

KIA ANGI PUKU TO HOE I TE WAI: OCEAN NOISE AND TOURISM

EMMANUELLE MARTINEZ* and MARK B. ORAMS†

*Coastal-Marine Research Group, Massey University, North Shore MSC, Auckland, New Zealand

†New Zealand Tourism Research Institute, AUT University, Auckland, New Zealand

Ubuntu, a traditional African concept, acknowledges interconnectedness between humans and between humans and nature. This concept is also central to the worldview of Maori, the indigenous people of Aotearoa/New Zealand, where the phrase *kaitiakitanga* is used to express the guardianship responsibilities Maori have with all living things. Such indigenous paradigms are pertinent to the issue of ocean noise, including the effect of human induced ocean noise on cetaceans. Few studies have focused on quantifying sound produced by tour boats and their effects, nor has research been conducted on the deliberate use of sound to create and enhance interactions between tourists and targeted species. It is argued here that an alternate approach to management is needed to minimize any potential effects on targeted species.

Key words: Whale watching; Swim-with-dolphins; Noise; Sound; Management

Introduction

In February 2009, the authors attended a public presentation on the issue of noise in our oceans. The talk was given by US-based marine acoustics researcher, Dr Christopher Clark. Because he was a visitor to Aotearoa/New Zealand, he was given a traditional *mihi* or greeting from representatives of local indigenous Maori. As part of this *mihi*, Rawiri Paratene shared a treasured expression his grandfather had gifted him: *kia angi puku to hoe I te wai*, which when translated means “move your paddle silently through the water.” As with many such phrases passed down the generations within cultures that have a strong oral tradition, this proverb

in Maori has multiple meanings. Rawiri explained that for Maori, there are many reasons why paddling your *waka* (canoe) silently is important. Efficient paddling technique produces little disturbance of the water, and therefore, little noise. This was a valuable skill because Maori needed to be able to move through dangerous areas quietly to avoid or to make an attack on rival *iwi* (tribes). *Kai-moana* (sea-food) is an important component of the Maori diet, and when fishing and approaching prey, stealth was a significant contributor to success, thus silent paddling was of considerable assistance. Finally, respect and reverence for the realm of *Tangaroa* (the god of the seas) was considered of paramount importance if one was to remain in his favor,

and to avoid bad weather or accident. Thus, for Rawiri, his grandfather's expression holds great significance and wisdom. It is also pertinent to the emerging issue of noise in our oceans.

The Issue

Because of the acoustic and visual properties of water, sound is of great significance to marine creatures (Hildebrand, 2005). More specifically, sound travels faster and further underwater than it does in air, and conversely, visible light is compromised underwater and diminished by depth, turbidity, and the physical make up of saltwater. Thus, in simple terms, it is far easier and more efficient to produce and listen to sounds underwater than it is to see. The consequence of these phenomena is that marine creatures have evolved to use sound in a wide and complex array of ways. They use it for communication, navigation, locating food and stunning it, as well as confusing both prey and predators alike. In particular, for large migratory species, such as the great whales that need to navigate over great distances and to locate one another, sound is fundamentally important (Committee on Potential Impacts of Ambient Noise in the Ocean on Marine Mammals & National Research Council, 2003).

The world's oceans are far from "silent," as Jacques Cousteau described them in 1953 (Cousteau & Dumas, 1953). Ambient noise in many of the world seas and oceans (especially in the northern hemisphere) has increased by an average of 3dB per decade over the past 50 years (Hatch & Wright, 2007; McDonald, Hildebrand, & Wiggins, 2006; McDonald, Hildebrand, Wiggins, & Ross, 2008). This increase is primarily due to human activities. Shipping and other marine transport, fishing activities, drilling and ocean exploration, construction and land "reclamation," dredging and spoil dumping, military activity, and tourism have all become major sources of underwater noise. Three specific additional activities have also become more commonplace: a) the use of explosives to assist with removal of rocks and sea-bed areas, which are difficult to dredge; b) the use of passive low-frequency sonar by the military to detect movement of vessels (especially submarines); and c) the use of sonic "air-guns" as seismic survey tools to scan for undersea oil and gas reserves. Ambient noise levels

are predicted to increase further due to the significant reduction in ocean's ability to absorb sound, a consequence of climate change induced ocean acidification. As a result, sound propagation distances are expected to increase by a minimum of 30% by 2050 (Hester, Peltzer, Kirkwood, & Brewer, 2008).

