

## **Culture, Intangibles and Metrics in Environmental Management**

Terre Satterfield  
Institute for Resource, Environment and Sustainability  
University of British Columbia  
Vancouver, B.C. V6T 1Z4 Canada  
*Corresponding author:* [terre.satterfield@ires.ubc.ca](mailto:terre.satterfield@ires.ubc.ca)  
604-822-2333

Robin Gregory  
Decision Research  
1201 Oak Street  
Eugene, Oregon 97401  
USA  
[robin.gregory@ires.ubc.ca](mailto:robin.gregory@ires.ubc.ca)

Sarah Klain  
Institute for Resource, Environment and Sustainability  
University of British Columbia  
Vancouver, B.C. V6T 1Z4 Canada  
[s.klain.ubc@gmail.com](mailto:s.klain.ubc@gmail.com)

Mere Roberts  
Department of Anthropology  
University of Auckland,  
Auckland, New Zealand  
[mere.roberts@auckland.ac.nz](mailto:mere.roberts@auckland.ac.nz)

Kai M. Chan  
Institute for Resource, Environment and Sustainability  
University of British Columbia  
Vancouver, B.C. V6T 1Z4 Canada  
[kai.chan@ires.ubc.ca](mailto:kai.chan@ires.ubc.ca)

1 Abstract

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3 The demand for better representation of cultural considerations in environmental management is  
4 increasingly evident. As two cases in point, ecosystem service approaches increasingly include cultural  
5 services, and resource planners recognize indigenous constituents and the cultural knowledge they hold  
6 as key to good environmental management. Accordingly, collaborations between anthropologists,  
7 planners, decision makers and biodiversity experts about the subject of culture are increasingly  
8 common—but also commonly fraught. Those whose expertise is culture often engage in such  
9 collaborations because they worry a practitioner from ‘elsewhere’ will employ a ‘measure of culture’  
10 that is poorly or naively conceived. Those from an economic or biophysical training must grapple with  
11 the intangible properties of culture as they intersect with economic, biological or other material  
12 measures. This paper seeks to assist those who engage in collaborations to characterize cultural benefits  
13 or impacts relevant to decision-making, in three ways; by: (i) considering the likely mindset of would-be  
14 collaborators; (ii) providing examples of tested approaches that might enable innovation; and (iii)  
15 characterizing the kinds of obstacles that are in principle solvable through methodological alternatives.  
16 We accomplish these tasks in part by examining three cases wherein culture was a critical variable in  
17 environmental decision making: risk management in New Zealand associated with Maori concerns about  
18 genetically modified organisms; cultural services to assist marine planning in coastal British Columbia;  
19 and a decision-making process involving a local First Nation about water flows in a regulated river in  
20 western Canada. We examine how ‘culture’ came to be manifest in each case, drawing from  
21 ethnographic and cultural-models interviews and using subjective metrics (recommended by theories of  
22 judgment and decision making) to express cultural concerns. We conclude that the characterization of  
23 cultural benefits and impacts is least amenable to methodological solution when prevailing cultural  
24 worldviews contain elements fundamentally at odds with efforts to quantify benefits/impacts, but that  
25 even in such cases some improvements are achievable if decision-makers are flexible regarding  
26 processes for consultation with community members and how quantification is structured.

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29 **Keywords:** culture, ecosystem services, structured decision making, consultation, environmental values.

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31 **1.0 Introduction**

32 Two remarkable events unfolded in Guyana and Bolivia in April 2011, each speaking volumes to  
33 the changing social and ecological landscape of environmental management. Guyana received the  
34 second of two payments from Norway, reportedly totaling \$250 million, in exchange for protecting its  
35 ecosystems and the services they deliver (Juniper 2011). Bolivia amended its federal constitution to  
36 grant equal rights to nature, in response to a long history of the contamination of community resources  
37 from mining and the influence of that country’s substantial indigenous population, who place the earth  
38 deity—Pachamama—at the center of all life (Vidal 2011)<sup>1</sup>. The first event signals the fact that the global  
39 trade in ecosystem services (including cultural ecosystem services) is gaining considerable traction; the  
40 second the fact that indigenous populations and the cultures they seek to represent are an increasingly  
41 vital constituency in environmental governance.

42 This paper seeks to address some of the challenges facing environmental management given an  
43 emphasis on culture, whether due to ecosystem service approaches (as in Guyana), where cultural  
44 services are one of four identified classes (Daily 1997), or due to indigenous populations recognizing the  
45 fundamental importance of their knowledge systems as part of revised federal constitutions (as in  
46 Bolivia). Our arguments also seek to address the growing disenchantment worldwide with the failure of  
47 management regimes to represent the cultural consequences of environmental decisions in First Nation  
48 or Aboriginal communities (Arquette et al. 2002; Nadasdy 2003; O’Neill 2003), alongside broader  
49 concerns that many of the primary means of conservation, such as the establishment of parks and  
50 protected areas, have disproportionately burdened indigenous and land-based populations (Zerner  
51 2003; Brockington & Igoe 2006).

52 Collaborations between indigenous communities and the research or consultant partners with  
53 whom they work are often at odds with those whose expertise is in conservation planning,  
54 environmental economics, or negotiations (Gregory, McDaniels & Fields, 2001; Brosius 2006). Further,  
55 indigenous communities may be tempted to engage in decision making processes they recognize as  
56 flawed because they fear that otherwise decisions will be made that are devoid of cultural  
57 considerations, or that a practitioner from ‘elsewhere’ will employ a misleading ‘measure of culture’ to  
58 somehow be valued alongside economic, biological or other more materialist measures. Such  
59 engagements leave a diverse group of practitioners and researchers (and the indigenous communities  
60 whose insights they represent) feeling uncomfortable, at best, for several possible reasons: (1) the  
61 norms of measurement or data inclusion reduce the complexity of ecological and social dynamics to

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<sup>1</sup> This Bolivian constitutional amendment was preceded in 2008 by adoption of similar

62 reductionist or static measures (Gunderson et al., 2002; Chan et al, 2012a); (2) a conviction that the  
63 social 'whole' is a curious and complicated mix of power and local-to-global interactions and conflicting  
64 knowledge systems (Brosius 2006); (3) a belief that neither a monetary measure of value nor an  
65 aggregate of individual preferences will accurately portray community impacts (Sagoff, 2004; Norton &  
66 Noonan 2007), and (4) awareness that it is not only culture (as an artifact as the mind) that needs  
67 protection but the physical spaces on which continuing cultural practices depend (Redford and Brosius  
68 2006; Peterson et al. 2008).

69 It is well known that integrating such interdisciplinary perspectives in environmental  
70 management contexts can be problematic. What is less clear is how these challenges might be  
71 reconciled, at least in part, through methodological improvements. Simply stated, much of the difficulty  
72 experienced in the course of environmental managers' attempts at developing interdisciplinary  
73 approaches to address cultural impacts is due to a profound disciplinary intractability that is negatively  
74 complemented by the lack of knowledge (or, in some cases, dismissal) of innovative methods. A  
75 willingness to transgress disciplinary boundaries and to seek practical, methodological improvements in  
76 current environmental management practices and policies (recognizing that progress will evolve slowly  
77 and that mistakes will be made) can lead to new learning and, over time, to reductions in the adverse  
78 cultural consequences of environmental management decisions for indigenous communities.

79 We begin this paper by reviewing definitions of culture in concert with critiques of conventional  
80 ecosystem service and related management approaches that have been raised by anthropologists,  
81 decision scientists, ecologists, ethnoecologists, geographers and planners whose interest is culture  
82 and/or cultural groups and the environments in which they live. Critical points address problems  
83 associated with the use of classification schemes, especially those pertaining to culture, as well as  
84 management regimes that necessitate the commodification of nature (Gomez-Baggethun & Ruiz-Perez  
85 2011, Robertson 2004). We then describe and discuss three case studies in which some aspects of these  
86 overall problems were resolved through methodologies involving the use of subjective or 'locally  
87 defined' scales or metrics to address cultural phenomena (as recommended by research from judgment  
88 and decision making) and narrative approaches to value elicitation. All three cases involve examples  
89 wherein culture was a central component in environmental decision making. The first is an explicit effort  
90 to examine cultural services, benefits and values<sup>2</sup> in the context of marine spatial planning in British  
91 Columbia. The second case study draws from a consideration of cultural concerns in planning for

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<sup>2</sup> These three terms have often been used interchangeably by those addressing culture in ecosystem service contexts (Chan et al., 2012b).

