2 = 41.1, n = 290, p < 0.01$). Specifically, campers at Ningaloo station – the area most affected by changes to the sanctuary zones – indicated the highest level of opposition, with approximately 80 percent opposed.

For those who had visited the area prior to December 2004, those at Ningaloo station also indicated the highest level of change to their activities, shown in Table II.

**Table II. Impact of sanctuary zone extensions on activities**

<table>
<thead>
<tr>
<th>camping area</th>
<th>no change</th>
<th>some change</th>
<th>much change</th>
<th>unsure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ningaloo</td>
<td>17.4%</td>
<td>23.4%</td>
<td>56.7%</td>
<td>2.5%</td>
</tr>
<tr>
<td>Warroora</td>
<td>38.5%</td>
<td>38.5%</td>
<td>20.0%</td>
<td>3.1%</td>
</tr>
</tbody>
</table>

Again, there was a significant association between opposition to expanded sanctuary zones and place of camp ($\chi^2 = 12.8, n = 259, p < 0.01$). In total, 80.1 percent of Ningaloo campers expressed some level of change in their activities as a result of the sanctuary zone expansion, in contrast to 58.5 percent of Warroora campers. Not surprisingly, there was a significant association among pastoral station campers between believing one’s activities to be affected by the expanded sanctuary zones and being opposed to the sanctuary zones ($\chi^2 = 64.6, n = 272, p < 0.01$).

Respondents were asked to specifically identify the nature of any changes in their activities. Several respondents reported that they were no longer setting out in their boats. Others were setting out in their boats for nearby recreation zones or to general use zones outside the reef, but complained about being inconvenienced by the extra distance boating to these areas and extra costs for fuel. Those setting out for nearby recreation zones complained about the crowding in these zones, with some pointing out that the concentration of boats in a confined area due to increased sanctuary zones presented a safety hazard. Several of those setting out beyond the reef in small boats complained that there was increased danger due to their exposure to waves and uncertain weather conditions. Some respondents pointed out that their children could no longer engage in boat fishing because of the distances involved and the safety problems. Finally, others indicated that they had moved camp to areas adjacent to recreation zones (presumably Lefroy Bay), with some complaining about not being able to camp at their traditional sites and experiencing crowding in their new camping areas.

Respondents were asked to indicate what maximum level of sanctuary zone coverage of the Ningaloo Marine Park they would be willing to accept. They were required to provide a percentage figure, and the
responses were reclassified according to whether they were above, below or equivalent to present levels. The findings are shown in Table III.

<table>
<thead>
<tr>
<th>Camping area</th>
<th>SZ exceeds maximum allowance</th>
<th>SZ at limit of maximum allowance</th>
<th>SZ well within maximum allowance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ningaloo (n = 174)</td>
<td>70.1%</td>
<td>28.2%</td>
<td>1.7%</td>
</tr>
<tr>
<td>Warroora (n = 66)</td>
<td>30.3%</td>
<td>62.1%</td>
<td>7.6%</td>
</tr>
</tbody>
</table>

Again, there was a significant association between opposition to expanded sanctuary zones and place of camp ($\chi^2 = 32.5$, $n = 240$, $p < 0.01$). Most Ningaloo station respondents (70.1 percent) provided a maximum level that was less than the current size of the sanctuary zones, hence indicating that their maximum level of acceptance had been exceeded. Most Warroora station respondents, on the other hand, indicated the current arrangement was within their level of acceptance, suggesting that their maximum threshold had not been exceeded but was close to the limit.

Surprisingly, despite the majority of station campers feeling affected by the changes to the sanctuary zones, campers rated the quality of their stay highly, with 98.2 percent of Ningaloo campers and 94.8 percent of Warroora campers rating their stay as either good or excellent (see Table IV).

<table>
<thead>
<tr>
<th>Camping area</th>
<th>average</th>
<th>good</th>
<th>excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ningaloo</td>
<td>1.8%</td>
<td>33.0%</td>
<td>65.2%</td>
</tr>
<tr>
<td>Warroora</td>
<td>5.3%</td>
<td>22.4%</td>
<td>72.4%</td>
</tr>
</tbody>
</table>

Finally, aerial surveys of camping numbers during the peak tourism season by the Department of Environment and Conservation indicated that the number of campers in 2006 was comparable to levels in 2004, indicating that no sustained downturn in station camp visitors.

Research implications

It would seem that a widespread perception that activities have been curtailed among respondents has not translated into a decline in use of the Marine Park for these users. Large numbers of residents and campers were continuing to visit the Marine Park despite increased sanctuary zones. Undoubtedly, the retention of large sections of beach access for shore-based fishing and the availability still of some two-thirds of the Marine Park waters for boat fishing meant that minimum requirements for satisfaction from recreational fishing had not yet been breached, even though some kind of ideal threshold for tolerating changes had been. From analysis of the findings, it appears that the majority of campers are irritated by the changes, but not to the point where their overall visitor satisfaction has been substantially undermined. In short, their threshold for tolerating changes has not been exceeded.

Only through postulating minimal and ideal levels for visitors’ threshold of tolerability is it possible to reconcile the ostensibly contradictory finding of large-scale dissatisfaction with sanctuary zone changes and negative impacts on activities on the one hand, yet continued satisfaction with the destination overall on the other. Much depends, of course, on the attractiveness of other destinations that could serve as alternatives, and this is where discrete choice modeling becomes relevant. In the case of Ningaloo,
there are popular fishing areas to the south such as Shark Bay that could serve as alternative destinations, although Shark Bay is also subject to extensive sanctuary zone restrictions. The comparative value of alternative destinations was not explored in the surveys. However, the fact that camping visitors are continuing to travel to the area in large numbers and rating the quality of their stay so highly, indicates that the Marine Park has remained a favored destination for those that are long-term repeat visitors. Part of this is undoubtedly due to the wide range of activities that can be carried out at Ningaloo, with most residents and campers engaging in activities other than fishing. Consequently, the quality of their visit to the Marine Park is sustained in part by satisfaction with other activities, such as swimming, snorkeling, camping, marine life viewing or relaxing. Fishing is but one part of an overall “wilderness experience” that defines Ningaloo as a satisfying destination for residents and campers, and this makes the threshold of tolerance more resilient. But it is also the case that fishing was of primary importance to the visitor satisfaction of those surveyed, and on this basis, some notion of a tolerance threshold related to fishing impacts alone is required to understand the apparent incompatibility in the findings.

It is of course possible that, with time, residents and campers will adapt to the tightened management regulations, and may well revise their level of maximum allowance for changes. Indeed, residents and visitors’ level of tolerating management changes is dynamic over time. Research by Moore and Polley (2007) indicates that visitor expectations of destinations tend to be anchored in prevailing conditions, which suggests that as those conditions change, so too do visitors standards for what they find as acceptable. Whether this is the case with residents and camping visitors to Ningaloo remains to be seen. It is probable, however, that change in user groups’ expectation levels are limited in both scale and time. Too much change too quickly, for example, will exceed the rate of adaptation to changes and therefore surpass their tolerance threshold.

It has been argued that incorporating the notion of tolerance thresholds within analytical frameworks promises to offer a more nuanced understanding of the interaction between destination change and destination choice. With increasing environmental pressures and expected impacts from climate change, the need to understand visitor resilience to environmental changes and management regimes is a priority in tourism research. Such understandings are vital if future resource allocation for recreational activities is to be planned and managed in a way that is sensitive to not only environmental factors, but social and economic needs that are the lifeblood of many tourism destinations and the travel industries that they sustain.

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References