Cetaceans and Sound

It has long been recognized that human produced underwater sound has impacts on marine mammals (Schevill, 1968) and other marine life (Banner & Hyatt, 1973). As human marine-based activities and the related sound produced have increased, concern has grown regarding potential effects on cetacean auditory systems. More specifically, these concerns focus on the effects on cetacean navigational, foraging, reproductive, and hearing capabilities (Richardson, Green, Malme, & Thomson, 1995), as well as their immune functions and overall health (Romano et al., 2004). Nonauditory effects of acoustic impacts (Jepson et al., 2003) are also of concern (Weilgart, 2007). For example, it is possible that noise could affect cetaceans indirectly through their prey. Fish show permanent and temporary hearing loss, stress, and behavioral reactions to noise (Engås, Løkkerborg, Ona, & Soldal, 1996; McCauley, Fewtrell, & Popper, 2003; Pearson, Skalski, & Malme, 1992; Sarà et al., 2007). It is argued that these impacts, particularly their cumulative longer term effects, could contribute to population level declines in species viability, abundance, and distribution (International Fund for Animal Welfare [IFAW], 2008).

A wide range of studies have confirmed that underwater sounds associated with human activities affect cetaceans. These include: dredging and construction, oil and gas drilling, marine geophysical surveys, military and other sonar, "pingers," and other acoustic alarms, transportation, seismic explosions, and oceanographic research (for reviews see Acoustic Ecology Institute [AEI], 2008; G. Gordon, Leaper, Hartley, & Chappell, 2003; IFAW, 2008; D. P. Nowacek, Thorne, Johnston, & Tyack, 2007; Richardson et al., 1995; Weilgart, 2007). While it has not been empirically proven, claims have been made that a number of these activities could have been associated with mass strandings (Cox et al., 2006; Jasny, Reynolds, Horowitz, &

Wetzler, 2005; Jepson et al., 2003; Parsons, Dolman, Wright, Rose, & Burns, 2008).

In addition to general increases in ambient noise, sound associated with specific activity (which is discrete in terms of time frame and location), is also increasing (AEI, 2008; IFAW, 2008; McDonald et al., 2006). While commercial shipping is the main contributor to ambient noise, recreational watercraft and smaller commercial vessels, such as those used for whale watching, can contribute to noise on a regional and local scale (AEI, 2008).

A number of studies have shown that cetaceans respond acoustically to noise generated by vessels in a variety of ways. These responses include changes in whistle production rates (e.g., Buckstaff, 2004; Lemon, Lynch, Cato, & Harcourt, 2006; May-Collado & Wartzok, 2008; Scarpaci, Bigger, Corkeron, & Nugegoda, 2001; Van Parijs & Corkeron, 2001); vocalization (Finley, Miller, Davis, & Greene, 1990; Holt, Noren, Veirs, Emmons, & Veirs, 2009; Schiefele et al., 2005); signal frequency (Lesage, Barrette, Kingsley, & Sjare, 1999; May-Collado & Wartzok 2008); and call duration (Buckstaff, 2004; Foote, Osborne, & Hoelzel, 2004; Lesage et al., 1999). Cetaceans have also been shown to increase their swimming speed and move away from the source of sound (Evans, Canwell, & Lewis, 1992; G. Gordon et al., 1992). It has been argued that if such noise persists over a long period of time (in some cases several years), cetaceans may abandon an area altogether (e.g., Bryant, Lafferty, & Lafferty, 1984; Morton & Symonds, 2002).

There is, however, substantial variation in cetacean responses to underwater sound. Experiments have shown that a given level of sound can cause a wide range of responses, from no detectable change in behavior to dramatic avoidance, cessation of feeding, or reduced reproductive rates (Southall et al., 2007). In addition, there are also intra- and interspecies variations, as well as variability, in reactions due to different physical and biological factors. For example, a number of studies have identified that reactions are influenced by the volume and type of noise, vessel characteristics, and the hearing capability of the animals (Blane, 1990; Kruse, 1991; Lesage et al., 1999; Watkins, 1986). Au, Benoit-Bird, and Kastelein (2007) indicated that in a quiet environment, harbor porpoises (*Pho-*

coena phocoena) have a shorter range at which they can detect sound, when compared with bottlenose dolphins (*Tursiops* sp.) in the same location. Consequently, they conclude that it is more difficult for harbor porpoises to inhabit a noisy environment. Thus, the influence of sound on cetaceans is a high variable and influenced by a wide range of factors.

