



Contents lists available at ScienceDirect

Journal of Environmental Management

journal homepage: www.elsevier.com/locate/jenvman

Compensating aboriginal cultural losses: An alternative approach to assessing environmental damages

Robin Gregory^{a,b,c,*}, William Trousdale^{d,e,1}

^a Decision Research, 1160 Devina Drive, Galiano, B.C., Canada V0N 1P0

^b University of British Columbia, Canada

^c University of Victoria, Canada

^d EcoPlan International, Vancouver, Canada

^e Simon Fraser University, Canada

ARTICLE INFO

Article history:

Received 14 March 2008

Received in revised form

19 December 2008

Accepted 28 December 2008

Available online xxx

Keywords:

Cultural loss

Aboriginal

Environmental damage

Compensation

ABSTRACT

We first identify six primary problems with conventional practice: lack of context, inadequate participation from aboriginal communities, exclusion of important losses, reliance on market-based measures, neglect of uncertainty, and inadequate treatment of time. We then propose a different approach to compensation, based on insights from the decision sciences and structured decision making. Using case-study examples, we discuss how the proposed approach might address common sources of cultural loss and, in a concluding section, summarize some of the implications for compensation agreements and for environmental management practices.

© 2009 Elsevier Ltd. All rights reserved.

1. Introduction

Cultural losses experienced by aboriginal communities are widely viewed as a pressing social issue. Many of these losses are due to environmental impacts affecting land, water, and air resources that are associated with the spread of industrial development over the past 100 years. For some people this issue is recognized as fundamental, with important implications for how society should move forward over the next decades: the unique perspective of Aboriginal cultures, their greater emphasis on sustainability, and the close integration of environmental, social, and economic concerns all speak to a new path forward. For others, the problem of aboriginal cultural losses is viewed as a source of guilt and embarrassment, with implications for how the benefits and costs of past and future resource development on aboriginal lands should be shared. For others, there is no problem: the employment and revenue benefits offered by

industrialization are seen to more than offset the environmental and cultural losses related to an outdated, albeit traditional, way of life.

Understanding the complex changes and implications of loss experienced by Aboriginal people is challenging for both native and non-native societies. In this paper we argue that conventional approaches for estimating cultural losses experienced by aboriginal populations are ethically illegitimate, methodologically incorrect, and simply don't make sense. We briefly review the pros and cons of conventional methods and then turn to a different approach, based on insights and techniques drawn from the decision sciences and participatory deliberative processes based in structured decision making (Gregory et al., 1993; Keeney and Raiffa, 1993). We demonstrate the advantages, along with some possible disadvantages, of this new approach using several examples from North American aboriginal communities. We conclude with a discussion of key issues, including the important question of the extent to which compensation is able to address the types of cultural losses often experienced by aboriginal populations in North America.

Our focus is specific to the choice of methods for incorporating cultural losses due to changes in the natural environment. We acknowledge that many individuals—including Aboriginal peoples themselves, along with anthropologists, lawyers, philosophers, geographers, planners, and biologists—have written persuasively

* Corresponding author. Decision Research, 1160 Devina Drive, Galiano, B.C., Canada V0N 1P0. Tel.: +1 250 539 5701; fax: +1 250 539 5709.

E-mail addresses: rgregory@interchange.ubc.ca (R. Gregory), william@ecoplan.ca (W. Trousdale).

¹ Address: 131 Water Street, Suite 208, Vancouver, B.C., Canada V6B 4M3. Tel.: +1 604 228 1855.

and elegantly about the topic of cultural loss in Aboriginal communities.² We owe them a profound debt, but our focus in this paper is more narrow: We seek to advance an improved methodology for assessing cultural losses from environmental damages in a way that makes sense simultaneously from the standpoint of the Aboriginal communities and from the perspective of governments, policy analysts, and the law. Although much of what we say in this paper will apply to traditional cultures in other countries and to resource-based losses experienced long ago, our focus is on cultural losses experienced by Aboriginal populations currently living in western Canada and the U.S. Pacific Northwest (referred to as First Nations, First Peoples, Inuit or Metis in Canada and Native Americans in the U.S.) who have experienced detrimental changes to their traditional lands and lifestyles.

2. Cultural losses due to environment change

Throughout North America there is a renewed interest on the part of Aboriginal populations for increased control or self-governance of traditional lands. This takes a range of forms, from outright management of natural resources to sharing in the benefits derived from resource extraction (e.g., jobs and revenues from mining, oil & gas production, forestry operations, rangeland, or fisheries). A spate of new legislation and court decisions echoes and reinforces this interest.

The emphasis on control over resource management goes hand in hand with a renewed interest in both land- and marine-based cultural activities and a heightened appreciation of the cultural losses that have been experienced over the past several centuries. In Canada, some of the most serious incursions into First Nation lands have occurred since the end of World War II and have been stimulated by the interest of large mining, forestry, or oil-and-gas companies in the rich resources found on (or under) traditional lands of First Nations people. Many of the legal and court initiatives have been undertaken on behalf of First Nation populations in order to protect what are viewed as traditional rights and activities.

