NATURE-BASED TOURISM DEVELOPMENT IN SOUTH CAROLINA

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Abstract: Tourism is South Carolina's second largest industry, with a $13 billion per year impact on the state's economy. Clustered near Hilton Head, Charleston and Myrtle Beach, traditional golf, tennis and beach related activities form the largest parts of the South Carolina tourist economy. However, abundant and relatively undisturbed natural resources in close proximity to developed areas make South Carolina an ideal setting for domestic nature travel. With the continuing support of the National Coastal Resources Research Institute (NCCI), staff and faculty of South Carolina Sea Grant and Clemson University have worked to establish the value of nature-based tourism as a tool for sustainable rural economic development while conserving natural resources and preserving the unique character of small coastal communities. Their efforts and the work of many volunteers have lead to the establishment of the South Carolina Nature-Based Tourism Association, an educational organization of community leaders, natural resource managers and tourism businesses. The Association's accomplishments include the publication of voluntary guidelines for nature-based tourism planning and management, a bimonthly newsletter, three annual statewide nature-based tourism educational conferences, and a series of in-service training for practicing natural resource interpreters. In 1996, the Association will begin a project to create a state-wide directory of South Carolina nature-based tourism businesses and resources. The directory will provide the basis for a joint industry marketing effort, a subsequent analysis of visitor satisfaction, and a preliminary attempt to assess the economic impact of nature travelers.

Keywords: nature-based, tourism, conservation, planning, rural economic development

Background and Introduction

The South Carolina Setting

Tourism is now a $13 billion industry in South Carolina, with about $7 billion of that total generated in three of the state's eight coastal counties. The industry's growth represents both opportunities and challenges for natural resource conservation and rural economic development on the coast.

Tourism development on the South Carolina coast is clustered in three areas. Myrtle Beach on the north coast, Charleston on the central coast and Hilton Head in the south. Between Myrtle Beach and Charleston lies the Santee River delta and the Francis Marion National Forest. Just south of Charleston, along U.S. Highway 17, is the ACE Basin, a 350,000 acre expanse defined by the basins of Ashepoo, Combahee and Edisto Rivers.

A thriving tourism industry combined with abundant and relatively undeveloped natural resources and the state's location within a day's drive of almost half the population of the U.S., to make South Carolina an ideal domestic nature-based tourism destination. But for all its potential, nature-based tourism, if not carefully planned for and managed, could harm the resources it depends on. Therefore, the challenge is to engage all stakeholders in the development of a nature-based tourism industry to integrate, or balance, the need for economic development in rural coastal areas with the need to conserve our natural resources. This is a strategy of inclusion, consensus and optimization.

Defining Nature-Based Tourism

"Nature-based tourism is responsible travel to natural areas which conserves the environment and improves the welfare of people." This is the Ecotourism Society's definition of "ecotourism" and also the definition adopted in South Carolina by the South Carolina Nature-Based Tourism Association (SCNBTA) for "nature-based tourism." Why is this kind of tourism variously called "ecotourism" or "nature-based tourism?" Perception is reality. In South Carolina, nature-based tourism organizers feared that an "eco" label might cause the concept to be misperceived as a sign of exclusivity by more conservative or traditional natural resource users such as campers, hunters and fishermen. Organizers also reasoned that because the key element of the definition of both eco- and nature-based tourism is conservation, then hunting and fishing (both well-managed, and thus non-consumptive of total resources) could be considered a subset of nature-based tourism. Organizers decided to include the broad spectrum of activities under the umbrella of nature-based tourism so that it would not seem to be exclusive or elitist in concept or practice, believing that the place from which to educate is from within the organization.

Planning for Nature-Based Tourism

Achieving a balance of economic development and natural resource conservation through nature-based tourism requires good planning involving all stakeholders, including rural residents, public and private natural resource managers, tourism businesses and tourists. The key to good planning for nature-based tourism lies in matching activities with the most appropriate natural resource areas.
More sensitive natural resource areas might be appropriate for very low impact activities of small numbers of wilderness campers, for example. Less sensitive areas might be developed into nature and visitor centers with interpretative programs able to accommodate large groups, the disabled, elderly and others requiring more infrastructure (parking lots, ramps, walk ways, etc.).

Ross Dowling outlined a planning process to match natural resources with appropriate tourism activities (Dowling, 1993). Dowling’s model is now being examined for its potential as the basis for a joint effort by the South Carolina Department of Natural Resources, the South Carolina Department of Parks, Recreation and Tourism, and the South Carolina Sea Grant Consortium to create a nature-based tourism plan for the ACE Basin region located between Charleston and Hilton Head.

Nature-Based Tourism in South Carolina

Initial Work

Nature-based tourism became a focus of attention in South Carolina in 1990 when Margaret Davidson, South Carolina Sea Grant Consortium director, and Robert Becker, director of the Strom Thurmond Institute at Clemson University, began to look at the changing fabric of the state’s rural coastal communities. As the traditional economies of agriculture and fishing lost ground to tourism and residential retirement development, traditional ways of life in many small towns were threatened. In fact, even the physical appearance of many communities was changing under developmental pressure. Some welcomed the changes and others were concerned about the loss of the small town heritage that makes rural South Carolina unique. Davidson and Becker began to consider rural development alternatives which tended both to conserve cultural and natural resources and offer opportunities for economic growth. Nature-based tourism is one such alternative.