Cetacean-Based Tourism and Sound

It is widely accepted that understanding and managing the potential impacts of human activities, such as whale watching (any commercial tour interacting with cetaceans in the wild) on cetaceans, is critical to the long-term conservation of targeted species. Although this activity is widely viewed as a viable, sustainable ecotourism activity, research on a diverse range of species at a wide range of locations clearly identifies that whale watching is not benign (e.g., Lusseau & Bejder, 2007). Whale watching (with the exception of land-based observation) does have effects on the whales and dolphins targeted, and these effects can have long-term detrimental consequences for these animals. The growing body of literature demonstrating impacts in different locations and with a range of species has led to some arguing that whale watching, if not carefully managed, is another form of harmful exploitation of cetaceans (Orams, 1999).

To illustrate, over the past 20 years, the following short-term effects of tourism activities on cetaceans have been detected: changes in behavioral state/activity (e.g., Constantine, Brunton, & Dennis, 2004; Dans, Crespo, Pedraza, Degradi, & Garaffo, 2008; Lusseau, 2003b, 2004b; S. M. Nowacek, Wells, & Solow, 2001; Ribeiro, Viddi, & Freitas, 2005; Stockin, Lusseau, Binedell, Wiseman, & Orams, 2008; Williams, Lusseau, & Hammond, 2006); group cohesion (e.g., Bejder, Dawson, & Harraway, 1999; Miller, Solangi, & Kuczaj, 2008; S. M. Nowacek et al., 2001; Ribeiro et al., 2005); dive intervals (e.g., Janik & Thompson, 1996; Lusseau, 2003a; Miller et al., 2008; S. M. Nowacek et al., 2001; Richter, Dawson, & Slooten, 2001); direction of travel (e.g., Goodwin & Cotton, 2004; Lemon et al., 2006; Mattson, Thomas, & St. Aubin, 2005; Williams, Bain, Ford, & Trites, 2002); and habitat use (Baker & Herman, 1989;

Bejder et al., 2006b; Lusseau, 2005; Lusseau & Higham, 2004; Ostman-Lind, Driscoll-Lind, & Rickards, 2004; Sorensen, Medved, Hyman, & Winn, 1984). Furthermore, more recent research has linked the short-term effects of tourism with long-term biological consequences for the viability and fitness of targeted animals (e.g., Bejder et al., 2006b; Lusseau, Lusseau, Bejder, & Williams, 2006; Williams et al., 2006).

This body of research has primarily concentrated on detecting changes in the targeted cetacean behavior as a consequence of the approach and close proximity of tour vessels and, in some cases, tourists swimming in the water nearby. Few of these studies have focused on the specific cause of the disturbance and have tended to measure the speed, approach distance and direction, as well as number and size of vessels. Therefore, little is known about whether vessel design, propulsion type, vessel construction, or other more specific variables have influence on responses of marine mammals. More specifically, while many studies have pointed to noise produced by cetacean-based tour vessels as a potential influential factor, very few have quantified and tested different types and volumes of underwater sound emitted by those vessels (e.g., Buckstaff, 2004; Erbe, 2002; Holt et al., 2009; Jensen et al., 2009). Furthermore, to our knowledge no studies have specifically examined the deliberate use of sound as a mechanism to create and enhance interactions between tourists and cetaceans.

The Deliberate Use of Underwater Sound During Cetacean-Based Tourism

In the 1970s, New Zealand diving and marine exploration pioneer, Wade Doak, founded an initiative he called Project Interlock (refer to Doak, 1981, 1988, 1993). He, his family, and friends explored opportunities to view and interact with wild dolphins at sea from a sailing catamaran off the coast of northern New Zealand. In exploring these interactions, Doak and colleagues conducted a number of experiments in transmitting sounds to the dolphins. They used a range of mechanisms, including using a bell, a whistle, playing musical instruments, and broadcasting music through underwater speakers. Doak reported a variety of responses in the dolphins, which he interpreted as

positive reactions. While these experiments formed a part of his much wider interest in an exploration of cetacean cognitive abilities, he was positive dolphins responded to their use of music and other sound.