Cultural losses, as used here, refer to adverse impacts on the range of traditional activities, emotional well-being, or social relations engaged in by an individual and/or an Aboriginal community as the result of changes in the land. Such losses can include reductions in fishing, hunting, or trapping activity; losses of identity through the curtailment of these activities; reductions in health, which may be linked to contamination of traditional foods or adverse emotional and psychological impacts; and negative effects on cultural, social, and economic relations that historically were based on these altered activities (Kirsch, 2001). In some cases, activities that were commonplace and central to community life have vanished as the result of mining, logging, oil & gas, or residential development. Economists refer to such severe changes as non-marginal; from the standpoint of a community, the loss of place—and the resulting loss of traditional activities, foods, and ceremonies—can prove devastating (Turner, 2005).

Extensive coverage has been given—in literature and in the popular media—to the magnitude of cultural losses imposed on Aboriginal populations by colonial administrators and programs during the settlement of North America. Cultural losses that still are being experienced by many of these same Aboriginal populations have received less notice; those directly responsible for the impacts tend not to be governments but corporations, with an interest not in the land itself but in what lies above (trees) or below (oil and gas,

minerals) or beside (marine estuaries for fish farms) a Nations' traditional territory. These losses tend to be less visible, in part because the sites in question are often remote and the instigators are in far-away offices (in New York or Toronto or London), and in part because losses often occur in the context of a presumption of benefits (jobs, training, new infrastructure). There is also, at times, an unstated presumption of incrementalism, whereby it is assumed that because substantial losses already have occurred, any new damages (to resources or to culture) will be relatively small.

A wide variety of evaluation methods have been developed to estimate cultural losses in terms that fit within the framework of the economic and legal system. With few exceptions, however, we believe that these evaluation methods for estimating land-based cultural losses have lagged well behind parallel developments in legislative and court initiatives. Recent Canadian court decisions, in particular, have redefined Aboriginal rights relevant to the estimation of compensable losses. A key case is *Delgamuukw v. British Columbia* (1997), which requires that oral histories given by Aboriginal elders are accommodated and given equal footing with other evidence. In the province of British Columbia, the ruling in *Gitksan v. B.C. Minister of Forests* (2002) confirmed the obligation of the Crown to consult with First Nations in the face of potentially damaging resource management activities initiated by the private sector. In northern Canada, the decision in *R. v. Iqaluit city*, 2002, stated that “respect for the environment is a key social value that is deeply ingrained” in Aboriginal culture and must be affirmed and protected by the courts. The recent ruling of the Alberta Appeal Tribunal in the case of *Gift Lake Metis Settlement v. Devon Canada Corporation* (2007) recognized that “oil and gas activity ... continues to have some impact on the value of the land for preserving a traditional Metis way of life and continues to have a negative impact on the cultural environment.”

In contrast, the dominant cost-benefit and market-based evaluation approaches used to estimate cultural losses rely on largely out-of-date, 1960s socio-economic and environmental methods. They neglect—whether from intention or ignorance—recent research findings in psychology, ecology, anthropology, economics, and the decision sciences, and they largely neglect applicable methods and practices common to related forms of compensation. As a result, many of the methods used to estimate resource-based cultural losses are not defensible even from the narrow grounds of good science or accepted decision making and legal practice. At best, the estimation of cultural losses due to changes in the land base is a difficult and challenging task; it makes no sense to take a tough job and make it harder by using out-of-date methods and inappropriate or poorly conceptualized analytical tools.

3. What's wrong with conventional compensation approaches?

Conventional approaches to estimating cultural losses from environmental damages typically fail to reflect many components of value that matter to the affected indigenous populations. Yet despite widespread criticism, the reliance on market-based approaches persists: we can think of four possible explanations. First, there exists a strong legacy of decisions made by the courts from a time when cultural losses were viewed very differently than they are now. This has led to an unfortunate record of precedence whereby accepted practices may reflect out-of-date methods and, more importantly, an out-of-date context that fails to acknowledge the primacy of land- and marine-based cultural practices to the well-being of Aboriginal communities. Second, there is little incentive for either industry or government to push for improved methods since, in most cases, the likely changes would place a higher emphasis on environmental services and the associated

² Only a portion of these discussions involves losses due to environmental changes; for example, others reflect the loss of language or trauma experienced by Native students while in residential schools.

cultural losses. “Doing things right” would thus initially take more work, and might not endear the responsible civil servants or corporate managers to their bosses. Third, underlying prejudice and a paternalistic attitude toward aboriginal populations still exist in many individuals, and may influence how cultural losses are addressed. Fourth, many aboriginal groups, desperate to settle claims quickly to help relieve sub-standard living conditions, agree to methods known to be inappropriate because they are recognized as acceptable to governments and courts and, thus, could lead to shorter response times and more speedy resolution of claims. Although this practice is to their long-term detriment, First Nations are not the only cultural group to place an unfortunately high value on short-term gains.

Examination of these reasons leads in many directions, far too many to pursue in this paper. In this discussion we therefore omit many important philosophical, historical, and political aspects of compensation and instead focus on inappropriate methodological techniques for estimating land-based cultural losses. As discussed below, six key dimensions form the focus of our concern: lack of a relevant context, inadequate participation of the aboriginal community, neglect of important types of losses, over-reliance on economic measures of value, failure to incorporate responses to uncertainty, and inadequate treatment of intertemporal losses.