In partnership with the National Coastal Resources Research Institute (NCRI), Davidson and Becker began to explore nature-based tourism as a tool for rural economic development on South Carolina’s coast. In their initial work investigators began to identify nature-based tourism businesses already in existence. They interviewed the operators and began to understand something of both the challenges they faced in operating their businesses and the things which made them successful. Investigators also attempted to draw a socio-economic profile of nature-based tourists with an interest in nature photography. The goal was to identify a segment of the nature travel market and help operators target that group in their marketing efforts. The products of this initial project included several videos of nature-based operators relating how they got started in the business and the problems they faced; a bibliography of nature-based tourism to assist other researchers; and a publication which offers guidance on how to start a nature-based tourism business. A related publication, “Developing Naturally” by Dr. Thomas Potts, was published in 1995 by the Strom Thurmond Institute. It is a guide for communities interested in exploring their potential as a nature travel destination.

Continuing the partnership with NCRI in 1992, Robert Bacon and Dr. Loen Toepfer, then director of Clemson University’s Recreation, Travel and Tourism Institute, created an outreach mechanism for present and future nature-based tourism information in South Carolina. Bacon and Toepfer established a pilot Grand Strand nature-based tourism organization using the concept of “satellite” nature-based tourism development. The concept of “satellite” nature-based tourism development uses the existing tourism base in the Myrtle Beach area to draw visitors into adjacent rural areas for, at least, part of their visit. Nature-based tourism, as a niche market, enhances the existing tourism industry by expanding the available product mix, diversifying the kinds of activities offered and offering a product which is viable in the off-peak fall and winter seasons. Nature-based tourism benefits rural areas by providing a flow of visitors to local shops and restaurants, and creates business opportunities for residents with knowledge of local natural resources. Such nature-based tourism entrepreneurs, who may be the sons and daughters of farmers or fishermen, could use their familiarity with local streams, rivers and marshes to start a canoe livery or wildlife guide service. Entrepreneurs might also establish bed and breakfast inns or “eco-lodge” accommodations. The “satellite” development concept addresses a “chicken or egg” problem of how to begin to attract visitors with limited existing tourism infrastructure. Day visits by nature tourists provides an initial flow of visitors into rural areas, stimulating an increased demand for products and services which can lead to the development, or expansion, of a variety of small local businesses. The emphasis on local businesses is important, because nature-based tourists enjoy experiencing both natural and cultural resources with the “local” flavor which helps to make these resources unique.

As the involvement of the South Carolina Sea Grant Extension Program in nature-based tourism grew, a tourism specialist, Pamela Kibler, was placed in the Myrtle Beach area to provide educational and outreach services to existing and start-up nature-based tourism businesses and to develop a working relationship with the established tourism industry. Kibler has worked closely with Dr. Loen Toepfer, former director of Clemson’s Recreation Travel and Tourism Institute (RTTI) and with Dr. Bill Norman, his successor. Toepfer and Norman have provided an academic and research base upon which Kibler has developed programs in the Myrtle Beach area and
statewide. An example of Kibler’s outreach activity among rural communities is a water trails workshop she organized to extend the successful model of the Edisto Canoe and Kayak Trail Commission in Walterboro, South Carolina to other communities with similar riverine resources.

The South Carolina Nature-Based Tourism Association

The success of the Grand Strand task force stimulated interest in creating a statewide organization. Bacon, Toepffer, Kibler and the members of the Grand Strand task force organized the state’s first nature-based tourism conference in March 1993. Speakers, including Dr. John Hunt from the University of Idaho’s Department of Resource, Recreation and Tourism Management, introduced nature-based tourism to 125 interested conference participants. The conference speakers addressed the potential impact of nature-based tourism on local businesses and communities, and extended much of the information gathered through Davidson’s and Becker’s earlier project, including a socio-economic characterization of the nature-based tourist. The conference provided a first opportunity for existing nature-based business operators to meet and exchange ideas. It also drew participants from the established tourism industry, providing an opportunity for them to become acquainted with the potential benefits to them of nature-based tourism. The conference received widespread press coverage in local newspapers and also received a mention in USA Today.

The South Carolina Nature-Based Tourism Association (SCNBTA) was formally established at the second statewide nature-based tourism conference in March 1994. Officers were elected, and a constitution and by-laws adopted. The association was formed as primarily an educational organization to encourage and plan for sustainable nature-based tourism. Organizational objectives include the establishment of voluntary standards and practices; the development of interpretative quality control mechanisms; the development of in-service training for natural interpreters; the provision of business assistance to members; the planned development of a nature-based tourism industry in South Carolina including all stakeholders in the planning process; and enhanced industry impact through collective marketing and promotion activities. Organizers opened membership in the Association to all industry stakeholders, especially representatives from communities, natural resource managers and tourism businesses.

Prior to the election of association officers, much of the leadership for nature-based tourism organization was undertaken by Bacon, Toepffer and Kibler in conjunction with their NCRI grant. Between the first and second conferences, Bacon, Toepffer and Kibler identified leaders to form the slate of nominees to head the Association. The nominees included: for president, Charlie Sweat, the chair of the Edisto Canoe and Kayak Trail Commission; for vice president, Jim Koenig, the director of Camp St. Christopher, a barrier island environmental education program; for secretary, Tim Todd, the president of the South Carolina Association of Tourism Regions; and for treasurer, Vicki Scott, an interpreter/guide from Capt’n Dick’s Explorer Cruises, a nature tour operator in Murrell’s Inlet. The slate of nominees became the Association’s first elected officers in March 1994. Bacon, Kibler and Norman, Toepffer’s successor at RTTI, all now serve on an advisory board appointed by the president. In addition, Kibler functions as a part-time staff assistant to the SCNBTA board.

One of the first decisions of the SCNBTA board under its elected leadership, was to organize the Association as a private, non-profit educational organization. The secretary obtained a federal identification number and state recognition for the Association’s non-profit status. A Charleston attorney has agreed to provide his services on a pro bono basis and is now working on the Association’s application for Federal 501(C)3 tax exempt status.