Doak is not alone in his attempts to explore options to interact with cetaceans, special relationships between humans and dolphins, in particular, have been reported over centuries (e.g., Pliny the Elder in 70 AD; Pliny L' Ancien, 1955) and, in more recent times, interacting with cetaceans has become a booming commercial tourism industry (Hoyt, 2001; O'Connor, Campbell, Cortez, & Knowles, 2009). As cetacean-based tourism has grown in popularity, so too has the range of techniques and platforms that are used to facilitate these opportunities. Whale watching is now conducted from vessels of all types and sizes, from ocean-going cruise ships to 2-meter sea-kayaks. It is undertaken using of aircraft from land-based observation sites, and in the water using snorkels and masks, as well as SCUBA diving apparatus (Orams, 1999).

In order to reliably sight dolphins and whales, tour operators have taken advantage of a number of naturally occurring phenomena, such as migratory pathways, feeding, breeding, and resting sites. Operators have also deliberately developed mechanisms to locate cetaceans (using spotting aircraft, sighting networks, and hydrophones) and techniques to facilitate close approaches (by feeding dolphins, towing swimmers on "mermaid lines," and placing swimmers in the water in close proximity to dolphins and whales; Hoyt, 2001; Samuels, Bejder, Constantine, & Heinrich, 2003).

The use of artificial underwater signals or sounds by tour operators and private recreational tourists to interact with cetaceans has been relatively common. In particular, swim-with-dolphin tour operators have encouraged swimmers to use several techniques to "entertain" the dolphins. These include singing, squealing, bubble-blowing, rewinding underwater cameras, tapping rings on dive masks, clicking fingers, playing with wetsuit zips, and making squeaky sounds around the vessel (personal observations, both authors). The production of such sounds has not, to our knowledge, been empirically investigated with regard to its effect on the dolphins. This is surprising, given the relatively common practice of tour operators encouraging

tourists to participate in such activities, and the widely reported concerns regarding noise pollution and its impacts on cetaceans. Perhaps the production of such sounds by tourists is considered relatively low level, intermittent, and of low priority with regard to the range of other potentially harmful effects resulting from tourism activities. However, such an assumption appears dangerous when the range of impacts that have now been shown is considered.

In New Zealand, the issue of tourists' deliberately using sound to interact with dolphins has been elevated in priority. Indeed, over the past few years, Hector's dolphin (*Cephalorhynchus hectori hectori*) swimming tour operators at Akaroa (Canterbury, South Island) have been providing stones to their clients onboard their vessels, and encouraging them when swimming, to bring them together under the water to create sounds (clicks, bangs, and rhythms). Anecdotally, tourists and their onboard guides report sustained and closer interactions between the dolphins and the swimmers. Such activities are problematic, in that intuitively most tourists (and indeed many operators) assume that because it is the dolphins "choosing" to approach and interact, there are no detrimental consequences. The "if they don't like it, they can just leave" response is common and appears rational. However, empirical evidence is clear with regard to vessel and swimmer approaches. Even if avoidance is not a consequence, dolphins and whales can be detrimentally affected by interactions with tourists. Thus, sustaining or enhancing interactions with dolphins by using artificial means such as clicking stones underwater, may not be in the best interests of the dolphins. This is particularly of concern at Akaroa, because the species of dolphins targeted for swim-with tours is the Hector's dolphin. This species is endemic to New Zealand, endangered and already under significant pressure from other challenges such as by-catch mortality, declining abundance of prey, and habitat degradation.

It is important, therefore, to design and undertake empirical research to assess the effects of deliberate use of sound as a component of tourists' interactions with cetaceans. The Swim-with Hector's Dolphins Tours at Akaroa is a good place to start and we are currently conducting such a study (Martinez, Orams, Pawley, & Stockin, in press).

