

Combining indigenous and scientific knowledge to manage migratory marine species across scales: challenges and opportunities

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Background

Managing dugong (*Dugong dugon*) and green turtle (*Chelonia mydas*) populations generates complex scale issues because their migratory routes typically cross several jurisdictional boundaries. In Australia, these species are protected from use by Australian wildlife legislation, with one key exemption: under the Native Title Act Indigenous Australians are given the legal right to hunt turtle and dugong for traditional purposes. The threatened nature of the species and permitted hunting create an additional scale challenge. Yet Aboriginal and Torres Strait Islander Traditional Owners have harvested these species for thousands of years, using their extensive knowledge base of species and environment to sustain their resource bases. The Australian government's recently drafted 'National Partnership Approach' mandates the incorporation of this traditional ecological knowledge (TEK) into dugong and marine turtle management. However, the consideration of how, and at what scales, TEK and scientific knowledge should be combined to better inform marine management has generally been overlooked, resulting in tensions across cultures and management jurisdictions.

The need to incorporate traditional knowledge and management systems into 'Western' science-based resource management has been recognized by many social and natural science researchers (e.g. (Berkes et al. 2000, Moller et al. 2004, Fraser et al. 2006). (Berkes 1999) describes TEK as a knowledge-practice-belief complex that extends beyond the basic environmental and taxonomic knowledge normally recognized by scientists. He categorizes TEK into four interrelated levels of analysis: (1) local knowledge of land and animals (factual or empirical knowledge), (2) land and resource management systems (applied knowledge), (3) social institutions (institutional knowledge, including values and norms), and (4) world view (conceptual or paradigmatic knowledge, belief system). Each level is embedded in the next, with world view at the 'broadest' level. Traditional management systems are often regarded by proponents as more ecologically holistic than western approaches, which tend to compartmentalize management among multiple agencies divided by political boundaries rather than ecosystems. Yet TEK is also typically considered to be value-laden, qualitative, and 'local' anecdotal knowledge, whereas scientific knowledge is regarded as objective, quantitative and testable. Under such circumstances, what scales can TEK be rendered relevant to species management?

Australian Indigenous peoples are still actively struggling to incorporate traditional knowledge of their sea country into both local and regional management plans (Mulrennan 2007). Consequently most Australian management agencies have incorporated a statement about the importance of using both Indigenous knowledge and scientific data to inform management strategies. However, the extent that agencies have

actually incorporated TEK into management policies appears limited, often confined to anecdotal facts that have been extracted from their cultural context and made compatible with western science and management principles. We suspect that this lack of cross-cultural literacy, marked by a dearth of trust, power sharking, and mutual respect among the stakeholders (Nurse-Bray 2003), has thus been a hindrance to successful dugong and turtle management in recent decades. However, eight Torres Strait Islander communities recently developed community-based dugong and turtle management plans with support from regional and national government bodies. The plans are based on customary law and informed by both traditional and scientific knowledge. The current implementation of these plans allowed a unique opportunity for us to examine how traditional and scientific knowledge systems are being utilized by Indigenous and non-Indigenous managers, as well as to identify potential opportunities for enhancing cultural understanding to improve management outcomes.

The way that TEK is perceived and categorized by managers and policy makers could have a profound impact on how that knowledge is interpreted and subsequently combined with western science and incorporated into management. Identifying the scales at which TEK is most often identified could hasten cross-cultural communication efforts and resolve issues of scale mismatch in relation to the application of traditional ecological knowledge.

Methods

The purpose of our study was to identify the scales at which TEK and scientific knowledge have been characterized and applied to dugong and green turtle management in Australia up to the present, using the categories developed by Berkes (1999) as a basis for comparison. To do this, we reviewed relevant literature (22 documents) related to Australian dugong and turtle management, and conducted 12 semi-structured interviews with Indigenous and non-Indigenous Australian marine management personnel. We performed a detailed analysis of the literature and interview transcripts with the help of N Vivo qualitative data analysis software.

Results

Literature

Much of the literature acknowledged the holistic nature of TEK. However, TEK tended to be narrowly categorized as local, place-based knowledge. The majority of references to traditional knowledge characterized it as empirical information supplementary to scientific data, such as knowledge of tides and seasons, and ways of differentiating animals based on body condition and sex. Knowledge that did not appear as neatly organized facts tended to be classified broadly as ‘culture’ and ‘tradition’ rather than applied knowledge. Several documents discussed both Indigenous knowledge and management practices, but rarely considered underlying value or belief systems. This result exposes a gap in understanding between Australian non-Indigenous and Indigenous stakeholders of dugongs and green turtles. While differences between the two culture’s knowledge bases and management practices have been acknowledged in the literature,

little mention has been made of the overarching social institutions and world views resulting in these differences.