92 environmental risks in New Zealand. The third example involves participation by an indigenous  
93 community as part of an environmental planning effort on a managed river in western Canada. These  
94 examples help illustrate both the successes and limitations of attempts to develop policy-relevant  
95 ‘measures’ of culture. Closing remarks turn to remaining questions, for both practitioners and theorists,  
96 and review some of the limits of any ‘classification’ and ‘measurement’ of culture, however these terms  
97 are defined.

## 98 **2.0 Problems of definition, classification and constituency**

### 99 2.1 Defining culture

100 The definition of culture is the subject of no end of debate. Thus it should be no surprise that much  
101 difficulty is encountered when so broad a construct is applied to environmental management and  
102 planning. A related development of the last two decades is that culture, once largely the domain of  
103 anthropologists, has been embraced by other disciplines and fields as an important variable in their  
104 work (Kuper 2000, Turner et al, 2008). As one example, researchers of the valuation and protection of  
105 ecosystem services now recognize cultural services as one of the most compelling reasons for  
106 conserving ecosystems. Ecosystem services have been defined in reference to their material and non-  
107 material values, with material values considered in relation to provisioning, regulating, and supporting  
108 services whereas non-material values and/or benefits are associated with cultural services. Costanza et  
109 al. (1997), for example, defined cultural values/services as “aesthetic, artistic, educational, spiritual  
110 and/or scientific values of ecosystems” (p. 254). The Millennium Ecosystem Assessment (2005)  
111 expanded this definition to include the non-material benefits people obtain from ecosystems through  
112 spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experience, including,  
113 educational/learning opportunities, maintenance of social relations, and aesthetic values.

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115         As befitting a definition of culture or cultural ecosystem services (CES) that seeks to capture the  
116 intangible attributes of nature, the focus is on ecosystems as generative of knowledge and supportive of  
117 human experiences (recreational, aesthetic, social and spiritual). These attributes nonetheless bear  
118 more than a passing resemblance to an idealized vision of nature akin to a wilderness aesthetic wherein  
119 one recuperates from the burdens of urban industrialization through recreation, experience, sensory  
120 enhancement and spiritual refreshment (Cronon 1996; Cole & Yung 2010). Such values matter  
121 tremendously to many North American and European audiences (Dunlap et al. 2000; Milfont, Duckitt,  
122 and Cameron 2006) and if this is the constituency, the problem of classification diminishes. It is a  
123 problem for CES with regard primarily to methods for planning and policy initiatives, insofar as such

124 variables might be difficult to define and measure (Gregory and Slovic 1997; Chan et al. 2011). But the  
125 problem of classification remains (a) if this isn't the constituency of concern, and (b) if such a definition  
126 suggests, either explicitly or implicitly, that people *ought* to experience nature this way. Additional  
127 problems arise when the assumption is made that all cultural phenomena are assumed to be immaterial  
128 or intangible, when many are not (e.g., specific territorial resources or material cultural such as burial  
129 sites, petroglyphs, or totem poles, among other facets) (Gibson et al. 2011).

130 Idealized notions of how 'other' cultures ought to experience nature are particularly manifest in  
131 debates about the ecological 'ignobility' of indigenous peoples implied to have 'lost' their cultural purity,  
132 for example because they hunt with guns or fish with motorboats and rifles, and so are no longer  
133 'traditional' in the eyes of western conservationists (Raymond 2007; Buege 1997, Redford, 1991.).<sup>3</sup> In  
134 post-structuralist terms, assumed ecological nobility is akin to what is today referred to as "racialization"  
135 or "oppressive eco-authenticity" (Sissons 2005). The argument is that by classifying groups we more  
136 often than not racialize them or produce a heightened emphasis on 'them' as different, as against a  
137 dominant (usually white) norm (James 2001). 'They' come to be defined by attributes or essences  
138 ascribed to them through traits (e.g., moralistic assumptions that indigenous people are *closer* to  
139 nature). Assumed behavioural expectations tend then to follow given idealized expectations (as in the  
140 case of ecological nobility), and so to grounds for harsh criticism when expectations are unmet. Both can  
141 then become the basis for coercion whereby the 'problem' group must be policed or managed to  
142 become more 'native' in the eyes of the beholder (Shepherd et al. 2010).

143 At the same time, maintaining and/or reviving customary cultural practices (e.g., indigenous  
144 systems of knowledge) also has proved fundamentally important to ongoing recovery from colonial and  
145 state violence, whose central characteristic was the forced assimilation of aboriginal populations into  
146 dominant society (e.g., via mandatory residential schooling involving removal of children from homes,  
147 loss of language, banning of cultural practices, loss of lands and/or access to lands, and inscription into  
148 cash economies) (Memmi 2003, Regan 2009). For this reason (recovery), as well as its intersection with  
149 nobility assumptions, many conservation and development projects actively promote a return of  
150 tradition. At times this takes the form of the valorization of local or indigenous knowledge by  
151 environment or development NGOs as a basis for maintaining biodiversity or agro-biodiversity  
152 (Shepherd et al. 2010). At other times (and, typically, for other reasons), it includes active efforts by

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<sup>3</sup> We don't mean to shy away from the ability to assert arguments about some practices as, for example, environmentally destructive or socially unjust. Rather, the problem is attributing these features to the essence or character of a place or people and in so doing maligning them as failing to meet our own, often naively romantic, standards of morality or nobility.

153 indigenous people themselves to define local classifications and measures for key terms including  
154 culture, health, community and so on (Donatuto et al. 2011).

155 Confusion, even contestation, also arises when there is conflation of cultural services with those  
156 who hold them, so that the *in situ* stakeholders themselves become viewed as a ‘cultural’ group. Such  
157 groups may be citizens with preferences like any other group; they might also be a self-defined  
158 population with a unique identity, which they refer to as *their* culture. But both are categorically  
159 different than indigenous groups when they are also Treaty partners with the state or crown, as is the  
160 case with groups known as ‘first people’ -- aboriginal or indigenous residents of settler nations such as  
161 Canada, Peru, Bolivia, Australia or New Zealand. In Africa, India, and Malaysia, among other places,  
162 there are people enduringly land-based and recognized as ‘indigenous’ or ‘tribal’ even though any  
163 notion of first peoples is precluded by millennia of successive inhabitants (Dove 2006). Moreover, many  
164 members of the group will also likely regard their status as closely linked to *their* ability to define just  
165 what *they* mean by culture or cultural services (Donatuto et al, 2011); and/or they will uphold very  
166 different ideas of what conservation planners might consider ‘nature’ or sub-categories such as  
167 ‘knowledge’, ‘spirituality’ or other master constructs (Nadasdy 2003).

168  
169 Defining, then, what culture is and for whom is a nontrivial problem for any environmental  
170 management regime in academically and socially collaborative contexts. One can employ the definition  
171 most associated with CES – primarily a set of experiences in nature. But definitions of culture employed,  
172 however warily, by anthropologists and those with whom they partner, tend instead to treat culture as  
173 an adjective rather than a noun (Appadurai 1996) which then modifies particular dimensions of culture,  
174 such as belief systems, symbolic expressions or identified assets and institutions.<sup>4</sup> Frequently, this  
175 realignment shifts ‘culture’ from being a ‘thing’ to also include processes, as in the following brief set of  
176 definitions:

177  
178 1. *Cultural worldviews and epistemes* -- worldviews generally understood to be comprised  
179 of explanatory logics, knowledge systems and ‘ways of knowing’ (e.g., perceptual systems)  
180 different from dominant norms, including but not limited to sensory engagement with and/or

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<sup>4</sup> In point of fact, many anthropologists are hesitant to focus on culture at all as the construct has been so difficult to define and because, in conservation contexts or those where compensation for cultural losses is at stake (Kirsch 2001; Gregory and Trousdale 2009), the larger point is damages to land or resources that constitute the basis for any populations’ ability to persist and maintain myriad social processes that are inextricably linked to place (West & Brockington 2006).