Association by-laws, drafted by Bacon, were also approved at the second conference. The by-laws established a Board of Directors with representation from each of the state’s ten tourism regions. The tourism regions are operated as private, non-profit entities and supported, in large part, by the South Carolina Department of Parks, Recreation and Tourism. The link between the Association’s structure and that of the existing tourism regions, provides the Association with a support system and useful links with tourism policy making within state government. The director of each of the ten tourism regions appointed the first board member from within each region. Thereafter, board members will be elected by association members. Providing a regional structure also allows for greater interaction among members within a region, sets the stage for cooperative marketing and allows for the industry to develop at different rates within each region.

In 1994, based on the interest generated by the first nature-based tourism conference, Bacon and Toepffer were able to secure a place for nature-based tourism on the program of the South Carolina Governor’s Conference on Travel and Tourism, the industry’s largest and most prestigious event. Bacon and Toepffer assembled an international panel from business and academia to address the audience on the nature-based tourism market and the issue of sustainability in tourism development.

Meanwhile, in 1993 Davidson and Bacon convened a group including academics, business people and public and private agency representatives to consider how to plan for and manage sustainable nature-based tourism in South
Carolina. The outcome of a series of meetings which took place over a year's time was "Guidelines and Recommendations for Nature-Based Tourism Planning and Practice in South Carolina." The guidelines were developed to address the roles of communities, resource managers, tourism businesses and tourists in contributing to a sustainable nature tourism industry. The group benefited greatly from the generosity and cooperation of the Ecotourism Society in providing it with examples of similar guidelines from around the world. Because the general nature of nature-based tourism guidelines remain relatively constant from place to place, the South Carolina group reviewed the guidelines, selecting those most suitable for the South Carolina setting and modifying them to address South Carolina specific issues.

The SCNBTA membership formally adopted the guidelines at the third nature-based tourism conference in 1995. The guidelines constitute the Association's official set of standards and practices to guide the industry's planning activities and the member's sustainable business practices. The guidelines were published by the Association with the assistance of NCRI and the South Carolina Sea Grant Consortium and distributed to the membership, in response to mailed requests from around the country and at tourism industry gatherings, such as the 1996 South Carolina Governor's Conference on Travel and Tourism.

South Carolina's fourth nature-based tourism conference will be held in November 1996 in Myrtle Beach. For the first time this year, the SCNBTA board voted to use the services of a meeting planner in putting together the conference. This decision was a concession to the individual board members' increasingly busy schedules. With other jobs or businesses to run, attending to the details of putting on a first class conference simply became too demanding. Using the services of meeting planners has freed the officers and volunteers from the routine organizational chores and allowed them to focus more attention on planning the conference's educational programs and field experiences.

Hiring the meeting planners was financed through membership dues, conference registrations and most especially the proceeds from auctions conducted at the two previous conferences. Live and silent auctions are both fun and entertaining for the participants and have proven to be an excellent fund raising tool for the Association. Volunteers from the conference committee solicited items from tourism and nature-related businesses around the state. Donated auction items have ranged from T-shirts to vacation weekends to a sea kayak. Over $2000 were raised within a 2-hour period at both auctions. The sale of conference sponsorships (coffee breaks, dinners, lunches and field trips) is another funding mechanism used with success by previous conference organizers. This year, the meeting planners will take charge of much of the sponsorship solicitation activity as well as negotiate favorable rates for accommodations and meeting space. The board anticipates that through these efforts the meeting planners will generate the funds necessary to pay for their services. Still, hiring meeting planners represents a calculated risk for the Association, which is responsible for the fee regardless of the outcome of the conference.

In 1996, NCRI has again funded a joint two-year project of the SCNBTA, South Carolina Sea Grant Extension and Clemson's RTTI. The project is designed to create, market and evaluate nature-based vacation packages and itineraries. Susan Reid, the South Carolina Sea Grant Extension Community and Business Development Specialist, joined the project staff in planning this project. The goal of the project is to transform an unrelated series of nature-based tourism activities into coordinated nature vacations.

In order to enhance the attractiveness of South Carolina to nature tourists and establish South Carolina as a nature tourism destination, the project planners reasoned that it was necessary to promote the entire industry and provide easy access to its individual businesses. There is a business in the Myrtle Beach area called "Myrtle Beach Golf Holiday." It is a magazine which lists participating golf courses and accommodations. Using this service, golf vacationers can, with a single phone call, make all necessary golf and accommodation reservations for an entire vacation. Golf courses and accommodations benefit from cooperative marketing and the vacationer has convenient access to all the information he needs.

The creation of a South Carolina Nature Based Tourism Business and Resource Directory will provide nature tourism businesses and nature travelers with the same benefits. In addition, the directory will serve as a membership tool for the SCNBTA. Again, the project is modeled after another successful publication, the "Bed and Breakfasts of South Carolina." This guide was published by the South Carolina Bed and Breakfast Association with grant support from the South Carolina Parks, Recreation and Tourism Department (SCPRT). Because it was produced with state money, the guide must list all bed and breakfast inns, not just association members. Members, however, receive enhanced listings which include promotional tag lines, the Association logo and a designation of association approval. Non-members are simply listed by name address and phone. Nature-based project organizers are working with the staff person at SCPRT who assisted the bed and breakfast association with its guide.

Bacon, representing the SCNBTA, has applied for a 50/50 matching grant from SCPRT under its Tourism marketing Partnership Program to help support the development and marketing of the nature-based tourism guide. On the
technical side, the guide will be produced in a standard rack compatible 4" by 9" format. The guide will also be created on-line for worldwide web access and facilitate updated listings between hard copy revisions. Norman is directing the data collection effort for the guide and is now supervising a pilot project to create a guide for the Grand Strand region. Kibler, working with a student from Coastal Carolina University, is testing data collection formats and methods in preparation for the statewide effort scheduled to begin this summer. The anticipated publication date for the guide is November 15, 1996 in conjunction with the annual SCNBTA conference. The back-up date is in early February 1997, in conjunction with the South Carolina Governor's Conference on Travel and Tourism.

