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Navigating collaborative networks and cumulative effects for Sustainable Seas

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ABSTRACT

Cumulative effects in the marine environment increase the risk of environmental, economic or social collapse because the combined effects of new and existing marine industries, climate change and other stressors are often not accounted for in the determination of environmental capacity. Ecosystem-based management and the development of tools that translate complex social-ecological processes into dynamic, adaptable management strategies are needed to avoid these pitfalls. Previous work has highlighted disconnects between how cumulative effects are interpreted and assessed by science agencies, funding agencies, and management agencies, but has largely missed how investors are interpreting them. These social-ecological boundary and threshold issues illuminate the pivotal challenge of institutional change and agency behaviors that are needed to address cumulative effects. Using scenario planning techniques, a team of researchers from the Sustainable Seas National Science Challenge in Aotearoa New Zealand engaged key decision makers and stakeholders in creative thinking and constructive conversation aimed at bridging some of these institutional and behavioral disconnects. A range of different strategies regarding how to address cumulative effects were proposed by the assembled participants, but the need for collaborative networks that enable collective thought and action across boundaries was emphasized throughout the day. This paper explores the themes that emerged and some of the barriers that must be addressed to facilitate bold action on the topic of cumulative effects.

Ki te kahore he whakakitenga ka ngaro te iwi – Without foresight or vision the people will be lost.

1. Introduction

Human and natural stressors accumulate in the environment and have cumulative effects (CE) on mountains, rivers, oceans, and the human systems that rely on them for health and well-being (Foley et al., 2017; Halpern and Fujita, 2013; Rudd and Fleishman, 2014). In particular, the CE of stressors such as new and existing marine industries and climate change have contributed to a rapid decline in ocean and coastal resources (Halpern et al., 2008; Kaplan et al., 2013), overwhelmed our ability to set appropriate marine resource targets and limits (Duinker et al., 2013), and increased the risk of environmental, economic, or social collapse (Scharin et al., 2016).

Cumulative effects analyses aim to manage and reduce the CE of human activities on coastal and marine ecosystems, but in the current state of practice, science and policy frequently do not align (Duinker et al., 2013; Foley et al., 2017; Prahler et al., 2014). Meanwhile, the role of economics and investment in the management of CE is often overlooked. Instead, CE tend to be defined differently in science and legal mandates, across different sector-based management policies, and are implemented inconsistently by practitioners due to a lack of clear definitions and a plethora of implementation challenges. Managing CE is also hindered by the interpretation and assessment of key elements such as scale (Therivel and Ross, 2007), impacts (Canter and Ross,

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2010), significance (Schultz, 2010), and baseline conditions (Prahler et al., 2014). For the purposes of this research, cumulative effects (CE) were defined broadly as stressors that overlap in space and/or time (e.g. environmental, economic, social).

These general challenges, along with location-specific issues in Aotearoa New Zealand (Aotearoa NZ) associated with fragmented science, management and governance (Lundquist et al., 2016; Thrush et al., 2016), diverse social values (Bremer and Glavovic, 2013), competing interests and power struggles (Bess, 2010), and capacity (McGinnis, 2012) all contribute to a daunting implementation puzzle. Current disconnected frameworks leave coastal and marine social-ecological systems in Aotearoa NZ vulnerable to rapid changes or tipping points, which can be difficult to predict because of variations in stressor responses, recovery times, interactions (e.g. synergistic, antagonistic), and surprise. These disconnects highlight the pivotal challenges of institutional and behavioral change that are needed to address CE in coastal and marine areas.

Ki uta ki tai—from the mountains to the sea—is an indigenous Māori concept that emphasizes the interconnectedness of ecosystems inclusive of people (Tipa et al., 2016). Most recently, a call for ki uta ki tai approaches to CE has come out of collaborative research undertaken by the Sustainable Seas National Science Challenge[2] (SSNSC), a large-scale, government-funded, mission-led research program. At the center of SSNSC is a commitment to ecosystem-based management (EBM), an integrated approach to oceans that emphasizes the maintenance of ecosystems and human well-being over sectoral management. At a workshop in August 2016, a team of researchers, government authorities, indigenous Iwi (tribes)/Māori, interest groups, and industry and youth representatives gathered to investigate possible management and governance strategies that could address CE across multiple scales and from multiple sectors. This paper explores the themes that emerged from our discussions and some of the barriers impeding bold action on CE.