181 spiritual and metaphysical properties of animate and inanimate objects; the organization and/or  
182 cosmology of the human-natural world and the social obligations that accompany these (Ingold  
183 2000); as well as norms for appropriate behaviour including how and through whom is  
184 knowledge acquired (Turner et al 2000).

185 2. *Cultural symbols* --whereby culture is understood as expressed through a vast array of  
186 symbolic phenomena and properties (language, ritual, dances, songs, stories and oral narratives,  
187 as well as *material culture* including all forms of artistic media, totemic poles and carvings,  
188 architecture, clothing and much more) (Sahlins 1999).

189 3. *Cultural assets* -- a set of goods marked by histories of a people (from important sites, to  
190 place names, to territories claimed or pending through Treaty, rights and title) (Koehler 2007;  
191 Marsden 2002); and, finally,

192 4. *Cultural institutions, practices or forms* – a set of practices; institutions of governance,  
193 exchange, naming, marriage or descent, kinship (human and nonhuman, and the eternal life of  
194 ancestors long physically dead though inscribed into and animating local landscapes); decision  
195 making—formal and informal (Roth 2008; Sahlins 2011).

196

197 This is by no means a complete or comprehensive list, nor can it be: an ethnographic understanding of  
198 culture is premised on time-intensive immersion, even proximate assimilation, into the worlds of those  
199 unlike oneself or as a social-group member looking at one's own. Ethnography's optimal output also  
200 remains a monograph, whose explanatory power resides in the quality of theory, description and detail  
201 often expressed in essay- or narrative-framing of observations. This evidentiary standard can be set  
202 against the comparatively efficient or rapid methods of collection based on *a priori* data targets, which  
203 most anthropologists regard with skepticism, or more colloquially as "drive-by" ethnography.<sup>5</sup> Yet this  
204 concern, to which we are sympathetic, fails to account for the needs of the environmental manager,  
205 politician or legal adviser whose task is to form (or reform) a management practice or regulation.  
206 Furthermore, anthropologists have no special standing when it comes to cries for more in-depth  
207 analyses and understanding: scientists will request more field work or additional data collection, legal  
208 advisers will want to carefully review precedent, and economists and ecologists will want to develop  
209 more complete models.

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<sup>5</sup> While worries about not being a *real* ethnographer cannot become the preoccupation of CES or other management approaches, many of these critiques are instructive because the empirical labor and standards for ethnography are an anathema to 'data' often dismissed as anecdotal.



210           With regard to employing cultural definitions in management contexts, it is also important to  
211 recognize that worldviews, symbolic expression and more intangible forms are all largely embodied  
212 expressions of culture, which have long since become so fully normalized and widely saturated  
213 throughout the everyday life of those who hold them that their attributes or ‘traits’ are not necessarily  
214 amenable to conscious articulation. Other aspects of culture, following the above definitions, are quite  
215 tangible, especially sites, masks, dances, and territories – entities that might also be protected by legal  
216 mandate in some countries or regions (Koehler 2007). Similarly, many cultural institutions such as  
217 naming practices, governance and decision-making institutions, as well as local knowledge systems are  
218 well known to those who hold them and are amenable to conscious articulation. But they might well be  
219 protected for reasons of privacy, family or lineages-specific rights to that knowledge, as well as broader  
220 intellectual and cultural property concerns (e.g., knowledge is held closely due to concerns about politics  
221 or bio-prospecting activities).

## 222 2.2 Classifying culture

223           A second class of concerns, typically articulated by human geographers or environmental  
224 ethicists as well as anthropologists, involves critiques of market-based management regimes (Harvey  
225 2007) and efforts to clarify and measure social or cultural phenomena more broadly. Linked to this are  
226 debates about assigning measures to environmental or cultural values, the commensurability and  
227 tradeoffs across environmental values, the commodification of nature (including the use of dollar  
228 measures of value), and the infusion of designs that presume logics of consumer or choice-based  
229 preferences (Sagoff 2004). On this last point (preferences), the problem is that an ‘individual’ (whose  
230 preference or choices are being measured) might be an inappropriate unit of analysis when the social  
231 group in question normally employs governance, property and decision making regimes that are  
232 collective or highly authoritarian (Ostrom 1994; Dietz et al. 2003). Furthermore, asking people their  
233 environmental choices or preferences is not as ‘easy’ as it sounds, especially when the people involved  
234 in decision making have a long history of subjugation.<sup>6</sup>

235           The underlying problem is that the act of classifying what constitutes a cultural entity or value  
236 might at best only awkwardly accommodate the meanings of this class for members of the community it

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<sup>6</sup> A common term is ‘subaltern’ referring to those so fully outside or excluded from formal and informal venues of political representation that any sense of agency or political voice, let alone representation, is beyond the imaginable (Spivak 1988). The problem here is not just simple representation, such as saying: Well, “they” need to be given the vote. Rather, the problem is that marginalization of this kind is so profound and subordination itself is so completely assumed, even normalized, that any alternate is cognitively, socially, politically inconceivable. This may be especially so for women in many parts of the world and across many decision contexts (Asfaw and Satterfield 2010).

237 is said to represent. This ‘classification failure’ might well undermine the legitimacy of environmental  
238 planning when engaging with local stakeholders, where legitimacy is a function of how well the  
239 management ‘tool’ or ‘approach’ captures cultural value from *their* point of view (Corbera, Brown, &  
240 Adger 2007). Further, the problem might be so profound as to be unresolvable by any classification (i.e.,  
241 it’s not just a matter of building better CES categories), because thinking about cultural aspects of  
242 ecosystems is seen to be irreconcilable with local ethno-theories of human-nature relations.

243 In concert with this set of concerns are critiques already raised by those who study the politics  
244 of knowledge – that school of thought which argues that the very criteria through which assessment or  
245 characterization of a system is made overly determines the range of considerations and outcomes  
246 rendered possible (Brosius 2010). [More colloquially, this refers to the critique often expressed as  
247 ‘those who design the approaches control the outcomes’.] Moreover, criteria themselves are said to  
248 inherently require the fitting of complexity into formats or data boxes that do them injustice or subject  
249 them to evidentiary norms that compromise the very essence of the thing meant to be captured.  
250 Examples from anthropology include Povinelli’s question: Do Rocks Listen (Povinelli 1995), or and  
251 Cruikshank’s question: Do Glacier’s Listen (Cruikshank 2005)? The former case describes an Australian  
252 Aboriginal group’s understanding of an important dreaming site known as “Old Man Rock,” a rock  
253 understood as registering the activities of Aboriginal people as they pass the site/rock, insights which  
254 are equally linked to the countryside’s health. In the latter case, glaciers are epistemologically  
255 understood not as inanimate objects but as animate and behaviourally responsive (e.g., melting, shifting,  
256 calving, etc.) to the transgressions of humans.<sup>7</sup>

257 In these intentionally provocative examples, scientists are willing to accept that relationships  
258 with multi-natural beings (de Castro 1998) form part of Aboriginal participants’ *beliefs*, but they are  
259 generally not willing to risk operating by such epistemological logics (Nadasdy 2007). Thus, the question  
260 from a management regime’s point of view becomes “what political or economic weight should these  
261 beliefs be given” (Povinelli, 1995, p.505) or “through what ecosystem service category might they be  
262 classified and assessed” rather than: “*Is there something important to be learned here that our own*  
263 *classifications obfuscate?*” Politically, the question of what weight to give beliefs also positions those  
264 with ‘different’ knowledge systems as at best quaint, or even blatantly wrong. Through such questions,

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<sup>7</sup> For example, one oral record from a First Nation’s person in Alaska, refers to geological change in 18<sup>th</sup> and 19<sup>th</sup> century as follows: “In one place Alsek River runs under a glacier. People can pass beneath [in] their canoes, but, if anyone speaks while they are under it, the glacier comes down on them. They say that in those times this glacier was like an animal, and could hear what was said to it.” (Cruikshank 2005, p. 40)

265 the rock or glacier becomes something else – not fundamentally important animate beings that  
266 comprise nature, but a curiosity of sorts to somehow be accommodated by the available categories.