The "SC Nature-Based Tourism Business and Resource Guide" will be distributed by the Association and SCPRRT at travel industry trade shows; at South Carolina Welcome Centers; by mail in response to individual inquiries; at individual businesses; in state parks; and via the world-wide web through the linked home pages of the South Carolina Sea Grant Consortium, the South Carolina Parks, Recreation and Tourism Department and the State of South Carolina. The guide is also designed to be used by travel agents and receptive tour operators in assisting them and their clients with vacation and tour planning.

Finally, the SCNBTA has begun to address issues of quality control in the interpretation of natural resources through a series of educational seminars. These seminars are being conducted under the direction of SCNBTA Vice President Jim Koenig, director of Camp St. Christopher and environmental learning center on Seabrook Island, in collaboration with the education program staff of the SC Department of Natural Resources' Marine Division. At these seminars, natural resource scientists from the department and the state's universities will provide the state's public and private resource interpreters with in-service training to help ensure the accuracy of information provided to the traveling public. Eventually, the Association would like to offer a certification program for interpreters, perhaps modeled after the one required by the City of Charleston for its historic tour guides.

Conclusion

In conclusion, over the past five years while many have contributed to setting the stage for the development of a sustainable nature-based tourism industry in South Carolina, much still remains to be done. Little has been done to address the issues of natural resource carrying capacity for nature travel. Although now being discussed by South Carolina Sea Grant, the South Carolina Parks, Recreation and Tourism Department and the South Carolina Department of Natural Resources, no regional planning process has yet begun. The SCNBTA is still a young, fragile organization which must engage and maintain the interest and participation of many more members to ensure its continued success. It must produce meaningful outcomes for its members and maintain an active voice within the tourism industry as a whole.

Finally, Davidson, Becker, Bacon, Toepfer, Norman, Kibler, the SCNBTA board and all the other industry leaders have all realized from the beginning that raising the awareness of nature-based tourism among state natural resource agencies, community leaders and the tourism industry was only the first challenge. The next and most important challenge lies in finding and maintaining a generally accepted and workable balance between economic development and the conservation of natural and cultural resources. If we can find that balance that, we will have gone a long way toward preserving those resources which have made our state an attractive and unique place in which to live, work visit and play.

References

MARINE TOURISM IN NEW ZEALAND: A PROFILE

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Abstract: Tourism is the fastest growing sector of the New Zealand economy and accounts for more than $NZ3.84 billion in foreign exchange. New Zealand’s tourism is based predominantly on scenic attractions, wildlife and natural resources. The country has a diverse and relatively pristine marine environment and it is likely that coastal and marine tourism will become increasingly important. However, the marine species and habitats targeted by tourism need to be identified and environmental implications assessed if this growth is to be managed sustainably.

This study investigated the current status of marine tourism in New Zealand, with particular regard to environmental issues and options. The term marine tourism was used to include all commercial operations visiting natural areas for the purpose of diving, recreational fishing, tour boating and cruises, and the viewing of seabirds and marine mammals. A mail-out questionnaire sent to all (~320) commercial operators was used to profile the industry. The major types of operation were identified as were the key areas, species and habitats targeted by each.

New Zealand’s marine tourism industry is still in its infancy; most operations are small, locally controlled businesses, and have evolved within the past five years. Wildlife viewing is the most common activity, with more than 44% of operators noting marine mammals and 78% seabirds as their key attraction.

Keywords: marine tourism, environmental issues, New Zealand

Introduction

In response to the demand for travel and adventure, tourism is now the world’s largest and most rapidly growing industry (Miller and Kirk, 1993; Snow, 1990). In line with this trend, tourism is New Zealand’s fastest growing industry and its largest earner of foreign exchange, contributing close to $NZ4 billion in 1995. A thriving domestic tourism industry generates a further $NZ4 billion a year, making tourism worth some $NZ8 billion a year, and contributing more than 5% to the country’s gross national product (NZTB, 1995). This growth rate for tourism is somewhat higher than the current world average of 3.8% per annum (Endecott, 1996). For the year ended June 1995, visitor arrivals to New Zealand were 1.37 million, an increase of 11% over the previous year. It is projected that the annual number of overseas visitors will exceed 2 million by the turn of the decade (NZTB, 1995). By comparison, New Zealand’s current population is only 3.5 million (Statistics New Zealand, 1995).

New Zealand (260,000 km²) lies in the southwest Pacific and comprises two main islands (North and South) at temperate latitudes (~34°-47° S). The country also includes, however, a number of smaller islands from the subtropics to the subantarctic. New Zealand has a diverse marine environment and an intricate coastline some 15,000 km in length. By world standards much of the country’s coastal and marine environment is pristine or still relatively unimpeached by human activity. An estimated 483,000 international visitors participated in marine tourism related activities in 1993 (NZTB, 1992–1993). Whilst this represents only 27% of the total visitors surveyed, it is expected that coastal and marine tourism will become increasingly important. For instance, in the same survey, scenic boat cruises (and short bush walks) were identified as the most popular activities.

The predominant style of tourism in New Zealand is based on wildlife, wildlife areas and scenic beauty, with nature-based tourism given considerable prominence in New Zealand’s domestic and international marketing strategies. With the rapid expansion and diffuse nature of tourism in New Zealand there has been very little documentation of the extent of marine tourism in the country. It is thus imperative that the marine species and habitats targeted by tourism are identified and environmental implications assessed if this growth is to be managed sustainably.

This paper documents the current status of marine tourism and quantifies the major types of attractions and activities. In addition it addresses some of the issues regarding the sustainability and future growth of the industry.