Assessing Impacts of Tourism-Caused Sound on Cetaceans

Conducting research on impacts of tourism on cetaceans is challenging. However, the use of innovative techniques and good study design can lead to the successful investigation of the issue (Orams, 2004). Bejder and Samuels' (2003) review of research on the impacts of tourism activities on cetaceans indicated that sound scientific evidence, in particular, can be successfully gathered if a study incorporates: multiple research platforms; appropriate behavioral sampling techniques; simultaneous measurement of multiple responses; supplemented opportunistic sampling with controlled experiments; analysis of both existing and historical data (when available); and innovative technologies (e.g., acoustic tagging, remote monitoring; refer to Bejder & Samuels, 2003, for a review). Thus, a variety of methods and accepted research protocols now exist for studying and assessing the impacts of cetacean-based tourism on the targeted animals.

Defining the real costs of whale watching on targeted populations is also challenging. Not only is it difficult to determine the biological significance of impacts, but it can also take decades to show an effect on the viability of targeted populations. An important consideration is whether short-term behavioral measures are suitable as indicators of long-term biologically and ecologically significant impacts (Beale & Monaghan, 2004; Gill, Norris, & Sutherland, 2001).

A number of authors have argued that attention needs to be focusing on observing and measuring potential indicators of long-term tourism-induced stress (Orams, 2004; Wright et al., 2007) and interpreting observed behaviors in the context of population-level consequences and, in particular, acceptable noise exposure levels (D. P. Nowacek et al., 2007). It is, however, difficult to determine what specific exposure levels (i.e., thresholds) might result in behavioral avoidance or displacement and, therefore, to specify what noise levels are acceptable (D. P. Nowacek et al., 2007). Nevertheless, it is important to establish baseline data on background noise. This will allow an assessment of changes in cetacean behavior and an analysis of potential correlations between noise level changes and behavioral changes (Lemon et al., 2006).

Detailed monitoring and measurement of animal behavioral responses and ambient noise exposure levels could help resolve many questions about short-term reactions (Erbe, 2002; D. P. Nowacek et al., 2007). Tag/telemetry systems could also help gather data on behavior/stress when underwater and noise level at an individual's specific location (AEI, 2008; D. P. Nowacek et al., 2007). Sound propagation and impact assessment models could be developed to identify scenarios where noise impacts could be significant (Erbe, 2002; Jensen et al., 2009; D. P. Nowacek et al., 2007). Models could include zone of audibility, masking and responsiveness, exposure levels, and likelihood of auditory injury (Erbe, 2002; Holt, 2008). Erbe and Farmer (2000) created, for example, a software model to estimate zones of impact on cetaceans around anthropogenic noise.

While there are a variety of tools for researchers to explore the effects of sound resulting from marine mammal tour operations, the lack of basic knowledge about most targeted populations inhibits researchers' abilities to inform management regarding suitable policies to minimize impacts.

Management of the Industry: A Way Forward?

The management of the exponential growth of the whale-watching industry has been a challenge (e.g., Evans, Panigada, & Pierce, 2008; Lusseau, 2004a). Although the potential effects of the industry have been widely flagged, the success (or otherwise) of management regimes to minimize such effects has not been addressed to the same degree (Higham, Bejder, & Lusseau, 2009). Casagrandi and Rinaldi (2002), for example, argued "that it is difficult, if not impossible, to formulate policies that guarantee that tourism can be maintained for a long time without severely impacting on the environment" (p. 1).

One of the difficulties is to translate observed impacts into effective management guidelines which can minimize or eliminate those impacts. Furthermore, while research may demonstrate short-term effects, it may not be possible to determine whether these effects will result in long-term biologically significant impacts on the observed population (Wright, 2006). Further challenges are related to the difficulties inherent in research on cetaceans,

namely whether claimed behavioral responses to disturbance have been interpreted correctly (e.g., Beale & Monaghan, 2004; Bejder, Samuels, Whitehead, & Gales, 2006a; Bejder et al., 2006b; Gill et al., 2001).

Another problem is related to the huge variation in management regimes currently being applied around the world. These range from no guidelines or regulation at all to highly regulated government licensed industries. This variability is inconsistent and highly fragmented (Garrod & Fennell, 2004). But are management measures effective? Research needs to help and guide managers to: a) mitigate harassment and disturbance both in the short and long term; and b) decide what options really do work. Thus far, what is emerging is that voluntary and industry led codes of conduct have limited success (e.g., Allen, Smith, Waples, & Harcourt, 2007; Constantine et al., 2004; Scarpaci, Dayanthi, & Corkeron, 2003; Scarpaci et al., 2004; Wiley, Moller, Pace, & Carlson, 2008). In addition, even when regulations do exist, there are significant challenges in their implementation, especially in their consistent application and enforcement (Orams, 2004).