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### 269 2.3 Measuring culture

270 This set of concerns also applies to critiques based on the commodification of nature --  
271 assuming nature as capital to be treated as fungible fiscal assets. The problem is greater for those  
272 working on CES because important distinctions need be made between preferences and principles,  
273 where the latter might not be fungible (Chan et al. 2006). The bottom line for valuation methods is that  
274 either dollar valuation is accepted as the primary methodological end or not. And if the latter case, then  
275 it's possible to simultaneously reject the notion of the translation of knowledge, beliefs, feelings or  
276 perceptions or experiences into dollar terms yet remain open to multiple metrics for the value of  
277 cultural services. The criteria for deciding upon metrics and employing them thus becomes critical, and  
278 intersects with the ability to express and to address the possibility that some things are relatively more  
279 important than others and so might be subject to negotiation or tradeoffs (or not amenable as can also  
280 be the case) (Baron & Spranca 1997). Possible candidates for the elicitation of what matters alongside  
281 measurement criteria, in the sense of questions to be asked when cultural assets, symbols, or  
282 institutions or beliefs might be affected by environmental management options, include the following:

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284 1. *Articulation*: It should be anticipated that culture itself is a complicated subject,  
285 including both tangible assets and intangible qualities that are lived or experienced rather than  
286 easily articulated in response to the direct question-answer formats that characterize  
287 preference surveys and similar instruments of research. Alternate methods that encourage  
288 narrative expressions of experience and meaning are thus likely more productive.

289 2. *Classification*: When working with indigenous partners, what culture *is* typically will not  
290 be well represented by units comprising generalized, a priori cultural categories. It might  
291 instead be both methodologically astute and socially just to recognize cultural dimensions of  
292 concern (e.g., cultural services) as an open category to be augmented or defined by those whose  
293 cultural constituency is legally or normatively involved.

294 3. *Importance*: Resistance to assigning weights or scales to cultural variables should be  
295 anticipated. But for practical reasons some assignment of relative importance can be necessary;  
296 for example, when seeking to articulate the possible impacts of a proposed action (siting a

297 pipeline or incinerator) on an established indigenous community, it's unlikely to be desirable to  
298 study all possible effects in the same detail and so one key question is to ask: which of this likely  
299 set of impacts will matter most to you and to your community? This does not imply that a  
300 tradeoff is made across values (especially protected ones) (Baron & Ritov 2009). These often are  
301 and should be treated as non-negotiable (e.g., being asked to consider as negotiable an  
302 extremely valued relationship or site). Instead, we mean only to address tradeoffs being made  
303 for the specific purposes under discussion (e.g., to allocate a limited budget across the different  
304 outcomes of possible scenarios or mitigation actions).

305 4. *Spatial relevance*: Measures of culture need to account for the place-based nature of  
306 these aspects of culture that might be affected by a proposed management action. Community  
307 members may find it difficult or be unwilling (e.g., for reasons of confidentiality) to locate their  
308 values spatially.

309

310 In the remaining portions of this paper we explicitly address the classification of culture problem and  
311 trial scales or metrics for measuring aspects of culture. We assert that a primary problem with  
312 conventional measures or metrics is that they under-represent or transgress key cultural values,  
313 principles, or institutions (Turner et al. 2008). With intangibles as the case in point, one premise that  
314 has been recommended (see the New Zealand-Maori case study in Section 3.2) is that, in order to  
315 simultaneously represent tangible and intangible concerns in a single meta framework, metrics can and  
316 necessarily must be flexible and constructed in a language that best represents local understandings of  
317 the concern or objective in question (Satterfield, Gregory & Roberts et al. 2010). This requirement  
318 especially applies to some types of cultural values due to their linked affective, experiential, sensory,  
319 and spiritual qualities and associations – which can combine to produce a ‘you just had to be there’  
320 quality. This reasoning relates, in part, to the possible *aspatial* quality of experiences of awe; whereas  
321 many ecosystem service assessments are conducted at the spatial/landscape level (Nelson et al. 2009).

322 For example, imagine a person trying to describe their feeling of awe upon entering a forest for  
323 the first time, or in the footsteps of other members of their community who have hunted or walked that  
324 terrain for hundreds of years. Unlike tangible benefits such as the provisioning of food, which people  
325 might easily be able to point to and which might have market-value equivalents, the same is not so for  
326 ‘awe’. Instead many people *describe* awe using mostly storied talk, namely the telling of the event or an  
327 analogous event that communicates the experience of awe for the speaker. This means that expressions  
328 of awe and all its parallels are most likely not amenable to the kinds of direct question-answer formats

329 used, for example, by contingent valuation or other preference surveys favoured by economists. Yet  
330 they may well be amenable to a narrative-based or descriptions-based measures, what decision analysts  
331 and psychologists typically refer to as a constructed scale (Keeney & McDaniels, 1992) or constructed  
332 value (Lichtenstein & Slovic, 2006) in which different degrees of awe (e.g., “a little” or “a lot”) may be  
333 tied directly to narratives. Performance measures of this kind are also used by practitioners of multi-  
334 criteria decision making (MCDM) (Adamowicz et al. 1998), though much of this work is aimed less at the  
335 particulars of building appropriate and/or good quality scales and more at aggregating individual  
336 preference functions into higher order social welfare functions.

337         Three different types of measures are employed as part of environmental management  
338 initiatives: natural, proxy, and constructed (Keeney & Gregory 2005). *Natural measures* are in general  
339 use and have a common interpretation: just as the concern to “maximize profits” is naturally measured  
340 in dollars, the concern to “minimize the loss of habitat occupied by a valued and/or endangered species”  
341 might make use of the natural indicator “hectares of lost and/or remaining habitat.” The second type,  
342 *proxy measures*, are less informative than natural attributes because they only indirectly indicate the  
343 underlying nature of the situation and so the achievement of an objective. An example is the use of a  
344 measure such as “dead or diseased trees per hectare” as a proxy for the health of a forest community.  
345 The third type of performance measure, *constructed metrics*, is used with values such as “awe” for when  
346 no suitable natural measures exist and the relevance of a proxy measure is tenuous. Another example is  
347 a scale to measure community support for a proposed management practice. Because no natural scale  
348 exists to measure support, an index (e.g., 1-5 or 1-10) can be created, with each rating denoting a  
349 different level of support. When thoughtfully designed, constructed indices define precisely the focus of  
350 attention and so permit discussion of pros and cons across community levels of the concern (e.g., is it  
351 worth postponing harvest of an area for x years in order to increase support from say, level 2 to level 4?).  
352

353         All three types of measures are made operational through the development of scales or metrics.  
354 Scales serve two major purposes: they provide a means for distinguishing among different levels of  
355 impact, and they provide a way to distinguish the endpoints of the range of anticipated impacts. Scales  
356 translate qualitative information into quantitative scores, but without losing information: behind a  
357 summary rating of ‘2’ for example, can reside narratives, oral testimony, and scientific information  
358 relating to this anticipated level of impact. Although creating appropriate metrics for intangibles  
359 remains difficult, in cases where it is deemed helpful and necessary by all parties involved in a  
360 consultation -- and thus with the consent and participation of local residents, resource users, or

361 indigenous partners – the development of an explicit performance measure can help to highlight  
362 progress, albeit imperfectly or partially, toward a desired environmental or cultural endpoint. We take  
363 up the above critiques and demonstrate some of the potential uses of proxy and constructed scales as  
364 well as narrative expression and cultural classifications more broadly in the following case studies.

### 365 **3.0 Cultural Investigations in Case Study Contexts**

366 **3.1 Marine spatial planning on Vancouver Island:** Field testing the articulacy and the spatial quality of  
367 intangible services

368           Predominant among techniques for characterizing environmental values are willingness-to-pay  
369 (WTP) and willingness-to-accept (WTA) approaches (Horowitz & McConnell 2002); preference surveys  
370 (Boxall et al. 1996); and choice experiments of different kinds (Powe, Garrod, & McMahan 2005). Such  
371 practices may yield quantitative results but these risk being so stripped of meaning as to misrepresent  
372 the cultural values under consideration. One alternative, following Calvet-Mir et al (2012) is to make  
373 better use of a suite of qualitative methods to first identify cultural services deemed important, and  
374 thereafter conduct social importance rankings of these comparing all services. In this example, the  
375 cultural services provided by the agroecosystem studied (home gardens in northeast Spain), emerged as  
376 the service relatively most valued by study participants (p. 159).

