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Forum

International and cross-cultural management in conservation of migratory species

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We live in an age defined by global access to information. This has rapidly increased the scale of our ecological and social awareness (e.g., fair trade movement) and helped us to identify ecological problems and conservation solutions beyond the typical scale of traditional knowledge (i.e., the foraging range of a human group) or political jurisdictions (i.e., state or national boundaries). For the first time, we can comprehend and accumulate biological knowledge for species on the scale of ocean basins (Prince et al. 1992; Burger & Shaffer 2008). Coincident with this knowledge has been the awareness of the global human footprint and some of its consequences, such as, resource over-exploitation, habitat degradation, and species extinctions. Presently, however, we have a mis-match between the scales at which management frameworks operate (local, regional, national) and the scales at which ecosystems or their components exist (Crowder et al. 2006). Significant conservation actions must be made at appropriate scales (ocean basin, continental) for migratory species, particularly when these resources (e.g., blue fin tuna) are subject to extraction by entities with a variety of national and international allegiances (Block et al. 1995).

Geopolitical boundaries arbitrarily delineate sub-populations and hinder effective management and understanding of these species. This is particularly true for far-ranging or migratory species, where foraging, moulting, or nesting ranges can be widely dispersed. Knowledge about habitat connectivity among neotropical migratory songbirds and butterflies that breed in nearctic (North America) and winter in the neotropics (Central and South America) has led to the recognition of flyways or migratory corridors and the development of international conservation consortiums. In 1990, the "Partners in Flight/Compañeros en Vuelo/Partenaires d'Envo", an international conservation programme, was formed in response to growing knowledge of wintering area habitat loss and concerns about population declines. Such international programmes can address conservation issues at the appropriate (and in some cases, global) ecological scale and can be used as models for species not covered by such conservation initiatives.

The *Kia Mau te Tītī mo Ake Tōnu Atu* (Keep the Tītī Forever) project exemplifies a cross-cultural collaboration of scientists and Māori community members to inform co-management of an important seabird resource (Moller et al. 2009a,b). Building upon this established partnership, we initiated the Rakiura Tītī Islands Restoration Project, an international collaboration between a United States non-profit conservation organisation, University of Otago scientists, and Rakiura Māori, with support from New Zealand conservation managers. Our shared resource, taonga tītī (the treasured sooty shearwater, *Puffinus griseus*), brought us together and

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facilitated an effective international partnership with the common goal of restoring damages to the New Zealand sooty shearwater population suffered as a result of the *T/V Command* oil spill off central California, United States in 1998 (Anon. 2004).

Pan-Pacific shearwaters face anthropogenic threats throughout their migratory range both on land (e.g., habitat disturbance, invasive species predation, over-harvesting) and at sea (e.g. oil spills, fishery bycatch, marine pollution, climate change; Croxall et al. 1984). Based on this knowledge, the New Zealand and United States scientists, with *iwi* (tribal) support, proposed to the Command Oil Spill Trustee Council the removal of invasive predators (rats and weka) on nesting islands in the Southern Hemisphere. This was determined to be the best action to restore the equivalent shearwater losses from the oil spill, ensure multi-species benefits to important island ecosystems, and provide the greatest long-term conservation success.

Setting an empowering new precedent, the Command Oil Spill Trustee Council approved this international restoration project in 2003. This decision faced intense scrutiny and public criticism for allocating funds to be spent outside of the United States, where the perceived damages had occurred; however, despite strong opposition, the science-based assessment of threats to the population remained valid and the request for international stakeholder involvement was justified.

Throughout this experience of getting the project approved we found the greatest hurdle to conservation solutions for this migratory species was expanding the scale of the bureaucratic framework to seek and include indigenous stakeholders. And yet, without *iwi* participation, this conservation action would not have been possible. Coordinated knowledge or establishment of a "community of learning" (Robson et al. 2009 this issue) and the regular inclusion of indigenous and non-indigenous peoples who benefit from shared resources will be required to make shared conservation gains in the future (Allen et al. 2009 this issue). In the marine biome, this problem is magnified as resource management and extraction are overseen by fishery management councils (which are industry-based) and international commissions and national treaty boards, such as the North American Free Trade Agreement or NAFTA (politically-based). It is rare to see inclusion of indigenous or scientific stakeholders.

Recent efforts to include a broader international approach to migratory marine species conservation has been planned and implemented through the Commission for Environmental Cooperation (CEC) supported in large part by NAFTA. Identified marine icons—the migratory leatherback sea turtles (*Dermochelys coriacea*) and pink-footed shearwaters (*Puffinus creatopus*)—illustrate the problem with defining even the scope of conservation and management action based on geo-political boundaries rather than ecologically meaningful boundaries. For example, these turtles are limited to nesting on islands in Papua New Guinea while the shearwaters are restricted to several small islands in Chile—both countries which are; (1) not part of the NAFTA tri-national group (United States, Canada, Mexico), (2) arguably the only places where significant conservation actions maybe accomplished, and (3) home to indigenous peoples who have a significant stake in conservation outcomes and resource use but have not been included (but see Anon. 2007).

We need to increase the scale of these "communities of learning" to include all stakeholders in future conservation work. At the same time we can not underestimate the strength and value of indigenous knowledge streams which involve time scales not often encompassed in modern Western science (Wehi et al. 2009 this issue). For example, Lyver et al. (1999) provided an example of how Māori sooty shearwater chick harvest records were used to develop powerful predictors of future oceanographic change. Further, interviews with local inhabitants on Bougainville Island suggest that leatherback turtle numbers had declined within the last 30–50 years (Kinch et al. 2009). Temporal scales of understanding can be greatly increased with the inclusion of traditional knowledge in our assessment of conservation issues and solutions.

In this new age of information, we must look to global co-management approaches to match the ecological scales of conservation issues we aim to solve. Because we desire to sustain natural resources which ultimately will sustain us, our *tamariki* (children), and our *mokopuna* (grandchildren), we will benefit by incorporating new approaches and more complete international and cross-cultural partnerships to understand and conserve our natural world.

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