As a consequence of the growing recognition of the effects of whale watching, there has been a push for a shift in attitudes towards management where the onus of proof is placed on the industry itself to demonstrate it is environmentally sustainable (Bejder et al., 2006b; Constantine & Bejder, 2008; Mangel et al., 1996). The precautionary principle is increasingly being advocated as a fundamental basis which should under-pin management regimes for cetacean-based tourism in the face of uncertainty (e.g., Principle 15 of the UNCED 1992-The Rio Declaration). However, Heazle (2006) used the example of the International Whaling Commission and argued that while the precautionary principle has its benefits, its vagueness (how much precaution is enough) and its openness to interpretation can also result in its application creating (instead of limiting) risks and uncertainty.

Higham et al. (2009) identified a lack of a comprehensive integrated management framework for cetacean tourism and, as a result, proposed an integrated and adaptive management model. They claim that this model not only addresses the current shortcomings in the long-term sustainable management of the whale tourism industry (Higham &

Bejder, 2008), but also responds to the growing recognition of the role of scientists in helping managers to achieve sustainability. They argue that decision analysis models, for example, can be used to investigate the consequences of various management policies to assess the environmental and economic risks incurred when establishing those policies (Lusseau, 2004b). Regions where such models can be applied could be used as a baseline for other areas where data on impact assessment are unavailable (e.g., where whale watching is about to be developed).

In considering this approach to cetacean responses to noise levels, there are limited data available and, as a consequence, little to guide management decisions. Wright et al. (2007) proposed that the adaptive management of noise impacts could be linked with well planned long-term studies that take into account uncertainties about the population level impacts of noise on the targeted species. They recommended careful extrapolation of data from other species. The monitoring of ambient noise levels and the use of noise impact assessment models (e.g., Erbe, 2002) could also help develop effective mitigation measures.

An alternate approach related to mitigation of potential risk of harm could be used. If it is accepted that minimizing underwater noise is an important objective, then research effort can be directed at measuring sources of noise and devising means of mitigating their effects. More specifically, if we are able to understand the frequency, timing, and significance of the use of sound by the cetaceans targeted for tourism, we could deliberately seek to reduce the amount of sound produced by such operations at those frequencies, times, and locations. For example, through research it is possible to gain an understanding of the frequency of communication whistles and clicks from dolphins at a particular location. Research can also establish when and where these sounds are used for particular tasks, such for foraging. If this is understood, then tourism operations can be managed by restricting tourist activity at particular times and in particular locations so as to minimize potential disturbance to the targeted marine mammals.

This kind of approach to research is potentially more cost effective and more likely to mitigate negative impacts on the targeted species. What we are advocating here is that rather than direct research

effort at quantifying and demonstrating an impact and then advocating for management change, we should direct our research effort at minimizing any potential effect through a considered understanding of the cetaceans' needs. This kind of approach is also consistent with the precautionary principle and well suited to an adaptive management type of approach. To give specific examples of how this could work in practice: if we know a particular location and time of day is important for resting, then we should ban tourism activity from that location at that time. Conversely, if we know that a particular location and time is typically used for social interaction, then let's permit the tourism activity to occur at that place and at that time. Similarly, if we know that a particular species uses a certain frequency range for communication, then we should ensure that tour vessels do not emit sounds at that frequency range or at a volume that masks such communication.

Current approaches to managing cetacean-based tourism have concentrated on such issues as restricting numbers of vessels, minimum approach distances, maximum approach speeds, and approach direction. In considering the potential effects of sound (deliberate or otherwise) on cetaceans, it seems likely that a similar kind of approach will be taken. That is, management will attempt to control vessel types, require certain propulsion systems, and ban or curtail the deliberate use of sound. Such an approach seems, to us, to perpetuate a management model that has not been overly successful in reducing the impacts of cetacean-based tourism to date. What we are advocating is that rather than scientists being required to 'prove' tourism activities negatively effect targeted species before management is designed to address the issue, an alternate approach is needed. Namely, we accept that we need to do all we can to minimize the potential effects that vessels, tour operations, and the sounds they produce can have. Research effort at designing quieter vessels and other actions intended to minimize underwater noise must be a better way forward.