377           Regardless, study participants are likely to find it difficult to give voice to values that are  
378 experientially or spiritually-charged, deeply held, or not readily expressed (e.g., upon request in survey  
379 designs). Such value positions and/or knowledge-based epistemologies are often relegated to quiet  
380 corners or absented through the use of overly rationalizing and confining direct question-answer  
381 formats (Nadasdy 2007).

382           Our first case attempts to address some of these problems; namely value articulacy, locating  
383 values spatially and/or assigning weights to these. It is drawn from a study of cultural services as inputs  
384 to marine spatial planning for northern Vancouver Island – part of the protected waters known as the  
385 Inside Passage, off British Columbia’s central coast (Klain, in review). Our goal was to develop an  
386 interview protocol to improve the ability for study participants to verbalize those non-use qualities and  
387 values that best express how they value their marine area (spatially or not) and why it matters, as  
388 defined by emerging classification of these [cultural] services/benefits/values. We take it for granted  
389 that there might be a need for holding some classifications constant across sites. On the other hand, we

390 also were open to value-elicitation opportunities, frames, or contexts that resist the tendency to fit the  
391 articulation of values into pre-set expressions, that provide alternatives to direct question-answer  
392 formats, and that enable value expressions with spiritual, affective or experiential content to be  
393 articulated as these pertain to qualities of natural systems.

394 The design relied on narrative-based elicitation techniques used to (a) elicit the kinds of  
395 conversational talk that encompasses everyday reflections on important values (Satterfield, Slovic, and  
396 Gregory 2000; Satterfield 2001; Moore et al. 2005), and (b) ensure that questions/prompts are as  
397 unassertive as possible regarding what people *should* think or value. The classification found in Chan et  
398 al. (2012a) designates the following types of nonuse and/or cultural services-cum-values: spiritual,  
399 educational, place, identity, artistic, intergenerational and recreational value. Each of this possible set of  
400 services from which cultural benefits can be derived was approached indirectly: first, by introducing the  
401 basic construct, and thereafter turning the conversation to any experiences, memories or other narrated  
402 explanations that might capture this category of value. When eliciting thoughts on the relevance of, for  
403 example, 'identity value,' we began not with the question: Do you have identity value for x? Rather, we  
404 used an interview schedule that provided prompts to encourage the interviewee to think about identity:  
405  
406 *"Identity is the idea, relationships, and sense of belonging that help shape who we are; who we belong to,*  
407 *the community we are a part of and so on. In this sense, you could even say that identity is tied to*  
408 *physical spaces and/or the things people do within those places."*

409  
410 This was followed with a parallel question/prompt along the lines of:

411  
412 *"Are there places that are important to your sense of identity or the identity of the group to which you*  
413 *see yourself as a member? How does that work? How would you describe, if at all, the nature of the link*  
414 *between places and people as it relates to identity, belonging or more simply, who you as a person or*  
415 *member of a group are and even who you are 'not' or who you are different from?"*

416  
417 We do not intend to suggest that prompts of this more abstract kind are 'easy' to respond to; instead  
418 what tends to happen is that interviewees pause and treat them as opportunities for reflection. Because  
419 the prompts blended abstract concepts, such as identity and sense of place with more tangible and  
420 concrete details tailored to the particular site uses, such as going to visit important places and reflecting

421 on catching fish, the overall quality of the discussion was greatly enhanced.

422 In all, 30 interviews (23 males and 7 females) were conducted across a variety of persons  
423 purposively sampled from those whose livelihoods depend on the marine environment. They included:  
424 marine mechanic (1), commercial fishermen (3), employees of an aquaculture facility or seafood  
425 processor (5), sport fishing and ecotourism operators (9), hatchery manager (1), local artist (1) marine  
426 educator (1), harbormaster (1), fisheries or marine biologists (3), employees of ENGOs (2), and  
427 employees in the marine transportation sector (3).

428  
429 [Insert figure 1]

430  
431 In brief, what can be surmised from this effort is that the capacity for stakeholders to articulate  
432 the seemingly *inarticulable* is high, given an appropriately designed opportunity. Relative to more  
433 material services, benefits or values, intangible attributes fared exceptionally well. Place or heritage  
434 value, for example, included all references to expressions of what is known as “place attachment”  
435 (Basso 1996; White, Virden, and van Riper 2008; Brown & Raymond 2007) wherein a person values a  
436 particular place as a site to visit, imagines its existence, and/or regards it as important because of  
437 personal or historical events that occurred there (e.g., physical places that act as heuristics for important  
438 narrated events). Across all questions (including but not limited to the above prompt), this particular  
439 value was mentioned 98 times, more than any other material or immaterial benefit, value or service  
440 (including provisioning, employment, or recreational services) (Klain, in review).

441 Spatializing these results proved less difficult than assigning weights or metrics of importance to  
442 them. Interviews were conducted in the company of local nautical charts so that question-prompts  
443 could involve the ability to see and point to locations on the map affiliated with the experiences they  
444 were narrating. When asked to designate areas that were important to them for the range of  
445 immaterial/intangible reasons discussed above, most complied (roughly 83% or 25/30). However, when  
446 asked to assign an importance scale or weight to the nonmaterial values (e.g., identity value) and/or to  
447 the spatial areas they’d designated, just over half of the respondents (16/30) complied (i.e., only half  
448 found it acceptable to express non-monetary values verbally, spatially and quantitatively). This may  
449 signal that we were asking, in the words of one interviewee, to “quantify the unquantifiable” and that  
450 further work is needed to improve the methods trialed.

451 3.2 Developing classifications of cultural values: a case of culture and the risk of GMOs

452



453 There are now multiple published studies documenting a broad constellation of nature's services and  
454 production functions including carbon sequestration (Jackson et al. 2005), biodiversity conservation  
455 (Nelson et al. 2009; Balvanera et al. 2006) forest restoration (Chazdon 2008), and pollination (Kremen et  
456 al. 2007). But no single published article that we could find attempted to map, model or assign value to  
457 cultural services as part of an explicit expression or representation of cultural services as defined by  
458 indigenous or local stakeholders. Nor has attention been paid by environmental managers more broadly  
459 to address seriously the use and meaning of 'culture'. This is all the more strange given the large number  
460 of recent publications by anthropologists and geographers noting the social and cultural impacts of  
461 parks and protected areas on indigenous populations (Zerner 2000; Wilshusen et al. 2002).

462 This second example looks more closely at how classifications vary (e.g. from widely employed  
463 classifications of culture such as those used by ecosystem service approaches) regarding what is said to  
464 matter as culturally important. The case describes an explicit effort to classify the cultural values held by  
465 indigenous Māori in New Zealand, and the way in which those values are said to be effected by the  
466 production, trial or planting of genetically modified organisms. The study was motivated by the fact that  
467 New Zealand's regulator is mandated to take Māori 'culture and traditions' into account, according to  
468 the principles of the 1840 'Treaty of Waitangi'. In particular, the Environmental Risk Management  
469 Authority (now part of the Environmental Protection Agency) found itself unable to address cultural  
470 concerns of an intangible or metaphysical nature, which had been raised across numerous applications  
471 to develop or trial genetically modified medical and agricultural products. A multi-year effort involving  
472 three of this paper's authors (Satterfield, Gregory and Roberts) ensued to investigate (a) whether GMOs  
473 were said to involve culture effects of any kind, be they negative or positive; (b) the distribution of these  
474 concerns across Maori, and (c) the development of a decision making protocol for balancing intangible  
475 and tangible effects (Satterfield et al. 2005; 2010; Finucane et al. 2005).

