

Navigating Change: Well-being, Values and the Management of Marine Social-Ecological Systems

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Introduction

Like other PICES member countries, Canada has a strong interest in ensuring sustainable seafood economies that both preserve important ecological functions and support the livelihoods and communities of Canadians on all three of our coasts. Unfortunately, Canada has not been immune from declines in some seafood species or the socio-cultural and economic drivers and impacts of these problems on Canadians.

In response, integrated management is mandated under Canada's Oceans Act (1996) and is described in detail in Canada's Oceans Strategy (2002). While a promising direction in terms of addressing these linked social-ecological system issues, realizing an ecosystem-based approach to management requires that there be: a) good information, data and analysis and b) willingness and capacity for stakeholders to work collaboratively toward mutually beneficial ecological, social, economic and cultural outcomes.

Compared to natural science information and data, however, there has been less socio-economic information collected and analyzed to inform management processes.¹ Moreover, much of the information that does exist for use in resource management planning is about economic activity and economic values. While useful, these data are limited in that they do not represent the full range of values (*e.g.*, those that are 'socio-cultural' in nature) that influence the setting of management objectives or the behaviors that drive social-ecological system change. A focus on economic activity and values paints an incomplete picture of the impact of ocean activities (and management interventions) on human well-being. To address these gaps, we have developed a research program to centre on the holistic concepts of well-being and values.

For us, the term value has a number of meanings, from the theoretical to the practical. In a resource management context, for example, this term is used in a variety of different ways, ranging from describing desired end states or qualities, to the assigned economic value (or price) placed on harvested natural resources, non-market values like the functional value the oceans play in mitigating climate change, or requests to respect and incorporate the 'traditional values' of First Nations into decision-making.^{2,3} While appealing in conceptual terms, there has been a relative dearth of applied, empirically-based research about individual and community values in the seafood sector.^{1,4}

Well-being is also a broad term, but for us it refers to a holistic, multidimensional aspect of human welfare that has material, relational and cognitive/psychological features. Assessing well-being is made challenging, however, due to its subjective nature, social and cultural construction, and because it is context dependent. Nonetheless, some models and frameworks have been developed to assess and measure it, including for fisheries.⁵⁻⁶

In the two case studies below, we present examples of two research projects that have engaged in empirical research in these critical areas.

Case study 1: Understanding values across the seafood sector

Seafood is significant in coastal communities in British Columbia. The province produces about \$1.5 billion in seafood a year, and the industry creates more than 19,000 full and part-time jobs – many of them in coastal communities. However, the seafood 'sector' does not function as an integrated whole but rather, represents a range of sub-sectors involved in the production and consumption of seafood. For example, in this study we considered the seafood sector to include recreational fishing, recreational fishing services, First Nations food and commercial fishing, fin fish aquaculture, shellfish aquaculture, seafood processing, seafood distributing, and cooking and serving seafood (restaurants/catering). These complex sectoral categories both shape and reflect an equally complex range of sometimes competing value sets associated with seafood production and consumption.

Based on the recognition that values are context dependent, we chose to focus on a single community for this initial study. We selected Campbell River, on Vancouver Island, British Columbia, because many of the seafood sub-sectors of interest are well developed in the area. Campbell River has long been known as the "Salmon Capital of the World" based on its recreational and commercial fishing sectors and, more recently, the salmon and shellfish aquaculture sectors have developed and, along with fishing, they support a number of processing plants. There are several retail fish markets and numerous seafood restaurants in the community.

One of the innovations of this study was the adoption of the Q method⁷ to identify values. The Q method uses the words of those involved with an issue to tap into the full range of perspectives on it. Specifically, we conducted ten



Photo 1 *“The people here are very proud of the ocean and they love being by the water. They use it recreationally. Families are at the ocean all day, playing on the beach and barbecuing and people are wind surfing and boating. It is a huge boat culture.” Statement by interview participant; photo of Campbell River marina by Daniel Day.*

in-depth interviews with participants in the sector and reviewed the non-market values literature and a variety of secondary sources. This initial phase identified a complex range of themes related to values, including: accessibility, adaptability of the ocean and the community, balanced use of the ocean, collaboration, conservation, fairness/equity, inclusiveness/input, inter-connections, healthy/clean ocean, loyalty, nostalgia, objectivity/science in decisions, physical experience of the ocean, productive ocean, prosperity, resilience of the ocean and the community, regulation, recreation, rights to the ocean, security of jobs and food, spiritual/cultural role, local versus global sharing, stewardship, sustenance, sustainability, teaching/learning, and tradition.