Methods

For this study marine tourism was defined as commercial operations visiting natural areas for the purpose of diving, fishing, marine mammal and seabird watching, cruising and tour boating. A survey of all marine tour operators was conducted during September and November 1995. Names and addresses of operators were obtained by writing to all the visitor information centres in New Zealand that have a coastal interest. In addition, a search was made through the Yellow Pages of all the telephone directories under the key words/phrases "charter services-boat and launch charter, divers and diving tuition, fishing trips, tourist
attraction and tour services, sightseeing and excursions.” A direct mail survey was selected as the most appropriate and economic method for collecting the data given the large number of tour operators dispersed throughout the country.

A total of 376 operators were initially identified as having some type of marine attraction component included in their tour. To maximise the response, stamped return-addressed envelopes were provided, and follow-up telephone calls were made to all those who had not returned completed questionnaires after three weeks. Twenty-seven surveys were returned as undeliverable. The possible survey sample was therefore reduced to 349. A total of 190 responses were received giving an overall response rate of 55%. The data were collated and analysed using the program SPSS for Windows.

Objectives of the survey were: (1) To obtain profile data on tour operations and the marine tourism industry as a whole (e.g., locations of operations, types of trips offered, and key attractions). (2) To identify possible environmental concerns, specifically the species and habitats perceived as vulnerable to tourist pressure. (3) To investigate the attitudes of the tour operators to the current and future management of the industry. This paper reports results of the first two objectives, examines the characteristics of New Zealand’s marine tourism industry, and discusses some of the management issues that need to be addressed.

Results and Discussion

Profile of the Industry

There is a marked seasonal pattern in numbers of visitors participating in marine tourism activities, with a distinct peak over the summer months December to March (Figure 1). A similar pattern is shown by total international visitor arrivals.

New Zealand’s marine tourism industry is still in its infancy; 61% of operations have developed within the past five years (Table 1). 43% of the respondents indicated that they close for a period of two weeks or more during the year. The closure usually coincided with the winter months June to August and was primarily a result of weather restrictions or lack of tourist demand. Together these factors contribute to a difficult operating environment where an operation must be able to support itself over the winter months in tourist numbers to remain commercially viable. Also, the industry is largely composed of small, locally owned and operated businesses. Overall, 82% of the operations employ less than three staff members. Small operators are relatively uncontrolled except by market forces which raises the issue of new operators visiting areas without an adequate knowledge of the resources.

Activity and Attractions:

The price of tours varied considerably depending on the activities offered, but averaged NZ$30-35 per hour. 72% of operations used powered boats, 15% yachts and 16% kayaks. The use of powered vessels provides access to locations and wildlife previously inaccessible to visitors. This highlights a concern expressed widely in the literature that, increasingly, nature tourism activity constitutes traveling to relatively undisturbed locations with fragile ecosystems or endangered and threatened wildlife (Butler, 1980; Kozlowski, 1985; Boo, 1990; Cellabos-Lascurain, 1991; Hawkins and Roberts, 1993; Jacobson and Lopez, 1994). In addition, species in these areas are unused to human presence and often more sensitive to disturbance (Klein et al., 1995).

New Zealand’s marine tourism industry encompasses a diverse range of activities, the major ones being cruises, line fishing, seabird and marine mammal watching (Figure 2). Wildlife viewing is the most common activity, with 54% of respondents noting marine mammals and 78% noting seabirds (including penguins) as a key attraction of their tour (Figure 3). Many operators (52%) noted a wide range of attractions ranging from historic sites to sea caves and the general marine vista. These attractions, grouped as scenery, in Figure 3, account for the large proportion of operators in this category.

Dolphins were the species targeted most frequently, with 2% of operators identifying them as a key attraction. There are four dolphin species commonly sighted in New Zealand waters: common (Delphinus delphis), bottlenose (Tursiops truncatus), dusky (Lagenorhynchus obscurus) and Hector’s dolphin (Cephalorhynchus hector), the latter endemic to New Zealand (Slooten and Dawson, 1994). New Zealand fur seals (Arctocephalus forsteri) and penguins were the next most commonly targeted species. The viewing of penguins involves blue penguin (Eudyptula minor), Fiordland crested penguin (Eudyptes pachyrynchus) and the yellow-eyed penguin (Megadyptes antipodes), recognised as the world’s rarest penguin. Thirteen respondents identified whales as a target attraction. New Zealand is the only place in the world where resident sperm whales are close enough to the shore to be viewed on a commercial basis. Other transient cetaceans are also viewed on an opportunistic basis. One of these is the rare southern right whale which has been sighted regularly in New Zealand waters for the past few years (Department of Conservation, 1995).

Many wildlife enthusiasts have a particular fascination for marine mammals (Kovacs and Innes, 1990; Simonds, 1991). Commercial whale watching worldwide has grown spectacularly over the past decade, almost doubling annually in terms of revenue and passengers (Hoyts, 1995). The abundance of marine mammals inhabiting New
Figure 1. Seasonal pattern in visitor numbers participating in marine tourism activities compared with the trend in total international visitor arrivals for the 1994 season (Market research NZTB/Statistics New Zealand).

Figure 2. Type of activities incorporated in New Zealand’s marine tourism industry (n=190, error bars represent one standard error).

Figure 3. Key attractions targeted by marine tourism operators in New Zealand (N=190).
Zealand's coastal waters will continue to attract increasing numbers of visitors, creating commercial pressure to expand the current level of activity. Care must be taken to weigh up the threats and opportunities with management decisions based upon rigorous environmental impact assessment.