476 For our purposes here as regards cultural classifications, the initial research question as to what  
477 might comprise the set, or *ontology*, of potentially affected cultural values was entirely open. Such  
478 'value openness' is crucial to recognizing not just the cultural classifications that different people hold,  
479 but more generally the enormous variety and importance of different value languages themselves  
480 (Martinez-Alier 2009). Not only do such languages vary with groups, and/or the positions of  
481 stakeholders in conflict with one and other, they can become a means of better comprehending  
482 differences between parties (Martinez-Alier 2009) that can be solved with clearer use of methods  
483 proposed here. Ethnographic or 'cultural models' interviewing was used to first identify values of  
484 concern and their meaning. Examples of such approaches can be found in the work of Kempton et al

485 (1996), Paolisso (2002), Morgan et al (2002), and Gregory et al (2012).

486 In the New Zealand case, approximately 90 open-ended interviews and focus groups were  
487 conducted across an 18 month period involving the broad spectrum that is NZ Maori (including  
488 academics, resource managers, professionals, small and large business operators, under-and  
489 unemployed, as well as Maori from both urban and/or rural *iwi*, roughly tribe).

490 Approximately 14 kinds of cultural values emerged as affected by GM (Table SI-1). Of those that  
491 were dominant, many were arguments that addressed Treaty principles (*tino rangatiratanga*),  
492 particularly the right of Māori to be consulted as provided for in Section 8 of the HSNO Act. More  
493 importantly, for the purposes of this paper, three of these (in bold) were prominent above all other  
494 concerns, and involve what we have heretofore referred to as ‘intangibles’ though of a very different  
495 kind than that captured by the classification: cultural ecosystem services. These were glossed as  
496 *whakapapa* (a cosmological and kinship-like institution that designates the order and place of all things  
497 Maori across time and space) (Roberts et al., 2004), Spiritual Matrix B including *mauri* (a metaphysical  
498 force present in all things whose treatment is central to the well being and purpose of both the thing  
499 itself and its malevolence or not in the face of movement or transfer or change), and Spiritual Matrix A  
500 including *tapu* (the potency of all things, which varies according to the entity itself) (Satterfield and  
501 Roberts 2008).

502  
503  
504 *Whakapapa* was particularly important and is less a cultural value like ‘spirituality’ and much  
505 more an epistemology that, like the aforementioned example of ‘animals as kin’, prescribes appropriate  
506 understandings of the relationship between humans and nonhuman entities that make up what is often  
507 meant by ‘nature.’ In this sense, *whakapapa* is both construct and cultural institution comprised of an  
508 elaborate cosmology beginning with the origin of the universe and of the primal parents, then  
509 continuing to trace human descent/genealogy as well as that for all living and non-living material and  
510 immaterial phenomena. Lineages connect each *papa* or layer, and animal and plant *whakapapa* typically  
511 involve many species often from distinctly different scientific kingdoms (for example, a kūmara/tuber  
512 and a rat can be found in the same *whakapapa*), along with nonliving phenomena such as stars. The  
513 clusters of nonhuman entities within such *whakapapa* appear to act as ecosystem maps. They may also  
514 function as a traditional knowledge taxonomy based on perceived similarities (usually morphological)  
515 between some or all of the things included in the *whakapapa*. Fundamentally, *whakapapa* is about  
516 establishing relationships and so understanding one’s rights, purpose, duties and obligations that flow  
517 from familial and tribal relationships and from one’s location in the larger order of relations, including an

518 understanding of ecosystem relationships, which define human rights and responsibilities towards one's  
519 environmental kinsfolk. Through that location one comes to know one's purpose, history, and the place  
520 of oneself and all other entities in the larger order (Roberts et al. 2004). [This is not an obscure example  
521 or point as the NZ courts recently granted personhood to the Whanganui River, the nation's third largest  
522 river, on the basis that the river is Te Awa Tupua (part of an integrated, living whole with inextricable  
523 relationships to local iwi/tribes (Environment News Service, 2012).

524

525 Whakapapa's layers of relations suggest, amongst other things, obligations to a much wider  
526 sphere of beings and time whereby any one person or thing is the sum total of all that has preceded him  
527 or her. Within this, *mauri* is a powerful force that suggests both what something is and what its purpose  
528 in life should be. Similarly, the *tapu* of something is often though not always a function of its *whakapapa*  
529 or geneology. Together the *tapu-mauri* complexes, and the multi-dimensional *whakapapa* construct,  
530 pose a vexing set of problems for the kinds of classification or valuation goals of environmental  
531 management. An effect, by definition, is a performance measure that assumes that given a certain  
532 action, harm in the form of a measurable and so tangible effect will ensue.

533 This was best expressed in an early decision by the regulator, in reference to a proposal to  
534 genetically modify cattle for the development of pharmaceuticals. The cows had been grazing on land  
535 belonging to the tribal iwi, *Ngati Wairere*, which when discovered propelled the case through that  
536 country's highest court (Satterfield & Roberts 2008). The regulator's decision requested a broader  
537 approach in which the question of tradeoffs ("weighting" in their language) and metrics were central:  
538 "The balancing of spiritual beliefs and scientific endeavour is not a matter solely for judicial weighing up.  
539 ...They do not lend themselves to point in time decision making, even though the HSNO Act requires  
540 this...A broader approach is required to provide a context in which the HSNO Act can operate in dealing  
541 with these kinds of issues..." (ERMA 2001:27). The dilemma faced by the regulator and the Authority  
542 (the 8 person decision making body comprised of scientists, at least one of whom are Maori, and one  
543 Maori philosopher) centered on questions such as: 'what can be considered best practice consultation  
544 on concerns of this nature'; 'what constitutes relevant and robust evidence concerning the perceived  
545 effects of GMOs on spiritual beliefs'; and 'how can one weigh and balance the magnitude and likelihood  
546 of "intangible" risks against tangible and/or physical risks using the existing process'?

547 One of the fundamental problems was a tendency to conduct consultation with Maori outside  
548 or alongside but not integral to the decision making process itself (paralleling Arnstein 1969, which  
549 remains sadly relevant). This also typically involved the conversion of narrative testimony provided by

550 Maori, and generally aligned with the above cultural constructs, to a low-high importance scale/metric.  
551 The 'scaling' of that testimony, however, rested with the 8-member Authority (Burley 2007). As a result,  
552 intangibles remained marginalized in the context of actual decisions because the designated scales often  
553 fit the narrated constructs poorly, and because they were applied by those for whom the [cultural]  
554 values were largely unfamiliar. The implications of moving beyond this step also meet *some* of the  
555 concerns of critics outlined in this paper. First, adopting scales or metrics in reference to cultural  
556 ontologies or classification that are designed in situ allows for knowledge expressions that were  
557 heretofore outside the assumed structure of the original planning tool (be it an ecosystem service one  
558 or that derived from risk assessment). Second, doing so necessarily involves input from indigenous  
559 partners or constituents, a critically important concern from the point of view of just processes in  
560 decision making (Peterson et al. 2008), and is also essential when 'meaningful consultation' is legally  
561 mandated as is the case in both New Zealand and Canada as well as in other nation states (Gregory et al.  
562 2008).

563         Because constructed scales (described in section 2.3) are extremely useful yet often misused, a  
564 more detailed example may be helpful. A Cultural Health Index (CHI) was developed in New Zealand as  
565 a tool to facilitate the input and participation of iwi into land and water management processes and  
566 decision making. It is based on interviews with elders who identified key indicators pertaining to a body  
567 of freshwater in their tribal area that, from a cultural perspective, are fundamental to maintaining the  
568 health of the waterway. These include spiritual as well as physical values associated with tribal identity;  
569 creation stories and rituals; historical events; traditional and extant settlements, sacred sites; food  
570 resources, access and transport. Developed by Māori working in collaboration with western scientists  
571 (Tipa & Teirney 2003) the CHI was designed by local Māori and calculation of CHI scores is informed by  
572 traditional knowledge and values. This is done using a number of sites on a river and developing a CHI  
573 for each site. It consists of three major components, namely: site status (denotes the association and  
574 significance of the river site to Māori, past present and future); food gathering resources and values; and  
575 stream health (includes many physical measures identified from a Māori perspective). Each component  
576 contains a subset of indicators, which are rated holistically on a 1-5 scale. These are then subjected to  
577 correlation and regression analyses, which help identify those indicators most highly correlated with  
578 stream health.