From this phase we then selected 40 statements made by the interviewees to represent the full range of value themes raised. For example, the cultural role of seafood in coastal communities was indicated in the statement, *“Salmon is recognized as an iconic seafood. It is a cultural icon for both the First Nations and non-First Nations; it connects the sea and the land like no other species. We must look after it”*. A second phrase relating to the importance of ‘boating culture’ is included as a caption in Photo 1. In the second phase of the study, we asked 42 individuals, representing all sub-sectors, to consider their priorities and rank the set of 40 statements by arranging the statements into 9 categories ranging between categories of “most like the way I think” to “least like the way I think”.

Using a combination of factor and qualitative analyses, we identified five factors, representing five groupings of

values (groupings of the statements from the pool of 40) which can be thought of as five idealized types. Table 1 shows a listing of each grouping, beginning with an overarching succinct title to characterize the grouping as a whole, followed by a list of five phrases representing the core value encapsulated in each of the five statements that were ranked “most like the way I think” within each group.

The nature of what is valued is notable. For example, the ‘collaborative pragmatism’ and ‘objectivity and innovation’ factors contain statements that emphasize the procedural or process values of collaboration and objectivity, respectively. The other three groupings emphasize substantive outcomes such as prosperity or a healthy fishery.

We also identified the value statements around which our sample of individuals had the most consensus and those value statements on which they had the most divergence. Generally speaking, there was consensus around the importance of using precaution and teaching people about the ocean, stewardship of the ocean for future generations, conservation of salmon as a community builder, and the adaptability of the eco-system. There was the most contention around using aquaculture to enhance seafood production and protecting First Nation rights to access.

Interestingly, the different value groupings do not align exclusively with the seafood sub-sectors. For example, the individuals involved in aquaculture did not align with only one value grouping (since they did not all load onto just one of the five factors). Indeed, individuals from aquaculture loaded on four out of the five factors.

Table 1 Value groupings in the seafood sector of Campbell River, British Columbia.

Collaborative Pragmatism	Local Stewardship	Objectivity & Innovation	Balanced Tradition	Balanced Prosperity
Collaboration*	Interconnection ocean/community*	Objectivity through science	Interconnection fishery/community	Prosperity*
Objectivity through science	First Nations rights and access*	Enhance production through aquaculture	Cultural role of salmon	Enhance production through aquaculture
Trust in regulations*	Pre-caution/Learning	Pre-caution/Learning	Recreation*	Security through aquaculture
Balanced use	Stewardship	Global sharing	Balanced use	Balanced use
Stewardship	Local decisions	Sustainable aquaculture*	Experience of nature/wild	Experience of nature/wild

* indicates that the ranking of that statement (in that factor) was significantly different than the overall mean ranking of that statement @ $p < 0.05$ in the data.

Case study 2: Shellfish aquaculture and well-being

As wild fisheries have plateaued, aquaculture has become an increasingly important source of protein and economic opportunity for populations around the world. As the industry continues to modernize, expand, and intensify, however, it will become increasingly important to understand how aquaculture affects the well-being of the social-ecological systems (SESs) in which it is embedded. Like any industry, aquaculture will have both positive and negative effects – costs and benefits – on the surrounding environment and communities.

Baynes Sound, on the east coast of Vancouver Island, is the site of 129 shellfish licenses which collectively produce half of all the shellfish cultured in the province: over 3,700 tonnes per year. Farms have existed in this area for decades, but there has been a more recent shift to deep water leases and a more widespread use of engines and technology. The farms are surrounded by more than 6,500 residents in several small communities.

Our study was conducted in these communities utilizing a mixed-methods approach to identify and measure the perceived ways that the shellfish aquaculture industry promotes and/or erodes community well-being as assessed by local residents. We began by conducting targeted semi-structured interviews with a variety of individuals including property owners who live upland of shellfish farms, residents involved with environmental and civic groups, resource managers/government agents, shellfish farm leaseholders, and owners of shellfish processing houses. A portion of the interviewees also engaged in participant-employed photography ('photovoice' – see Photo 2) which enabled these individuals to record their views on a theme visually and discuss their photos and views during an interview.



Photo 2 Shellfish aquaculture in Baynes Sound. Photo by anonymous interviewee who participated in the photovoice project.

Our findings demonstrate that the relationship between aquaculture and well-being is multi-dimensional, and includes subjectively interpreted dimensions of environment, economy, and experience. Positive and negative aspects of each dimension are shown in Table 2.

These dimensions are complex and inter-related. For example, the environmental changes related to shellfish aquaculture activities can directly affect objective aspects of ecological and economic productivity, but perceived changes in the natural environment also contribute to people's subjective assessments of well-being as residents subjectively consider the meanings and effects of those changes based on norms, individual values, and beliefs. Local economic activity and stimulation were priorities for residents but, to foster subjective well-being, many residents felt that economic activity should be locally owned, employ local people, be sustainable, provide sustainable jobs, and

Table 2 Effects of shellfish aquaculture on well-being in Baynes Sound across environmental, economic and experiential dimensions.