3.1. Absence of context

Compensation for cultural losses needs to address those things important to the population that is the intended recipient. This means that the context for determining an appropriate form and amount of compensation will depend on the experienced type and extent of harm. Direct dollars lost is likely to be one of the dimensions, and for monetary losses a dollar-based payment is appropriate. However, cultural losses generally have many other dimensions—traditional activities and ceremonies, health, meaningful jobs, knowledge transmission, collective and individual identity or status—and many of these are likely to be addressed more fully through non-monetary means: trading new lands in good condition for degraded lands, exchanging opportunities to fish or hunt in new areas for similar opportunities in traditional areas, providing support for the continuance of aboriginal forms of governance.

Other types of cultural losses may best be addressed, albeit only in part, by an apology or acknowledgement of damage: emotional and psychological responses that include grief, anxiety, suffering, and shame, for example, are legitimate and serious components of loss, no less real than the loss of livelihood or potential income (Avraham, 2006). For these types of losses, for which there are no recognized objective guidelines, compensation has the different goal of seeking “corrective justice” (Radin, 1993) through an attempt to establish compensation that “restores moral balance between the parties.” Other legal scholars (Eades, 1993) have referenced a sense of “collective enlightened conscience” in which consideration is given to “the nature of the injuries, the certainty of future pain, and the severity and the likely duration thereof.” To consider these components of loss thus requires that a focus be placed on addressing damages as they are manifested within those who have experienced them, in ways that make the most sense from the standpoint of these individuals and their community.

There exist many examples. For a Native population that no longer can harvest traditional foods on its territory because of contamination from a nearby factory or paper mill, the best compensation may be provision of an opportunity to harvest these same foods from a nearby national park that ordinarily would be off-limits. For a Native population that can no longer fish or trap because river flows have been disrupted following construction of

a hydroelectric dam, the best option may be to reintroduce some flows to the river (even at levels well less than historic) and thereby at least partially restore local fish and wildlife populations. In these (and similar) situations, monetary compensation may have a role to play but non-monetary forms of compensation are useful as a complement to enhance the comprehensiveness, and the acceptability, of an overall compensation package.

Clarification of the context for compensation also brings attention to the important, but widely ignored, psychological distinction between the value of a loss and the value of a gain. The distinction matters because any replacement-based approach to compensation assumes, for example, that the prior loss of fish or habitat or game is fully compensated by an equivalent gain. Yet research in the behavioral sciences (Knetsch, 1990) has shown that losses and gains are valued asymmetrically, with a loss typically counting two or three times as much as a formally equivalent gain (Kahneman and Tversky, 1979).³ Since compensation aims to construct a settlement package (i.e., money plus other forms of compensation or mitigation) that, so far as possible, will make the impacted population “whole”—as well off as if prior losses had not occurred—the asymmetry between the value of a gain and a loss has important legal implications for the required extent of compensation (Rachlinski, 1996) and, as discussed more fully later, for the balance between compensation and mitigation initiatives.

3.2. Inadequate participation

Much progress has been made over the past decade in ways to encourage participation from non-native communities in discussions of environmental management options; the literature contains numerous discussions and case-study examples (NRC, 2005). Yet involvement of aboriginal populations has proven more difficult, with Native communities frequently opting out of deliberative processes or choosing to participate only as part of parallel yet separate discussions.

There are many explanations for this observed reluctance, but three reasons are most often provided by members of Aboriginal communities. First, indigenous peoples often are invited “to sit at the table” as one of many stakeholders. Yet this invitation often is viewed as an insult: their links to the land existed for hundreds or thousands of years, and in many cases national laws (e.g., as under the Canadian constitution) guarantee First Nations a special status as a recognized government (so that consultations take place “government to government”). Second, Aboriginal communities often experience capacity constraints that make it difficult for members to participate in ongoing discussions. Third, many deliberations take place in an urban setting, with discussions following rules of behavior and timing only appropriate for non-native populations. Furthermore, fishers or trappers who have been deprived of their traditional means of livelihood don’t necessarily want to sit in a conference room to discuss their losses; instead, they want to bring people out to their rivers, lakes and woods and show them the changes that have taken place.

3.3. Neglect of important losses

One of the most obvious shortfalls of current compensation practices is that important dimensions of loss often are omitted from analyses or, if included, are not represented accurately. Two cases are most common: losses are noted but treated as trivial, with

³ This distinction is at the core of an important theory of exchange generally known as Prospect Theory, based on theoretical work by Kahneman and Tversky and three decades of supportive experimentation.

significant inaccuracies and little detail, or important dimensions of cultural loss are ignored completely. In either case, the neglect often is due to ignorance rather than intent; resource managers and agency staff may simply not be aware that something important to a Native population has been, or might be, adversely affected.