The literature we sourced from Indigenous authors tended to interweave discussions of empirical environmental knowledge with that of resource use and management, mythology, art, and history, thus presenting a more holistic image of TEK. However, these documents engage with scientific knowledge mostly at the empirical level, focusing on its factual and descriptive aspects without digging too deeply into the often opposing worldview presented by western science. As was the case with the non-indigenous literature, this proclivity to engage with knowledge only at the most basic scale while ignoring the value systems that created it risks hindering meaningful communication across cultures, potentially limiting the success of co-management attempts.

Interviews

Indigenous interviewees comprehended the multi-scale nature of dugong and turtle management and were committed to utilizing both traditional and scientific knowledge systems. They identified traditional ecological knowledge as an essential foundation for community-based management of dugongs and green turtles, and cited their main management goals as community/cultural empowerment and traditional resource sustainability. Thus, TEK was linked not only with information for management, but also for maintenance of culture and community values, and for Indigenous ownership of traditional resource management strategies. Most interviewees agreed that scientific information is an important ‘tool’ for monitoring resource bases and informing management, and supported collaborations with researchers. Thus, similar to the results from our literature review, science was viewed as useful supplemental information, especially at a regional scale, but the value system which encompasses ‘Western’ science was largely ignored or rejected. For example, interviewees cited their disapproval of fragmented management split among several government agencies.

Non-indigenous interviewees were typically familiar with scientific research methods and emphasized the importance of such research to natural resource management. As opposed to the literature, many non-indigenous interviewees considered TEK as much more than ecological information, highlighting Indigenous spiritual and historical connections to sea country as an important aspect of traditional knowledge. However, those who discussed TEK in terms of its application to traditional management systems often stated that aligning ‘western’ and Indigenous values for co-management was an ongoing challenge fraught with misunderstandings and lack of communication due to inconsistent world views. Thus, interviewees recognized that different belief systems among Indigenous and non-Indigenous stakeholders influence the priorities each group has for management. However, a direct connection between the influences of a particular world view on the interpretation of empirical or ‘factual’ knowledge was not made by interviewees.

Conclusions

These perspectives suggest that one of the scale challenges afflicting marine species conservation in Australia results from inadequate communication and interpretation of knowledge among indigenous and non-indigenous stakeholders. This is evidenced by the

selective use by both stakeholder groups of TEK and scientific knowledge at the empirical level without full awareness of the values and belief systems influencing that knowledge. Greater recognition of the world views expressed by the two knowledge systems is spreading among individual managers, but a shift in institutional awareness at the management and policy level is currently lagging behind. Recognizing the many scales of Indigenous and scientific knowledge relevant to marine resource management will be a significant step forward for managers and policy makers at all levels of government. The implications of this study will impact how knowledge is interpreted in the future and highlight areas of concern for cross-cultural management collaborations.

References Cited

- Berkes, F. 1999. *Sacred Ecology: Traditional Ecological Knowledge and Resource Management*. Taylor & Francis, Philadelphia, PA.
- Berkes, F., J. Colding, and C. Folke. 2000. Rediscovery of traditional ecological knowledge as adaptive management. *Ecological Applications* **10**:1251-1262.
- Fraser, D. J., T. Coon, M. R. Prince, R. Dion, and L. Bernatchez. 2006. Integrating traditional and evolutionary knowledge in biodiversity conservation: a population level case study. *Ecology and Society* **11**.
- Moller, H., F. Berkes, P. O. Lyver, and M. Kislalioglu. 2004. Combining science and traditional ecological knowledge: Monitoring Populations for co-management. *Ecology and Society* **9**.
- Mulrennan, M. E. 2007. Sustaining a small-boat fishery: Recent developments and future prospects for Torres Strait Islanders, Northern Australia. Pages 183-198 *in* *Fishers' Knowledge in Fisheries Science and Management*. United Nations Educational, Scientific and Cultural Organization, Paris.
- Nursey-Bray, M. 2003. Fishing for answers; the incorporation of Indigenous Knowledge in Northern Australia, developing cross-cultural literacy. Pages 321-328 *in* *Putting Fishers' Knowledge to Work Conference Proceedings, 27-30 August*. Fisheries Centre Research Reports.