

Indigenous peoples and local communities' bio-cultural knowledge at the interface of marine research

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Abstract

Globally, the governance and management of land and sea resources by Indigenous peoples and local communities has existed for tens of thousands of years and continues to exert influence over a quarter of the worlds' surface today (Garnett et al 2018). Yet the primacy of Western science still overshadows the bio-cultural knowledges of Indigenous peoples and local communities. To move beyond exclusions and disenfranchised worldviews, science theory and practice must begin to embrace, engage, respect and support Indigenous peoples and local communities' bio-cultural knowledges. We draw on the marine research sector, specifically fisheries, to demonstrate where knowledges are providing useful expertise and call for multidisciplinary approaches to co-productions of science.

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By

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Globally, the governance and management of land and sea resources by Indigenous peoples and local communities has existed for tens of thousands of years and continues to exert influence over a quarter of the worlds' surface today (Garnett et al 2018). Yet the primacy of Western science still overshadows the bio-cultural knowledges of Indigenous peoples and local communities. To move beyond exclusions and disenfranchised worldviews, science theory and practice must begin to embrace, engage, respect and support Indigenous peoples and local communities' bio-cultural knowledges. We draw on the marine research sector, specifically fisheries, to demonstrate where knowledges are providing useful expertise and call for multidisciplinary approaches to co-productions of science.

The traditional view of Western science as objective, impartial and observer-orientated is often conflicted with bio-cultural knowledges, which are place-based, generational, collectivised, culturally-driven, interconnected and articulated as a lived experience of wisdom and Eldership (Nurse-Bray et al 2014; Khusniati & Sudarmin 2017; Ogawa 1995). Yet the goals of marine science and Indigenous stewardship are similar: to conserve, learn from and respect the seas as givers of life and livelihoods. We suggest that the barriers that

marginalize Indigenous peoples through arguments as to what constitutes ‘science’ needs less attention than the focus on how we make mutual gains from multiple forms of marine knowledge.

For many coastal Indigenous and local communities, sustainable management practices are central to custodianship of marine resources. Culturally significant keystone species create identities and shape the responsibility, for example, to maintain the connection to food security for peoples and communities (Noble et al 2016). Yet Western sciences often value a rational approach that idealizes the human-nature separation. However, without Indigenous and local input, sustainability science will face wider pockets of uncertainty, as bio-cultural knowledges create a broader spectrum of learning from the lived intergenerational experience of continuous resilience to a changing environment. Wiser management is based on the sense-making and intelligence gain from living through an experience, which often does not occur within Western science frameworks.

Figure 1. Weaving together Indigenous and Western knowledges (©Jessamy Gee)

In Figure 1 we highlight some fundamental differences between bio-cultural knowledges and western science that contribute to difficulties in merging them, yet if woven together thoughtfully and respectfully can strengthen concepts of modern science. Our diagrammatic tree has two sides and three aspects of knowledge difference that include a) change indicators and understanding patterns, b) responsive action and c) sustainable management. We explain these aspects below and use case studies to illuminate how bio-cultural knowledges can improve marine research.

Knowledge of indicators of change and understanding patterns :

Western sciences often create data that is free of cultural context, reliant on linear time and dismissive of oral histories (Mackenzie et al 2017) to measure change through, for example, report cards and spatial variability of fish stocks. Indigenous peoples and local communities, however, regard a holistic view as a more important measure of marine resources and their health. In the Canadian North, for example, Indigenous intergenerational observations of change and decline in local area species are filling gaps in scientific assessments undertaken at regional levels. Holistic responses that gauge animal wellness, such as fat levels and changed behaviours through toxicity, are understood not through specific causes, but a range of socio-ecological parameters that are seasonally dependent, culturally-based and flexible to external influences (Berke, Berkes & Fast 2007). Furthermore, oral histories of species, such as yelloweye rockfish, from western Canada have extended baseline data by decades and indicated size and population decline through a range of non-Indigenous behaviours previously unconnected through discrete data collection (Eckert et al 2018).

Knowledge in responsive actions :

Western conservation agendas often privilege decisions that reinforce the human-nature dualism, while simultaneously viewing Indigenous peoples and local communities’ rights and responses as a threat to dominant paradigms (Dale & Natcher 2014). Adaptation, as a conservation response, for Indigenous peoples and local communities include autonomous and cooperative decision-making, which are also an arena for asserting human rights away from Western superiority (von der Porten et al 2016). For example, Alaskan Indigenous communities are self-determining the institution of new whaling seasons as an autonomous response to climate change, while the harvesting of invasive crab species is a means to re-engage traditional family practices of food gathering (Huntington et al 2017). In Okinawan islands, south-west Japan, local communities work with immigrant fishers to infuse fishery economies with cultural connections and reciprocity-based behaviours that lessen conflict, enable social cohesion and advance shared governance of marine resources (Sugimoto 2016).