Many changes to the local environment fit the first description, of losses that often are only partially included. A primary reason for the omission of important components of loss has to do with an asymmetry in standards for the presentation of evidence. Many traditional use and other descriptive studies have been completed by anthropologists and ethnobotanists, often in close collaboration with the resident indigenous population. These studies provide a relatively comprehensive comparison between the earlier life of a community, with a healthy natural environment, and current limits imposed as the result of adverse changes: the effects of pollution on fisheries, changes in wildlife migration patterns, impacts from roads, contamination of air and water from industrial emissions, and the like. Yet the information collected by economists, risk analysts, and lawyers for use in risk assessments or compensation hearings typically is far more cursory. In many cases, categories of value closely follow those of more mainstream analyses, so that activities distinctive to the indigenous population—use of traditional food resources, sacred gathering areas, passing on of knowledge between generations, food-based cultural ceremonies—are treated as interesting but irrelevant to compensation estimates.

Better technical and scientific studies are not necessarily the answer. Instead, closer attention must be given to the significant body of knowledge that is not grounded in conventional scientific methods. Some of the holders of this “local” knowledge are long-time community residents; some are aboriginal populations with special interests in cultural uses of environmental resources; some are resource users with specialized knowledge such as fishers, farmers, trappers, or hunters. From a decision making perspective, one should not care whether information comes from conventional science or alternative knowledge sources; instead, one should accept—or reject—any information on the basis of its relevance to the context and the credibility of the process by which it was developed. The legal and legislative basis for doing so is strong: the traditional ecological knowledge (TEK) of Aboriginal peoples has been given explicit standing as part of the Canadian Environmental Assessment Act (CEAA), and legislation in many provinces—including Alberta’s 1990 Metis Settlement Act (MSA)—establishes a legal basis for the use of traditional knowledge when estimating compensation for cultural losses that might include impacts on traditional activities, emotional well-being, and social relations.

One example comes from work of the ethnobotanist Nancy Turner and her colleagues, Chief Adam Dick and Kim Recalma-Clutesi, in understanding the significance of eelgrass (*Zostera marina*) to First Nations living on the eastern side of Vancouver Island, Canada (Turner, 2005). Eelgrass is widely recognized to be an important feeding and holding habitat for juvenile salmon. Biologists from the Canadian Federal Department of Fisheries and Oceans (DFO) noted this linkage and have protected or rehabilitated several key eelgrass beds in the coastal Lower Mainland area (such as some portions of the lower Fraser River estuary) so as to protect local fisheries. Yet for many First Nations living along the coast of British Columbia, eelgrass beds provided not only a sanctuary for juvenile salmonids and herring but also a focus for cultural ceremonies, a key resource for trading, and a rich source of foods and nutrients. An eelgrass bed that functions well as a nursery for salmonids might not work well as a supplier of eelgrass roots for food; it has become extremely difficult to locate the large, orange-coloured rhizomes that previously were widely harvested by

Kwakwaka’waku and other First Nations, and the small, dark-coloured rhizomes that are found today are considered useless for either food or ceremonial purposes. Unless these culturally prescribed reasons for protecting eelgrass are included in the assessments of DFO and other agencies, the full extent of losses incurred by the First Nation community will not be recognized.

A related omission in identifying impacts reflects heightened contaminant exposure levels due to lifestyle differences between aboriginal and other populations. As noted by ethnobotanists and risk researchers (Harris and Harper, 2000), the typical member of an Aboriginal community living along the Pacific coast consumes substantially higher quantities of wild foods such as salmon and shellfish than the typical mainstream urban resident. In some cases, differences in consumption rates can be as much as two orders of magnitude (Harris and Harper, 1997). Contamination of wild food sources, including heightened mercury levels due to nearby fish farms (Debruyne et al., 2006), therefore may have only a limited impact on the mainstream urban population but severely impact rural Aboriginal populations. Similarly, the contamination of berries and game due to pesticides and herbicides used in forestry will result in greater impacts on Indigenous populations due to the greater reliance of these populations on wild food sources.⁴ This asymmetry between Aboriginal and mainstream consumption rates, magnified by the close link between consumption of certain foods (shellfish, salmon and berries) and important cultural ceremonies, means that significant health and cultural losses may be ignored whenever a conventional risk analysis uses population averages to estimate contaminant exposure levels for a First Nation community.

The second category of neglected values, those that often are completely ignored in compensation hearings and resource loss evaluations, describes many of the emotional and psychological losses experienced by First Nations. These losses may be named by western analysts as being concerned with worry, or guilt, or shame, but those experiencing the emotional damages may simply feel overwhelmed or “disorganized” in the world, unable to find their place. An example comes from a First Nation whose members live in the coastal mountains of British Columbia. For centuries, the lives of this First Nation were centered on a variety of fish- and game-related activities on a river known as the “land of plenty.” After construction of a series of hydroelectric dams, flows on the river were stopped completely (except for releases during flood events) and the lives of community residents were changed dramatically. Were compensation simply to address the direct resource losses of fish and game, fundamental emotional and psychological losses related to the loss of traditional activities, ceremonies, and a shared sense of place and collective identity would be ignored.