Dimensions	Positive components	Negative components
Environment	Industry as advocate Biodiversity enhancement Water filtration	Beach modification Predator netting Destruction of predators Bottom changes Species interactions Plastic pollution Carrying capacity
Economy	Tax-base Income Sustainable jobs	Non-local ownership Job quality Provenance of workers
Experience	Sense of place Identity Way of life Local history Local environment Local pride Community participation	Beauty/naturalness Debris Hazards and safety Noise Smell Alienation/separation

stimulate local vitality through connections to other local businesses. Perceptions about the ability of the shellfish aquaculture industry to meet these requirements varied, and many residents expressed a feeling they did not want the character of the area to be altered. Finally, we found that residents expressed ways that the effects of shellfish aquaculture can enhance or erode well-being through pathways that are neither environmental nor economic. The experience dimension encompasses those effects that alter residents’ expectations of their lived experience, but may not lead to identifiable ecological or economic change.

In a second phase of this study, we conducted a mail survey (developed from the qualitative interview data) to assess the breadth and depth of perceptions about these dimensions within the Baynes Sound communities. Preliminary analysis of these data suggests several key findings. First is that within each dimension attitudes are variable, highlighting the fact that the way local residents view the impacts of aquaculture is variable. Second, several key variables were associated with this variability in expressed attitudes. Specifically, geography (namely residency on the smaller of the two islands in the sound), strong ecological worldview (as measured by New Ecological Paradigm score), and infrequent shellfish consumption were correlated with negative perceptions of the effects of shellfish aquaculture on well-being.

Conclusions

The results highlighted in both of these case studies have clear implications for oceans governance and management. For example, while divergent value sets are often present in governance processes, they can serve to impede those processes when: 1) the emphasis is on difference rather than commonality and 2) there is no mechanism to identify

and incorporate the full range of those value sets into decision-making. The first case study demonstrates that the Q method may be one way to capture, compare, and incorporate ocean and seafood values into decisions. By eliciting a broad set of value statements, highlighting how values may group together, identifying common ground and highlighting points of disagreement, processes like the one described in this case study could provide participants with a common vocabulary that cuts across existing constituencies.

The second case study demonstrates that a multi-dimensional understanding of well-being moves assessments of effects of changes beyond trade-offs between jobs *versus* the environment, providing a more holistic way to understand local preferences for social-ecological conditions and how these conditions may be enhanced or diminished by coastal and marine activities. Aquaculture and other changes that modify SESs and the flow of ecosystem services are experienced and valued variably across communities, highlighting the need to be attentive to the local contextual realities that shape attitudes and objectives at very local scales.

Emerging integrated marine ecosystem-based management (EBM) planning processes for Canada’s Pacific Ocean offer a place-based, collaborative approach to natural resource management that aims to restore and protect the health, function and resilience of entire ecosystems for the benefit of all organisms, while at the same time leading to social, cultural and economic benefits. For these processes to be successful, however, it demands a deep understanding of underlying values and preferences of individuals and communities, as well as how the impacts of activities such as aquaculture can be considered in a holistic and therefore, more meaningful and resonant way. Our hope is that

research of the type presented here will contribute significantly to developing more effective and collaborative management objective setting processes, reducing conflict, and resulting in better resource management outcomes.

References

- 1) Sharp, S. and Lach, D. (2011). Integrating social values into fisheries management. *Fisheries*, 28:4, 10–15.
- 2) Costanza, R. *et al.* (1987). The value of the world's ecosystem services and natural capital. *Nature*, 387: 253–260.
- 3) Brown, T. (1984). The concept of value in resource allocation. *Land Economics*, 60:3, 231–246.
- 4) Buijs, A. (2009). Lay people's images of nature: comprehensive frameworks of values, beliefs and value orientations. *Society & Natural Resources*, 22:5, 417–432.
- 5) Coulthard, S. (2012). What does the debate around social wellbeing have to offer sustainable fisheries? *Current Opinion in Environmental Sustainability*, 4: 358–363.
- 6) Coulthard, S., Johnson, D. and McGregor, J.A. (2011). Poverty, sustainability and human wellbeing: A social wellbeing approach to the global fisheries crisis. *Global Environmental Change*, 21: 453–463.
- 7) Barry, J. and Proops, J. (1999). Seeking sustainability discourses with Q-methodology. *Ecological Economics*, 28: 337–345.



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Dr. Linda D'Anna (linda.d'anna@viu.ca) is an ecologist who uses interdisciplinary approaches to investigate the interface among ecology, economy, and culture and its impact on ecological management and restoration efforts in coastal and estuarine systems. Linda's work explores how the socio-cultural components of coastal systems impact and are in turn impacted by the biological ones by focusing on the interconnectedness of these social-ecological systems – an interconnectedness that encompasses not only geographical, ecological, and physical contexts, but cultural and social ones as well. Her goal is to inform ecosystem-based management and process-based ecological restoration efforts that secure coastal resilience and wellbeing.

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