579

580 3.3 Lower Bridge River, British Columbia

581           A third example of developing metrics for cultural concerns comes from decisions about river  
582 flows affected by a dam on the lower Bridge River near Lillooet, in south-eastern British Columbia,  
583 Canada (Failing et al., in press). The area is part of the traditional territory of the St'at'imc First Nation.  
584 After construction of the Terzaghi Dam in 1960, a four km section of the river channel immediately  
585 below the dam was left essentially dry, and flows on the river as a whole were greatly reduced. A Water  
586 Use planning process, initiated in the late 1990s and involving a diverse set of stakeholders – federal and  
587 provincial governments, local resource users, and nearby communities in addition to the utility (BC  
588 Hydro) and members of the St'at'imc Nation – structured discussions over several years, and had the  
589 goal of developing a new flow regime for the river that would be acceptable to all participants. A key to  
590 this process was the shared creation of an adaptive decision- making framework for evaluating flow  
591 releases downstream of the dam (Failing et al., in press). This resulted in a water use plan that  
592 implemented a series of experimental flows, beginning with a seasonally adjusted water release  
593 (averaging about 3 cms) and a 4-6 year review period established to carefully monitor and evaluate the  
594 results of each trial. At early stages of deliberations the key concerns were salmon abundance and  
595 revenues from power production, but as the multi-stakeholder group continued to assess flow  
596 alternatives it became clear that it was essential to add measures that dealt with the health of the river  
597 ecosystem (for example, concerned with the abundance and diversity of the aquatic benthic  
598 community) and additional cultural objectives to capture the full range of those things that mattered to  
599 aboriginal and other decision participants.

600           One of the concerns formally brought into the evaluation of flow alternatives by representatives  
601 of the St'at'imc Nation involved stewardship of the river. Basic to St'at'imc culture and self-identify is a  
602 feeling of responsibility toward the long-term protection and viability of the Bridge River on behalf of  
603 the St'at'imc people as well as for the benefit of other First Nations, along with a responsibility to  
604 protect the river itself. Two additional core components of stewardship were identified: the level and  
605 quality of participation in river-related opportunities, and a long-term commitment to oversight and  
606 monitoring. The recognition of these concerns aided both the identification and evaluation of flow  
607 alternatives and provided visible confirmation to the St'at'imc that the decision process itself was able  
608 to “level the playing field” by including considerations important to their Nation alongside other  
609 environmental or economic concerns.

610           The five-point scale used to incorporate stewardship concerns is shown in Table 1. Does this  
611 index fully capture stewardship? Not at all: the cultural concept of stewardship is fundamental to the  
612 St'at'imc population and holds both spiritual and practical importance that is not captured in this simple

613 scale. However, this same criticism can be made of other ecological or economic measures. The  
 614 deliberations helped all participants to recognize these limitations in the context of the task at hand,  
 615 which was not to develop a comprehensive inventory of all concerns but, rather, to develop a defensible  
 616 basis for shared decision making (and to move from a highly unsatisfactory situation, in which flows  
 617 downstream of the dam were stopped, to something better – not perfect, but representing a significant  
 618 move forward). Thus this type of scale works for the St’at’Imc because stewardship is not an absolute  
 619 measure but, instead, it’s a relative measure that allows for stewardship to be included in the  
 620 comparison of management alternatives and that establishes a basis for ongoing dialogue decision  
 621 participants over time. While the wording presented in this table was developed by St’at’Imc  
 622 stakeholders, there is a notable similarity to the framework original presented by Arnstein (1969), and  
 623 long confirmed and elaborated by more recent work (Gregory et al. 2012).

624  
625

|            |  |
|------------|--|
| Poor:      | One or more of the key parties are not included in active participation and stewardship opportunities are limited.   |
| Fair:      | All of the key parties are involved but stewardship opportunities are limited.   |
| Good:      | All key parties are fully involved, and there are moderate opportunities for active stewardship by key parties and affected communities.   |
| Very Good: | All key parties are fully involved and there are significant opportunities for active and collaborative stewardship, but with limited long term financial and institutional commitment.                        |
| Excellent: | All key parties are fully involved, there are significant opportunities for active and collaborative stewardship and there is a commitment to active and on-going oversight, monitoring and capacity-building. |

626 **Table 1.** Lower Bridge River, Canada example five-point Stewardship Scale. *Language for the*  
 627 *stewardship scale was derived from two all-day focus workshops, the first including 10 diverse*  
 628 *stakeholders, the second meeting comprised of 12 community identified St’at’Imc elders who were*  
 629 *charged with articulating the scale and implementing it when assessing flow alternatives (Failing et al.,*  
 630 *in press).*

631  
632

633 Another fundamental concern for St’at’Imc emphasized maintaining the cultural and spiritual quality of  
 634 the river’s flow. To represent these concerns in a scale that could be compared directly to other project-  
 635 related impacts (e.g., effects on fisheries, river health, power generation) study proponents worked  
 636 closely over several months with St’at’Imc representatives to the Water Use Plan and, in addition,  
 637 incorporated input from a group of St’at’Imc resource users and elders who were considered by the  
 638 community to be the resident knowledge holders. Some members of this group were residents of the  
 639 area prior to the construction of the dam a half-century ago, and this knowledge provided an important

640 context for construction of the “spiritual quality” measure. After numerous discussions, it was agreed  
641 that this measure should include the sound (the voice of water and birdsong), sight (seasonally  
642 appropriate patterns of pools and riffles); smell (of the water itself and at the water’s edge), and feel of  
643 the river (wadeable at different locations). Importantly, it was the St’at’imc elders themselves who  
644 translated the “spirit” or “voice” of the river into these terms, and they observed that in moving from a  
645 water-release volume of 0 to 3 cms/y, there already had been noticeable improvements. While these  
646 four components clearly do not provide a universal definition of cultural or spiritual quality, they define  
647 the aspects of cultural and spiritual quality thought to be most relevant for the evaluation by St’at’imc of  
648 a suite of alternative flow regimes and habitat enhancement activities on the river, and within the  
649 (average annual) range of 0 to 6 cms-y.

650 To refine these constructed performance measures over time (in keeping with the adaptive  
651 nature of the overall flow management plan), it was decided that a committee of three to eight St’at’imc  
652 members will act as observers of the river; with designated observations to be taken four times per year  
653 under a range of test flows; and including a visual record at each observation site using video camera  
654 and still photography. All of this will occur in conjunction with a replicable and transparent scoring  
655 system for assigning scores to each component (Failing et al. in press).

#### 656 **4.0 Discussion: Directions in Articulating Culture and Environmental Policy**

657 What ultimately can be said about these efforts to improve the consideration of cultural considerations  
658 as part of in environmental decisions? Problem identification is a comfortable terrain for many social  
659 scientists, although problem solving is less so -- in part, because fears of conservation or development  
660 planning as social engineering run deep. Escobar (Escobar 2005), quoting Thoreau, states: “If I knew for  
661 a certainty that a man was coming to my house with the conscious design of doing me good, I should  
662 run for my life... for fear that I should get some of his good done to me (p. 205)”. Yet, it is also the case  
663 that many local First Nations are doing planning of this kind for themselves and seek advice about how  
664 to do so. Those who reject outright the idea of ecosystem services as a basis for conservation planning,  
665 or regard all environmental planning as a form of coercion, are not likely to be comforted by these  
666 methodological innovations. Nor do we mean to ignore the fact that all decision-making involves both  
667 political will and technical and deliberate implications. Such concerns are all the more legitimate as  
668 major conservation organizations act as nascent state entities (West 2006) and/or are ever more  
669 pressured to perform accountability outcomes for distant donors at the expense local actors (Brosius  
670 2006).

671 Classification necessarily involves planning conducted as the local identification of what matters,  
672 who knows, and by what rules of question framing and evidence? In the New Zealand and British  
673 Columbia cases, changes (though only partially complete) are evident in the very basis through which  
674 key cultural values are operationalized and debated in decision making. Not long ago it was virtually  
675 impossible to imagine scientists and indigenous partners sitting down at the table discussing *mauri* or  
676 the 'spirit of the river', let alone including these as meaningful attributes in conservation planning. These  
677 examples and the associated value openness occurred because of indigenous activation of state  
678 mandated recognition of First Nations (see also Miller 2011).