Another possible source of emotional loss stems directly from the task of evaluating losses. Stoffle and Evans (1990) tell the story of an Aboriginal leader asked by the state of California to help them determine the more important impacts of a proposed project. He responded: “You come in here... and ask that one portion be chosen for protection over another. That is like lining up my children and asking which ones I want you not to shoot.” The emotional cost associated with such ongoing losses has led to

⁴ In addition to the cultural implications, increased contamination can result in other health problems for aboriginal people who depend on the resource for their diet. An example is from the Swan Hills area of Alberta, where after a toxic spill the government limited the intake of fish per person per month. This put aboriginal people, especially those who still pursue a more traditional lifestyle, in a difficult position: either they ignore health warnings and continue their traditional lifestyle at the risk of personal health, or they further impoverish themselves (both monetarily and nutritionally) by purchasing food at the grocery in the nearest town.

adoption of the term “cultural triage,” a concept borrowed from the rationing of life-saving medical resources: designating some resources as less special, and thereby placing them at greater risk, can be felt as a violation of the sacredness of the land and of responsibilities toward nature. To the extent that hindsight might show that at least some losses could have been prevented or reduced, then members of the Native community may experience feelings of guilt or shame associated with abnegating stewardship responsibilities.

Finally, and for all types of losses, an important source of neglect when identifying impacts is tied to how information about cultural losses is collected and analyzed. Emphasis typically is given to quantitative information, drawn from census records or models or maps; more qualitative methods for collecting information, such as the use of narrative discourse and stories, often are ignored. Interviews and historical documents might be used, but often they are neither comprehensive nor in-depth. In the case of interviews, typically little time is spent to build trust, few individuals are involved, and limited opportunities are provided for direction from the Native population. Because access to key knowledge holders can be difficult—a legacy of long-term problems of mistrust, the relatively low numbers of surviving Elders, and language differences—important information relating to cultural losses is not obtained and extra initiatives, such as hiring and training interviewers from local populations, often are not undertaken.

3.4. *Reliance on market-based measures*

Standard practice estimates compensation for cultural losses in terms of a market-based measure of value. This typically requires converting traditional cultural practices, such as subsistence hunting or fishing activities, into a market-based equivalent (Brown and Burch, 1992). The conversion can be direct, such as substituting marketed foods such as beef or cans of tuna for the value of moose or fish that previously were obtained through traditional practices. Or it can be indirect, for example using survey techniques such as contingent valuation (CV) measures (Mitchell and Carson, 1989) to derive a market-based measure of value for the lost activity based on an individual's willingness to pay to avoid a loss or their willingness to accept monetary compensation in return for taking on the loss.

A charitable perspective on market-based methods is that they seek to find a way to integrate traditional cultural losses with approaches typically used to include negative environmental impacts and externalities. The difficulty is that this requires a double conversion and, for many Aboriginal people, a double affront. First, activities essential to the life of a community—hunting, feasting, collecting berries, managing forest biodiversity—are set aside and separated, conceptually, as if the community could continue to prosper more or less well so long as more or fewer of these activities took place. This creates a separation between the people and the environment and their culture that is loathsome to many Aboriginal populations (Nadasdy, 1999). Second, these same activities then are converted from natural units—days of hunting, pounds of berries collected—into a market-based measure, to form the basis for a monetary compensation settlement. Yet this invalidates the significance of the activities to the affected Aboriginal community, and assumes a relation between the substance of the loss and a market-based dollar amount that is often sufficiently tenuous as to be meaningless (Ackerman & Heinzerling, 2002). In addition, the value of the lost hunting or fishing activity itself typically is assumed to be zero (Brown and Burch, 1992), which in turn implies an ignorance of the various components of this value—including sharing among community members, ties to long-

standing cultural activities, and the transmission of knowledge across generations

Despite these criticisms, market substitution or “alternative cost” methods remain one of the most widely used dollar-based techniques for estimating compensation. In a well-known case from the 1980s, the prices paid farmers in Wisconsin for live cattle and chickens were used to set a value for losses of fish and game traditionally harvested by Chippewa Indians. A more recent example, from western Canada, involves compensation for a Metis community whose losses stem from 50 years of exposure to oil and gas exploration and production on their traditional lands. A report commissioned by the developer, using a “market basket substitution” method, based losses on the market price of substitute foods available in area stores, in this case using “sliced ham, enriched white bread, and frozen French fries” as substitutes for the lost traditional activities. The economic value of traditional knowledge, transmitted from generation to generation, was included through addition of the estimated cost of a one-week cultural camp, to be held each year.

A related problem is that market-based approaches focus on the value of a loss to an individual rather than to the community. Cultural losses, however, are not solely within the domain of the individual. Any attempt to establish cultural losses based on the elicitation of individual values such as a persons' willingness to pay, which is the hallmark of economic approaches, neglects the social process by which values typically are constructed: the value of culture is not measured solely in terms of individual welfare but in terms of the well-being of the society (Sagoff, 2004). Because the community is enduring, estimates of cultural losses based on individual values ignore important losses associated with continuity of the community and the needs of future generations.