To date there is no system in New Zealand which can be used to ensure operations are ecologically sound. To achieve sustainable management there is a need for industry-wide environmental standards ensuring operators have adequate guidelines and knowledge about the ecosystem in which they are operating. The governmental body charged with conservation matters in New Zealand is the Department of Conservation, consequently it has the most significant and direct role in administering marine tourism. It must be noted that where marine mammals are not encountered, the Department has no powers of regulation over marine based tour operations, such as seabird or general aquatic viewing. The Department has adopted a very precautionary approach to any increased commercial marine mammal watching (Baxter and Donoghue, 1995). The lack of information to guide management necessitates this approach. All marine mammals around New Zealand are fully protected under the Marine Mammals Protection Act 1978. In 1990 regulations (promulgated under the Act) were introduced, establishing a permit system specifically for the control and management of marine mammal watching. These were revised in 1992 in response to the rapid growth of marine mammal watching around the country. The regulations are based upon research conducted overseas, and the results of two New Zealand studies which assessed the impact of marine mammal watching on sperm whales (Baker and MacGibbon, 1991; Gordon et al., 1993).

Few respondents noted marine reserves as a major attraction on their tour (Figure 3). This may reflect the small number of marine reserves in the country (13 have so far been established under New Zealand's Marine Reserves Act 1971) and their location generally away from key tourist destinations. In addition, 11 of the 13 protected areas have been created within the past five years. Recovery of natural resources in an undisturbed area is a gradual process, hence changes in the environment generated by protection may not yet be clearly visible.

Environmental Concerns

Respondents were given a list of marine attractions and asked to note any which they considered particularly vulnerable to pressure from tourists in their locality. In addition they were asked to identify how much of a detrimental environmental effect they felt a list of 10 different scenarios could potentially have on the species or habitats visited during a "tour like yours" (responding on a four point scale from 1—major detrimental effect to 4—no detrimental effect).

Respondents were then grouped on the basis of their target attraction. This enabled us to examine the degree to which the operators felt their particular key attraction was vulnerable to tourist pressure and the actions during a tour like theirs, which may have a notable detrimental environmental effect on the key species or habitat identified. None of the four key taxa noted above was regarded as being particularly vulnerable to tourist pressure (Table 2). Concern about actions that might affect the species or habitats targeted related mainly to: increasing amounts of litter, and overcrowding by tourists spoiling the 'naturalness' of the sites visited (Table 3). Very few operators considered that detrimental effects would arise from such actions as touching, noise, or the general presence of tourists, even though these have been identified elsewhere as potential problems associated with wildlife viewing. Reliant as they are upon sound for communication, prey detection and orientation, marine mammals may be especially vulnerable to noise disturbance (Reeves, 1992). An echolocating animal has the problem of discriminating the echoes from its target from general background noise. Anything which increases the level of background noise, such as vessel traffic, could reduce the efficiency at which it can perform an echolocation task (Gordon et al., 1992), yet none of the operators targeting marine mammals identified noise as a potential concern.

This indicates that targeted animals are either not affected by current levels of marine tourism activity, or that operators are unaware or not prepared to acknowledge an impact. The terms 'potentially' and 'tour like yours' were used to try and take the onus off the individual and remove any inherent bias in the question. If in fact operators do not perceive their type of tour to have any potential effects on the species or habitats targeted it may raise an issue of concern to managers as they encounter the problem of trying to effect change in the industry without willing participants.

Conclusion

New Zealand is endowed with spectacular coastal scenery and unique marine wildlife. Marine-based tourism is likely to become increasingly important in New Zealand. The relatively successful management of marine tourism to date is potentially a result of the industry still being in its early stages of development. As the industry continues to grow there will be an increasing need for proactive coordinated planning if negative impacts are to be minimised and the environmental, social and economic returns maximised.
Table 1. Number of years marine tourism operations have been established in New Zealand.

<table>
<thead>
<tr>
<th>Years of operation</th>
<th>Number of operations</th>
<th>Percent of operators</th>
<th>Cumulative percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5</td>
<td>116</td>
<td>61.4</td>
<td>61.4</td>
</tr>
<tr>
<td>5-10</td>
<td>42</td>
<td>22.2</td>
<td>83.6</td>
</tr>
<tr>
<td>10-15</td>
<td>14</td>
<td>8.4</td>
<td>92.1</td>
</tr>
<tr>
<td>15-20</td>
<td>6</td>
<td>2.2</td>
<td>94.2</td>
</tr>
<tr>
<td>20-25</td>
<td>2</td>
<td>1.0</td>
<td>95.2</td>
</tr>
<tr>
<td>25+</td>
<td>9</td>
<td>4.8</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 2. The number of operators targeting the four most frequently identified attractions and the proportion of those operators indicating the target attraction was vulnerable.

<table>
<thead>
<tr>
<th>Target Attraction</th>
<th>Number of operators targeting the attraction (n=190)</th>
<th>% of operators indicating species vulnerability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dolphins</td>
<td>42</td>
<td>40</td>
</tr>
<tr>
<td>Seals</td>
<td>35</td>
<td>50</td>
</tr>
<tr>
<td>Penguins</td>
<td>35</td>
<td>45</td>
</tr>
<tr>
<td>Whales</td>
<td>13</td>
<td>23</td>
</tr>
</tbody>
</table>

Table 3. Actions that operators identified could have a major to moderate environmental effect on the animals or habitats visited during a tour like theirs (only includes actions of concern identified by > 50% of the operators).