2. Context and background

2.1. Regulatory frameworks and cumulative effects in New Zealand

At present, coastal and ocean management in Aotearoa NZ is covered by 25 statutes governing 14 agencies and operating across seven spatial jurisdictions (Bremer and Glavovic, 2013). Under the Resource Management Act 1991 (RMA), responsibility for the sustainable and integrated management of marine natural resources in the territorial sea (12 nautical miles) is devolved to regional and district councils. Sustainable management of natural resources within the exclusive economic zone and on the continental shelf (from 12 to 200 nautical miles) is regulated by the Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act (EEZ Act) 2012. Activities not covered by these two acts include fisheries, maritime transport, submarine cables, and marine reserves; these activities are addressed under a variety of other Acts. However, because stressors cross political boundaries, and interpretations of CE, if considered at all, are different under each of these governance and management regimes, the integrated approach promoted by the RMA is largely superficial (Van Roon et al., 2016). Central government support for RMA implementation, coordination, and collaboration across all levels of government is needed to address CE in the marine environment (Bess, 2010), but first a shared understanding of what CE are and what should be done is needed.

2.2. Mātauranga Māori and cumulative effects in Aotearoa

Another key feature of resource management in Aotearoa NZ is the role of indigenous Iwi/Māori as partners with the Crown under the Treaty of Waitangi, widely considered the founding document of the country. According to the Treaty and contemporary resource management regulations, tāngata whenua (local indigenous people) have the right to exercise kaitiakitanga (Māori stewardship according to their own aspirations and practices), and therefore Māori have the right to be included in planning and decision making for natural resources through co-management and co-governance arrangements (Webster and Cheyne, 2017). These arrangements present opportunities for both mātauranga Māori (Māori indigenous knowledge systems) and scientific knowledge to contribute to the evolution and enhancement of sustainable management goals and practices. A key contribution that mātauranga Māori offers for managing CE is a place-based understanding of environmental change. This understanding is derived from intergenerational observations and the transmission of that knowledge (see Appendix A for the karakia (incantation) that opened the workshop). Mātauranga Māori also offers a holistic world view that emphasizes relationality, interconnectedness, and the cultural and metaphysical dimensions of place. Changes in the natural environment and the relationships between humans and their environment have been recorded through oral histories, whaikōrero (speeches), whakataukī (proverbs), waiata (songs), and whakapapa (genealogy).

2.3. Social-ecological challenges of cumulative effects

Cumulative effects can be caused by multiple activities overlapping in time and/or space, or they may be caused by a single activity that generates multiple stressors. For example, bottom fishing removes specific size classes of fish but can also increase sediment in the water column, destroy habitat structure, and change sediment characteristics (Thrush and Dayton, 2002). As the number of activities in marine systems increases, our understanding of the effects of multiple stressors is refined and increased occurrences of abrupt social-ecological system shifts are documented. This can lead to previously agreed upon levels of activities becoming unacceptable Scientists, managers, and others are now increasingly recognizing the need to work at the level of social-ecological systems, where responses to stressors may be non-linear and surprises can cascade (Crépin et al., 2012; Thrush et al., 2016). In this paradigm, managing for resilience and implementing governance structures that deal with surprises has gained both relevance and urgency (Bennett et al., 2015; Serrao-Neumann et al., 2016).

Furthermore, the management of CE is frequently troubled by perceived conflicting interests (e.g., urban expansion versus ecosystem restoration) and high stakes outcomes. Incorporating a range of interests and values into marine management and governance is also complicated by the urgency and reactionary nature of decisions being made. In coastal and marine areas, conflicting practices and values often overlap in a relatively small geographic space, but values are largely ethereal when considered in relation to practices, and may therefore be more easily overlooked in decision making. Some experts suggest that values attributed to ecosystems and their associated goods and services depend on the stakeholders who are in a position to benefit or understand (Hein et al., 2006; Stephenson, 2008), raising questions about equity and social justice.

2.4. Scenario planning techniques

The SSNSC, which focuses research on social-ecological systems within an EBM framework, provides an ideal setting for progressing work on CE. To encourage researchers and research participants to connect across interests, disciplines, cultures, and other boundaries, we utilized scenario planning techniques at a SSNSC-funded workshop. Scenarios are plausible, alternative stories of possible futures, increasingly utilized to address complex problems such as climate change with diverse groups of participants (e.g., IPCC, 2000). Scenario planning can provide an internally consistent, structured exploration of CE

[2] www.sustainableseas.co.nz.