679 As mandates for including cultural concerns and the growth in political agency that fuels these  
680 become increasingly common, culture is almost certain to become a classification that necessarily  
681 involves indigenous constituents and policies. Consulting with constituents to create new and  
682 meaningful scales -- documented expressions of important cultural values used to conduct evaluations  
683 and decision making -- can also reduce covert political machinations precisely because a record and  
684 precedent is provided that is politically difficult to overturn. This particularly holds true if and where  
685 community level consultation is mandated and practiced (e.g., our NZ and British Columbia 'smaller-  
686 scale' examples), less so when overt political and economic force is enabled. This is the case in many  
687 contexts, for example, in Bolivia, where --aforementioned constitutional provisions aside -- road  
688 construction is severing in two a protected area that is largely indigenous territory (BBC News 2012); or  
689 in Canada where proposed oil and gas pipelines openly advocated by the federal government are widely  
690 unpopular (Gregory 2012).

691 The question of how to think about and approach the question, locally, of who might speak for  
692 the 'group' in decision fora is not addressed here and needs considerable attention. A conventional  
693 social scientist approach presumes a representative sample of the group as best. But it might equally be  
694 the case that representation is defined locally as a function of designated leadership (civic or  
695 customary); recognized cultural knowledge holders when this is key (Davis & Wagner 2003); or some  
696 other means of appropriate representation of local constituencies as leadership and demographic  
697 groups change over time.

698 The question of 'who' pertains equally to knowing when the unit of analysis is the group versus  
699 the individual. Far too often, it is assumed that the group is an aggregation of individual preference  
700 judgments when in fact the group (e.g., as collectively responsible for governing the commons) is the  
701 appropriate unit of analysis. When this is the case, discursive decision-making approaches are likely  
702 more viable than methods based on surveys of individual preferences (Wilson and Howarth 2002). This



703 is particularly true to the extent that significant learning -- about meanings, preferences and knowledge  
704 -- can occur as a result of the interactions among group members and their evolving understanding of  
705 the consequences of proposed actions (Gregory et al, 2012).

706           Some give and take across interdisciplinary borders (Peterson et al. 2008) on the norms of  
707 evidence and greater use of narrative and open-ended exploratory techniques can improve the  
708 opportunities for expressing the inexpressible. Much deeper site-based knowledge will be required to  
709 do this well, as will collaboration with those long familiar with the ethical norms of research access and  
710 relationship building across different communities. In addition, because people may be more able to  
711 discuss abstract concepts (e.g., identity, sense of place) when mentioned in conjunction with going to an  
712 important site or catching fish, it might be best to closely couple discussions of material ecosystem  
713 services (e.g., provisioning of food) with invisible benefits (such as the transmission of knowledge that  
714 occurs when sharing that task with a child) (see also Turner et al. 2008; Calvet-Mir et al. 2012).

715           Yet even when the intangible dimensions in a decision context are satisfactorily articulated,  
716 assigning weights to these dimensions and addressing the associated tradeoffs as part of management  
717 plans will often remain difficult. Tradeoffs are widely recognized as difficult (McShane et al. 2011), and  
718 this is especially so when the objects of proposed trades are strongly held and thus tradeoffs are  
719 resisted as amenable to common measurement of any kind (Ginges & Atran 2009; Baron & Ritov 2009;  
720 Satterfield & Roberts 2008; Baron and Spranca 1997). Imagine, for example, discussions of a stand of  
721 trees that are recognized by a cultural group as inhabited by the spirits of their ancestors; and imagine  
722 the possibility of discussing the right to protect these physical and metaphysical resources as open to  
723 negotiation. In such cases, fungibility should not be taken as a given but neither should it be considered  
724 necessarily off-limits: instead, it should be approached cautiously, as potentially offensive or morally  
725 compromising at the same time that it might be viewed as politically or practically necessary in order for  
726 an indigenous group or community to gain a voice in a critical environmental policy debate.

727           That we need to engage meaningfully and respectfully with diverse constituencies and find  
728 better ways to represent the complexities of natural and cultural worlds as part of environmental policy  
729 decisions is a given. That we have barely begun is a verdict that simultaneously reflects a disturbing past  
730 and a more promising future.

731

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736

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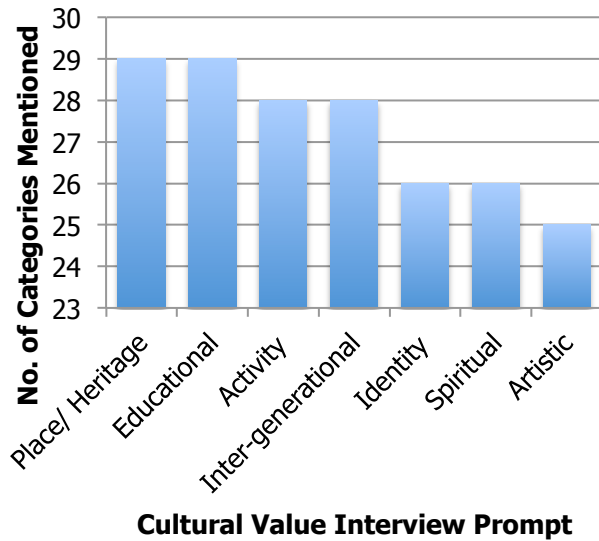
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**Figure 1. Eliciting Cultural Values in the Context of Ecosystem Services for Marine Spatial Planning.** Number of cultural services, benefits or values mentioned for each cultural value prompt across interviewees (n=30). The mention of each category of cultural ecosystem service, benefit or value (y axis) was summed across seven cultural value prompts (x axis). The number of categories mentioned reflects the degree of articulacy about what matters culturally, be that expressed as a service, benefit, or value. The typology used for coding the “number of categories mentioned” is drawn from Chan et al. 2012a, p. 13.

| Cultural Values Raised                      | Definition  |
|---|---|
| I nga wā o mua                              | Deference to ancestral wisdom   |
| He tangata, he tangata                      | Intrinsic value (and, in many situations, primacy) of human beings, both individually and collectively.   |
| <b>Spiritual Matrix A – tapu, mana, noa</b> | Metaphysical potency and power manifest in all entities   |
| <b>Spiritual Matrix B – mauri, wairua</b>   | Origin, meaning and presence of purpose, agency or life force in all things   |
| Taonga                                      |   |
| <b>Whakapapa</b>                            | Among Polynesians this concept is used to encapsulate their understandings of the world and of their place in it. This typically takes the form of an elaborate cosmogony beginning with the origin of the universe and of the primal parents, then continuing to trace the descent of living and non-living, material and immaterial phenomena including humans. |
| Kaitiakitanga                               | Guardianship---differentiated from stewardship, which implies “someone else’s property”   |
| Kia tūpato                                  | In contemporary terms, <i>kia tūpato</i> (be cautious) follows most closely the ‘precautionary principle’   |
| Kimihia te mātauranga/mōhiotanga            | quest or desire to seek new knowledge   |
| Kōrero tahi                                 |   |
| Tino rangatiratanga and Treaty Principles   | Related to the principle of partnership implicit in <i>Te Tiriti o Waitangi</i> as both evoke participation and control in decision-making processes. Tino rangatiratanga as absolute power and authority refers to the person or group who has the power to act with ultimate authority when necessary.  |
| Tikanga                                     | While there are no specific Māori terms for virtue, ethics and values, the term <i>tikanga</i> can be justly said to embody them all. <i>Tikanga</i> speaks to ideas of right, correct, true, and/or just rules of practice.  |

|         |   |
|---------|---|
| Kaupapa | Purpose and consequential ethics including 'who' benefits, also signifies kaupapa signified 'will' 'intent' or 'motive.'  |
| Karakia | <i>Karakia</i> , first and foremost, is the invocation or prayer through which permission for transfer or exchange is sought from the realm of the Atua. More specifically, <i>karakia</i> is the invocation itself whereas <i>pure</i> is the ritual practice in which those invocations are situated. |

**SI-Table 1:** Cultural classifications were drawn from interviews and focus groups with 90 Maori stakeholders, selected for their diversity of views and traditional knowledge expertise. A full reported of methods is available in Satterfield et al. 2005.