<table>
<thead>
<tr>
<th>Target Attraction</th>
<th>Action of concern</th>
<th>% of operators identifying concern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dolphins</td>
<td>Increase in litter</td>
<td>56</td>
</tr>
<tr>
<td></td>
<td>Overcrowding of natural sites</td>
<td>54</td>
</tr>
<tr>
<td>Seals</td>
<td>Increase in litter</td>
<td>63</td>
</tr>
<tr>
<td></td>
<td>Overcrowding of natural sites</td>
<td>50</td>
</tr>
<tr>
<td>Penguins</td>
<td>Increase in litter</td>
<td>52</td>
</tr>
<tr>
<td>Whales</td>
<td>Overcrowding of natural sites</td>
<td>50</td>
</tr>
</tbody>
</table>
This paper highlights some of the issues emerging in New Zealand’s marine tourism industry. In particular, the operators perception that tourism does not impact the environment, despite the long catalogue of literature documenting the environmental impacts which result from tourism. Managers are likely to encounter increasing resistance as they try to regulate the industry. To achieve sustainable management it is vital that research and monitoring keeps pace with rising tourist numbers. Resistance to regulation will be alleviated if operators and the general public can see management policies are not formulated in an ad hoc manner but are based upon robust, scientifically defensible research.

References


A STUDY ON THE PHYSIOLOGICAL EFFECTS ON THE HUMAN BRAIN WAVES OF ULTRASONIC WAVES CONTAINED IN THE SOUND OF WAVES IN COASTAL AREA

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Abstract: Currently in Japan, for the purpose of health care, relaxation as well as recreation in the coastal area, a research aim at and/or use ocean natural environmental element is conducting and Tassia-Therapia is one of examples. This paper reviews the ultrasonic properties of coastal wave processes and their effect on humans from the viewpoint of relaxation in the coastal area, as well as finding new value in the coastal area, by the ultrasonic which is new evaluating scale. Specifically, the paper describes the characteristics of ultrasonic noise in waves and evaluates their potential to act as a previously unrecognized measure of coastal wave processes and as an influence on human physiology. It is known that these waves reach the brain through the skin and airborne vibrations—these stimuli are believed to have some influence on brain function and information processing. Recent studies in the field of music, for instance from analyses of Gamelan music in Bali, have reported that ultrasonic waves influence the brain by stimulating the alpha wave. To determine the extent of these influences from coastal processes, studies were carried out using both artificially produced ultrasonic noise and actual coastal wave noise. It is expected that application of this result to coastal region may add new menus to the eco-tourism. The implications of these findings for both the measurement of coastal processes and on understanding human interaction with coastal environments are discussed and further research needs outlined.

Keywords: sound of coastal wave, ultrasonic wave, alpha wave

Introduction

According to our questionnaire survey on the appeal of coastal areas, many subjects said that the sound of waves was one of the agreeable environmental factors (Nagata, 1993). The sound of waves differs with the shape of the sandy beach, artificial coast or bay, the incline of the sea floor and other factors. Where the coastline is long, waves break one upon another, producing a sound that can only be perceived as a noise. Studies conducted so far have pointed out that the rhythm and the sound volume of waves are important factors in making people comfortable. In recent years, attempts have been made to apply such findings to the construction of wave-absorbing structures (embankments, breakwaters, etc.) and generate agreeable sounds of waves while analyzing the appeal of the auditory environment in coastal areas (Nadaoka, 1995). In Germany, France and other countries in the Mediterranean area, healing through the use of various factors of the natural environment in the ocean and coastal areas (thalassotherapy) is practiced. Also, intensive efforts are being made to explore ways to utilize environmental resources in coastal areas and, thus, to create a new attractive environment harmonious with nature. In the present study, the sound of waves is assumed to be a new environmental resource in coastal areas. We consider it is important to evaluate sounds inaudible to the human ear (ultrasonic waves) in addition to the audible sound of waves (8Hz to 20kHz). To explain the effects on humans of ultrasonic waves contained in the sound of waves, we will provide the results of physiological measurements and sensory tests (evaluation of sound quality). We will also discuss the properties of the sound of waves and ecotourism.

Method of Experiment

In the experiment, 14 students with normal hearing (nine male students and five female students) were confined in an anechoic room, as shown in Figure 1, and exposed to ultrasonic waves recorded in a natural coast and artificially generated ultrasonic waves, and their brain waves were recorded to see how the appearance of the brain waves varied with sound pressure and frequency. The experiment was conducted according to the following method.

Implements for the Experiment and Sounds Presented to Subjects

Figure 2 shows the arrangement of implements for the experiment and the scene of the experiment. As shown in Figure 3, sounds presented to subjects were of three types: audible sounds, artificial ultrasonic waves superimposed on audible sounds, and natural ultrasonic waves superimposed on audible sounds. The subjects were exposed to each type of sound on the master tape for 26 minutes. Three kinds of sound fields were created by combining different degrees of sound pressure (35dB, 45dB and 55dB) and different frequencies (25kHz, 35kHz and 45kHz). Figure 4 shows the frequency bandwidth of natural ultrasonic waves. For each subject, the brain waves on both sides of the front of the head as well as the pulse were recorded. To find out how the sound of waves was perceived, sensory tests using 25 pairs of adjectives on the seven-grade evaluation system were performed.
Figure 1. Three types of the sound source.

Figure 2. Frequency bandwidth of natural ultrasonic waves.
Results of Measurement

Effects of artificial ultrasonic waves with different frequencies

A comparison of the effects of supersonic waves with three different frequencies (25kHz, 35kHz and 45kHz) showed that the greatest change in brain waves occurred when the frequency was 25kHz. Some subjects showed brain wave changes in response to both 25kHz and 35kHz waves. It can be inferred from this that somewhere between 25kHz and 35kHz and closer to 25kHz, there is a certain frequency which produces the greatest effect on brain waves. Table 1 gives the number of subjects whose alpha wave appeared in response to ultrasonic waves with each chosen frequency.