Conclusion

For the Maori in Aotearoa/New Zealand, a number of important concepts are central to their world-

view (Cheung, 2008). *Kaitiakitanga* is the expression which is used to describe the duty of care or responsibility that Maori consider central to their relationship with nature. Translated it means guardianship or stewardship, and it implies that there are *kaupapa* (values) and *tikanga* (codes of behavior) that guide this relationship. For Maori, nature and other living things, ancestors and spirits, and the world are connected and interdependent. This paradigm is not unusual in indigenous cultures (e.g., the spirit of *ubuntu* of the Xhosa of Southern Africa) and it closely aligns with ecological principles of interconnectedness. The wisdom of these approaches is important with regard to the issue of noise. On its own, noise can be viewed as a relatively transient, and perhaps, discrete issue for marine resource management. It is not as tangible as extractive activities such as fisheries and whaling. It does not appear to be as inherently harmful as dumping, oil spills, or dredging. It is, however, one of those chronic insidious human-made influences that can compromise the integrity and viability of the whole. For Maori, it can be viewed as an insult to *Tangaroa* (the god of the sea). It is a potential exploitation of their *taonga* (culturally significant treasure) and a compromise to their *wairuatanga* (spirituality).

At the presentation attended by the authors in Tamaki-makau-rau (Auckland), marine acoustics expert Dr. Christopher Clark graphically and convincingly presented data that showed the scale of the problem of ocean noise. It was sobering and disturbing, but what was more striking was the reaction and *korero* (speech) of Rawiri Paratene afterwards. It was obvious to us in the audience that he, as Maori, felt deeply insulted by the growing impacts that ocean noise was having. More significant than this, he expressed that he felt diminished by human-kinds collective actions in both producing these sounds and our inaction with regard to trying to reduce them. He expressed, on our behalf, a common deep-seated reaction within each of us present which reemphasized the great dilemma and challenge: How do we manage our use of marine environments so that we do not diminish the special values and significance they have for all of us, human, nonhuman—those who have gone before us—and those who will come after?

Ubuntu In Action

The connection between the world view of indigenous Maori in Aotearoa/New Zealand with “the spirit of *ubuntu*,” which was the theme of the 6th *International Congress on Coastal and Marine Tourism*, is multifaceted. There are strong parallels between the ideals of interconnectedness, mutual dependence, and holism in both Xhosa and Maori culture. It also strikes us that the concept of *ubuntu*, which implies that we must continue to engage with and learn from one another, has serendipitous connections with our attendance at the presentation on ocean noise, given by Dr. Christopher Clark in Tamaki-makau-rau/Auckland earlier that same year. As a US-based scientist, he delivered a talk which reported on research on marine acoustics in the Western academic tradition. This engaged and inspired Rawiri, who in turn shared his grandfather’s *whakatauki* (proverb) from the Maori cultural tradition. This resonated with us and helped inspire our further thinking about our research in the marine tourism setting, and this article is one of the results. Thus, this article itself is a manifestation of the spirit of *ubuntu*. We are grateful to all involved in this process of sharing and learning, and we hope that this article may, in a similar way, become a catalyst for further thinking, research, and work in the area of ocean noise. We consider it an issue of fundamental importance for coastal and marine tourism, and it deserves and needs further emphasis and attention.

Biographical Notes

Emmanuelle Martinez is a Research Associate with the Coastal-Marine Research Group at Massey University, New Zealand. She received her B.Sc. (Hons.) from the University of Leicester, UK, her M.Sc. from the University of Otago, New Zealand, and her Ph.D. from Massey University, New Zealand. Research interests include marine ecology, the behaviour of cetaceans, specifically the effects of tourism, and the conservation of cetacean populations.

Mark B. Orams is Professor at the School of Hospitality and Tourism, and Associate Director of the New Zealand Tourism Research Institute, both at Auckland University of Technology, New Zealand. His research interests span the domains of marine recreation and sport, and coastal tourism management. An internationally respected yachtsman, he also served as Executive Director of the Sir Peter Blake Trust in Auckland between 2004 and 2007.

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