Cooperative decisions for adaptation often draw together Indigenous and non-Indigenous partners. In Tasmania, Australia, Indigenous peoples have invested in developing kinship ties with the government for mutual benefit and resulting in increased access rights to fisheries (*tebrakunna* country and Lee 2019). The Sámi peoples of Finland have also repaired relationships with scientists, alongside fish stocks and habitats, to improve cultural self-esteem, revive salmon-spawning sites and jointly publishing outcomes in prestigious

journals (Mustonen & Feodoroff 2018).

Knowledge in sustainable management :

Science assists to entrench Western economies of capital and industry into sustainable management, where unequal private enterprise rights contribute to diminishing Indigenous peoples and local communities' rights to manage resources for common good. However, Indigenous forms of governance are based upon collectives of communities and knowledges, and the generational obligations of individuals to contribute to group and territory benefit. In the Pacific, Indigenous governance of communal conservation areas is becoming the rule rather than the exception, where in Fiji alone 10,000 km² of waters are under community management. Bio-cultural knowledges, here, operate to conserve marine areas through valuing sacredness, taboo zones, no-take areas and seasonal closures to improve stocks and catch rates, recovery of vulnerable species and integrate cultural practices into marine management (Govan et al 2009). While Indigenous groups work to maintain sustainability and health of marine resources within their own territories, they act cooperatively for broad-scale resolution of issues, such as sharing resources and solutions, working with outside institutions and imparting bio-cultural knowledges as a daily, lived experience of cultural practice that extends to other spheres of life, such as health, education and employment.

Indigenous bio-cultural knowledges can also influence government policy and initiatives, where the use of *moku* – the geographical, cultural and spiritual determinants of territory boundaries – in Hawai'i has led to the restoration of depleted fisheries according to those cultural practices, such as no-take areas (Freidlander et al 2017). In Aotearoa New Zealand, the Sustainable Seas National Science11<https://sustainableseaschallenge.co.nz/> (the 'Challenge') program seeks to influence, at a national scale, how Māori bio-cultural knowledges are able to effect change in marine and fisheries management, policy and practice through, for example, leading and co-designing research themes.

Conclusion : These examples show where Indigenous peoples and local communities hold bio-cultural knowledges that can contribute to the makings of a modern science – the top of our figural tree. Western science is only one part of the toolkit for Indigenous peoples and local communities to conserve marine environments and sustain fisheries. Bio-cultural knowledges, underpinned by oral histories, wisdom of lived experiences and flexibility towards adaptation, contest the frameworks of linear and perfectly predictable modelling (Dessai & Hulme 2004). Yet what is required is for science to meet halfway in working together and conceive where cultural practices can create respectful co-productions of knowledge (Silvano & Valbo-Jørgensen 2008). A reciprocal collaboration between both knowledge streams could create a new vision for resilient seascapes.

Co-productions of knowledge share several important and fundamental attributes. Both are constantly verified through repetition and verification, inference and prediction, empirical observations and recognition of pattern events (Matsui, 2015). However, holistic overviews that frame bio-cultural knowledges require moving away from the illusion that they are mutually aligned with science and focus instead on the value of competing frameworks that strengthen the ground-truthing process. There is a need for ethical and culturally sensitive approaches in legitimising and validating bio-cultural knowledges away from the constraints of science in perfectly predicted outcomes. To mutually validate and integrate bio-cultural knowledges into effective marine and fisheries management requires equitable relationships through respectful dialogue (Davidson-Hunt & O'Flaherty 2007, Robson et al 2009).

The responsibility of conserving and sustaining resources falls upon many shoulders in society. Multidisciplinary research into marine and fisheries management and governance is an emergent field, yet barriers still exist for Indigenous and local participation. In the spirit of partnership, it is crucial for managers and researchers to undertake negotiations at the cross-cultural interface, and while not always straightforward, they are pivotal to building the platforms for ethical research and management. Co-developing sustainable agendas with Indigenous peoples and local communities' bio-cultural knowledges is becoming harder to ignore. Without these ancient worldviews, global marine and fisheries governance and management cannot progress to a state of fullness or richness, nor can science be satisfied it has the only answers.

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