Table 1. Number of subjects observed alpha wave vital in each frequency (in case artificial USW)

<table>
<thead>
<tr>
<th>Frequency (kHz)</th>
<th>No. of Subjects (total 14)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Artificial USW</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>45</td>
</tr>
</tbody>
</table>

When the frequency was 25kHz, the alpha wave was activated in 13 out of 14 subjects. Figure 3 shows a typical example of how the brain waves of such subjects changed with the passage of time.

Effects of Artificial Ultrasonic Waves with Different Degrees of Sound Pressure

As shown in Table 2, in which the effects of ultrasonic waves with different degrees of sound pressure (35dB, 45dB and 55dB) are compared, 13 out of 14 subjects showed much activity in their alpha wave when the sound pressure was 45dB. Eight subjects showed alpha-wave activity also when the sound pressure was 55dB. It can be inferred from this that somewhere between 45dB and 55dB there is a sound pressure zone which produces the greatest effect on brain waves. Figure 6 shows a typical example of how the brain waves of such subjects changed with the passage of time.

Table 2. Number of subjects observed alpha wave vital in each sound pressure (in case artificial USW)

<table>
<thead>
<tr>
<th>Sound Pressure (dB)</th>
<th>No. of Subjects (total 14)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Artificial USW</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>55</td>
</tr>
</tbody>
</table>

Effects of Natural Ultrasonic Waves With Different Degrees of Sound Pressure

As shown in Table 3, both natural and artificial ultrasonic waves elicited the greatest reaction when the sound pressure was 45dB.

Table 3. Number of subjects observed alpha wave vital in each frequency (in case natural USW)

<table>
<thead>
<tr>
<th>Frequency (kHz)</th>
<th>Sound Pressure (dB)</th>
<th>No. of Subjects (total 14)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Artificial USW</td>
<td>35</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>45</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>55</td>
<td>8</td>
</tr>
</tbody>
</table>

Comparison of Artificial and Natural Supersonic Waves

Figure 7 shows how artificial and natural ultrasonic waves produced different results. Brain waves reacted more strongly to natural supersonic waves than to artificial ultrasonic waves. The probable explanation is that, whereas artificial ultrasonic waves are made of a single frequency, natural ultrasonic waves have a wide range of frequencies, as shown in Figure 4.

Reaction Time of Brain Waves

Allowing for individual variation, subjects showed reaction in their brain waves (the alpha wave) 20 to 40 seconds after they were exposed to artificial and natural ultrasonic waves. Generally, the reaction time of brain waves was short when the audible range was narrow and long when the audible range was wide. Table 4 shows the reaction time of the brain waves of all subjects.

Table 4. Reaction time of brain waves.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Max. audible sound</th>
<th>Reaction speed (sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO1</td>
<td>(KHz)16.55</td>
<td>27</td>
</tr>
<tr>
<td>NO2</td>
<td>16.75</td>
<td>28</td>
</tr>
<tr>
<td>NO3</td>
<td>14.25</td>
<td>16</td>
</tr>
<tr>
<td>NO4</td>
<td>16.5</td>
<td>37</td>
</tr>
<tr>
<td>NO5</td>
<td>16.5</td>
<td>35</td>
</tr>
<tr>
<td>NO6</td>
<td>16.25</td>
<td>34</td>
</tr>
<tr>
<td>NO7</td>
<td>15.75</td>
<td>26</td>
</tr>
<tr>
<td>NO8</td>
<td>14.25</td>
<td>18</td>
</tr>
<tr>
<td>NO9</td>
<td>15.75</td>
<td>25</td>
</tr>
<tr>
<td>NO10</td>
<td>16.25</td>
<td>41</td>
</tr>
<tr>
<td>NO11</td>
<td>14.5</td>
<td>23</td>
</tr>
<tr>
<td>NO12</td>
<td>15.25</td>
<td>30</td>
</tr>
<tr>
<td>NO13</td>
<td>15.75</td>
<td>32</td>
</tr>
<tr>
<td>NO14</td>
<td>16</td>
<td>28</td>
</tr>
<tr>
<td>Average</td>
<td>15.71</td>
<td>28.57</td>
</tr>
</tbody>
</table>
Figure 3. Alpha wave appearance by different frequency (in case subject No.3, 45dB).

Figure 4. Alpha wave appearance by different sound pressure (in case No. 13, 25 KHz).

Figure 5. Alpha wave appearance by different USW sources (in case subject No.7, 25 KHz).
Psychological Evaluation

To find out how sounds containing ultrasonic waves and sounds not containing them are perceived differently, the subjects were asked to describe their feelings by using 25 pairs of adjectives such as clear-turbid, pleasing to the ear-jarring, rhythmical-unrhythmical and warm-cold when they were exposed to sounds. The results (profile) are shown in Figure 6.

The results are summarized as follows:

(1) From a comparison of the effects of ultrasonic waves with various degrees of sound pressure, it was found that there was a sound pressure around 45dB which affects the alpha wave most strongly. Through an experiment in which subjects were exposed to artificial ultrasonic waves with various frequencies, it was found that there was a frequency around 25kHz which most strongly affects humans.

(2) It was found that natural ultrasonic waves produce greater effects on human brain waves than artificial ultrasonic waves.

(3) It was demonstrated that, allowing for individual variation, it takes 20 to 40 seconds for ultrasonic waves to produce effects on human brain waves (the alpha wave).

Conclusion

In the present study we described the experiment designed to find out about the physiological effects on humans (the activation of the alpha wave of brain waves) of ultrasonic waves contained in the sound of waves. The experiment demonstrated that exposure to ultrasonic waves activates brain waves. When the alpha wave appears on a person's brain waves, it means that the person is undisturbed, if not comfortable or relaxed. The way waves are generated on the coast and the sound of such waves differ with the shape of the coast. We believe that our study will provide basic data in the process of creating an attractive coast by making use of the results of evaluation of the coast in terms of the sound of waves.

References