Monetary compensation has a role as part of a compensation agreement with an Aboriginal community. In some instances, monetary compensation may be a preferred metric, at least for a portion of the losses that have been experienced. Monetary compensation also may help with the challenging task of communicating the significance of Aboriginal losses to a government or corporation, and thus help to stimulate mitigation activities designed to reduce the magnitude or severity of current and future losses. Our intention is to decouple the usual association between market-based approaches and monetary compensation: as described in more detail later, it is not necessary to put up with the inappropriate and offensive assumptions of market-based methods in order to realize the practical benefits of compensation expressed in monetary terms.

3.5. *Neglect of uncertainty*

In many ways, the history of Native peoples' relationship to natural resources in North America is all about surviving in the face of ongoing uncertainty (Berkes, 1999).⁵ In some cases, this has involved unexpected movements from a traditional land base to another site (often as a result of government intervention); in other cases, a resource base that for hundreds of years served as the foundation for a local community was suddenly taken away (e.g., the loss of access to anadromous salmon runs due to construction of an irrigation dam). At minimum, most native populations have experienced new limits placed on their movements and activities due to increased population levels, industrial development, and the incursion of forestry, mining, and other resource-extraction

⁵ Researchers in adaptive environmental management, for example, have noted strong parallels between the traditional practices of First Nations and the prescriptions of modern adaptive management strategies.

activities into traditional lands. These changes have brought some benefits but they also have imposed significant costs on many First Nations' cultures and lifestyles. In addition to the environmental or social or economic disruption, uncertainty itself imposes an emotional and psychological cost in that adjustments need to be made on a recurring basis and, often, are accompanied by worry, stress, and anxiety (MacGregor, 1991). In some cases, stress associated with not knowing the long-term seriousness of industry-related health effects may be worse than the direct impacts of exposure.

The neglect of uncertainty in the development of compensation strategies is both surprising and unnecessary, because there are many ways in which uncertainty can and should be incorporated as part of compensation discussions. Example contexts include the estimation of how environmental activities in an area are expected to be altered, and in turn affect the health and well-being of a Native community, as the result of logging activity or climate change or oil and gas production on traditional lands. Uncertainty typically exists about the level and magnitude of future change, the ability of the community to adapt, what the changes might mean for the health and employment opportunities of people living in the area, and the responses of the natural environment. These changes all have direct and indirect effects: changes in employment opportunities may influence the desire of the local Aboriginal population to engage in traditional hunting, fishing, or gathering activities, and changes in local animal and plant species (e.g., fewer salmon returning to local streams) may in turn affect other species (e.g., bears or raptors who feed on these salmon).

These sources of uncertainty can and should be taken into account as part of discussions on compensation for cultural losses, for example through models that track the probabilities and distributions of likely outcomes associated with different policies. If, as in the usual case, the compensation estimate is only a single number, then useful information about the likely range of effects is missing and accuracy is sacrificed. The lack of attention to uncertainty also leads to a neglect of opportunities to create flexible compensation packages, ones that could provide more or less of different components over time depending on how the future unfolds. Without this focus, all sides—government, industry, the First Nations, and the environment—can end up living with compensation policies that are less robust, and ultimately more expensive and less effective, than they should be.

3.6. Failure to incorporate losses over time

The concept of cultural loss inherently involves time, to the extent that culture implies an ongoing social community and loss implies the taking away of something considered to be of value. For Aboriginal communities, cultural losses typically result in historical, current, and future impacts. When industrial development is the source of a loss, such as an ongoing program of timber harvest or oil drilling and exploration, negative impacts can take place over a period of many decades and across a multitude of sites. Even in those cases where a single event is responsible for a loss, such as an oil spill or other accidental release, earlier losses may also have occurred and thus negative effects are spread over time; in the case of the Exxon Valdez oil spill, for example, some earlier spills took place and some losses are still being experienced by Native populations twenty years after the accident.

Some compensation efforts ignore the dimension of time completely, focusing on current losses and avoiding either retroactive or future implications. When time is identified as a concern, the usual approach is to employ a discount rate to express past or future losses in terms of the present. Discount rates for future losses function as a form of reverse interest; if the discount rate is 10

percent, for example, then the loss of something worth \$135 to people three years from now is considered to be equivalent to the loss of \$100 today. At minimum, the use of lower discount rates should be considered, as well as the use of different rates for different components of value.⁶ In addition, the conventional use of discount rates assumes both a willingness to quantify values and a particular conception of time—as a linear, forward-moving concept—that may not be shared by many Aboriginal communities. For a First Nation, the idea that the future is discounted as compared to the present may be abhorrent and a violation of fundamental conceptions of how the world works.

The experience of damage over time can change the nature of a loss and, in turn, change the nature of compensation that might best address it. For example, a one-time loss of the ability to fish in an area might be compensated by a monetary payment or by the ability to fish in a similar type of environment. However, if loss of the ability to fish is ongoing or permanent, then other considerations—related to the loss of cultural institutions, kinship obligations, and social ties—may well enter into the picture: for example, this is the concern now held by many Native populations in Alaska or the Yukon, who view the impacts of climate change on their lives not as an unusual phenomenon, experienced over one or two seasons, but as ongoing and (for all practical purposes) permanent. In such cases,⁷ one of the goals of compensation might be to provide solace and to reaffirm the legitimacy of the loss and the responsibility of society to address it, even though such redress cannot assess an exact value for the loss (Gregory et al., 1996). Although the courts recognize that some losses cannot be replaced, there still is a hope of being able to “enable the injured person to obtain a substitute source of satisfaction or pleasure (where some ‘amenity’ has been lost), or alternatively to comfort the victim or provide him or her with solace for what has happened (as in the case of pain and suffering).” (Cane and Atiyah, 2006)

For First Nations, the dimension of time is highlighted by the cumulative effect of many cultural losses related to changes in the environment. For example, environmental impacts on human systems often are cumulative to the extent that a mix of activities—oil drilling, contamination of groundwater, interference with animal migration routes—result in a combined negative impact on a community larger than the simple sum of the individual components. Cumulative effects influence both social and environmental resilience, in that a person or plant species previously weakened as the result of one source of damage is then less likely to be able to recover if impacted by a second or subsequent source.

4. What's right about decision-focused compensation approaches?

A structured decision making (SDM) approach builds on the methods and insights of multi-attribute utility theory (or MAUT) and decision analysis (Keeney and Raiffa, 1993) along with findings from behavioral decision research (Kahneman and Tversky, 2000). The approach provides a way to assess compensation for environmental damages that takes account of multiple dimensions of value and that establishes endpoints that reflect the informed experience of the affected community. As further discussed in this section,

⁶ The discount rates that often are used are based on financial transactions in the mainstream business sector; there would be appear to be little connection between these intertemporal tradeoffs and the use of environmental resources over time by First Nations.

⁷ A non-environmental example would be personal injury cases where the courts have used the impossibility of coming up with a precise or accurate measure of loss as one reason for imposing a cap on compensation for pain and suffering, such as the ruling of the Supreme Court of Canada in Andrews, Grand & Toy (1978).

application of an SDM approach to compensating aboriginal cultural losses thus is responsive both to formal standards (Gregory et al., 2008) and to the cultural knowledge and practices of First Nations.

A basic strength of an SDM approach is that it derives from common sense. As a series of process steps used to address complex problems—summarized in the acronym PROACT (Hammond et al., 1999), which stands for defining the PROblem, clarifying Objectives, identifying Alternatives, distinguishing Consequences, and addressing Tradeoffs—the approach seeks to improve the understanding of values and consequences as they relate to management options rather than (as with economic or benefit-cost analyses) to provide a summary ratio or number. Because of this underlying rationale, SDM approaches have been adopted by both Native communities (examples in this section come from four First Nation communities in Canada and the United States) and government resource managers (Gregory and McDaniels, 2005). In the remainder of this section, we use case-study examples to describe how SDM approaches are responsive to the criticisms of compensation practices raised in the previous section.

4.1. Recognition of context

SDM approaches takes as their starting point development of a clear definition of the context for the compensation. Because cultural losses will vary across Aboriginal communities, this requires asking questions: What are the key issues? What concerns, and whose concerns, might be affected? What are the constraints on problem definition (e.g., does the current population contain individuals who experienced the loss in question)? What is the mandate of the current proceeding (e.g., what can and can't be covered via relevant legislation?). SDM approaches thus incorporate multiple stakeholders and multiple points of view. Because the approach incorporates multiple metrics (Turner et al., 2008), the attention of those providing information remains focused on the subject of cultural losses (what was experienced? when? by whom?) rather than requiring the conversion of effects into other, less appropriate metrics.

In a SDM process, the different dimensions of value associated with changes in the environment are defined by those who experience these effects in terms of specific attributes (or performance measures). Consider a reduction in hunting opportunities for a Native settlement as the result of industrial development. In contrast to a conventional analysis, which might assess the loss of hunting opportunities in terms of lost income or the number of days no longer spent in the activity, a SDM analysis might characterize the loss across several dimensions: reduced psychological well-being, lost contributions to cultural ceremonies, reductions in health, or the loss of cultural instruction provided to younger members of the community. Similarly, a gain in employment opportunities might be assessed in terms of the added income that is provided, the additional taxes (and services) available to the community, or the improved self-esteem of those with jobs. Such measures have both a specific dimension (or dimensions) and a direction, in that more of something can be either better or worse.

An example comes from the Swinomish Indian Tribal Community in Washington State, impacted by shellfish contamination due to a nearby oil and gas refinery (Donatuto and Harper, 2008). For the Swinomish, shellfish are a cultural keystone species—not solely a food resource, but also a prevalent “cultural object” relevant to all aspects of economic, cultural, spiritual, and social life. The primary government regulator, the U.S. Environmental Protection Agency, has defined harm to the Swinomish Tribe due to shellfish contamination in reference to added health risks (disease and mortality). Yet for the Swinomish (as for many other Native

communities), health is a much broader concept whereby human health, ecological health, and cultural health are all largely inseparable. Some of the most important tribal health factors related to shellfish include participation in spiritual ceremonies, degradation of dietary practices, opportunities for subsistence harvests, knowledge of the behavioral properties of key food species (e.g., their abundance or disappearance across seasons), intergenerational education opportunities, and a window to understanding of the metaphysical and physical attributes of the world. The context for understanding what shellfish contamination means to the Swinomish is far more broad than simply a measure of increased morbidity, and thus a multi-dimensional measure is required.

Additional evidence that context matters in assessments of compensation is provided by recent research on valuation and exchange. Slovic, for example, demonstrates the importance of context in the construction of preferences; for judgment tasks that are unfamiliar, people's responses will vary with the cues that are provided (Slovic, 1995). Gregory and his colleagues emphasize context in the understanding of environmental policies, noting the importance of defining losses or gains in terms of what matters to participants (Gregory et al., 1993). In related research, Brown compares losses due to natural and human causes (Brown, 2005). He concludes that “Losses due to ... human causes were considered much more serious than when the same losses were caused by natural events.” The bottom line is that context—how and why a loss occurs—can directly affect the magnitude of a judged gain or loss and needs to be accounted for as part of compensation estimates (Knetsch, 1983).

4.2. New opportunities for participation

A value-focused methodology, such as SDM, offers new opportunities for participation from an Aboriginal community. In particular, the emphasis on careful definition and measurement of affected values means that considerations such as the effects of a resource change on spiritual or ceremonial practices are given the same attention as considerations such as jobs or revenue (which does not imply equal weights; more on this below). This “leveling of the playing field” typically is enshrined in principles to guide consultations: as discussed in detail elsewhere (see Gregory et al., 2008), these might include principles such as the need to clearly state objectives (including emotional and trust concerns as well as environmental impacts), the recognition of knowledge diversity and quality, the balancing of multiple interests, and a commitment to ongoing collaborative learning.

As part of a study of alternative flows to a managed river in British Columbia, for example, one of nine dimensions of value is the Cultural and Spiritual Quality of the river, which includes the smell, sound, sight, and feel of the river as experienced by members of the St'at'imc First Nation (Failing et al., in preparation). This scale tracks changes associated with higher or lower water flows, in addition to other outcomes such as fish and wildlife abundance or riparian vegetation. To obtain information to better define this objective, input was collected from St'at'imc elders and from interviews with other St'at'imc resource users and community members; these members were self-selected based on community and kinship ties, ancestry (many were members of one family that was particularly hard-hit by development on the river), and knowledge of the resource base. The resulting four-component scale includes sound of the river, smell, movement of water, and interaction (of people and water). To ensure consistency and transparency in assessment, a protocol for collecting measurements was developed that includes who will be doing the observations, at what times of the year and where (in terms of reaches of the river), and how individual observations will be aggregated.

4.3. Incorporate multiple sources of loss

Conventional analyses of cultural losses typically make a distinction between those damages that easily can be measured or counted (such as a reduction in numbers of animals trapped) and those that are more difficult to assess (such as how lost trapping opportunities affect community well-being). In many cases, a formal analysis includes only the former whereas more qualitative losses are consigned to a traditional use study and are not integrated into the evaluation. SDM techniques are particularly helpful in this respect because they describe losses in terms of different metrics, depending on what is considered most appropriate, and thus facilitate evaluations based on the comparison of impacts (both costs and benefits) on a First Nation with and without a facility (e.g., a pulp mill, an aquaculture facility). For example, benefits or costs in terms of changes in physical health or intergenerational education can be measured in appropriate units and then assessed against the benefits or costs that accrue from changes in jobs or sales of fish and game.

This ability of SDM to incorporate multiple types of impacts also enables the approach to assist with both retroactive and future-oriented problems. For example, SDM approaches have assisted in the incorporation of retroactive damages relating to pain and suffering and emotional losses. Although a vast literature and extensive case records (from personal injury court cases) address compensation for pain and suffering, little of the evidence or methods has been incorporated into Aboriginal loss claims. This is surprising, for two reasons. The first is that the types of losses experienced by many Aboriginal populations—being forced from their traditional lands, deprived of significant sources of wild food or discovering that these foods are tainted, and losing important social connections because fishing or hunting or gathering activities are stopped—are likely to result in emotional changes that may include feelings of shame, guilt, and disempowerment along with accompanying social changes. A full analysis of cultural losses therefore should include techniques that can help to address emotional losses, moving them from the realm of the invisible to the visible, as well as more tangible losses (Turner, 2008). The second reason for surprise at the lack of attention is that the required methodologies are not new. Many of the key approaches have been widely known for nearly 20 years; Bovbjerg, Sloan and Blumstein (Bovbjerg et al., 1989), for example, review various methods for estimating pain and suffering damages and offer a system of standardized awards that takes account of factors such as the context for the injury, its severity, and the age and circumstances of the victim.⁸

4.4. Avoid reliance on market-based measures

Compensation estimates based on SDM approaches will typically incorporate input from three primary measures of loss: natural, proxy, and constructed (Keeney and Gregory, 2005). The first, *natural* measures, are in general use and have a common interpretation: just as the concern to “maximize profits” is naturally measured in dollars, the concern to “minimize the loss of wildlife habitat” might make use of the natural indicator “acres of lost habitat.” The second type, *proxy attributes* also are in general

use and are well understood. An example is the use of a measure such as “diseased trees per hectare” as a proxy for the health of a forest community, or use of an indicator such as air emissions (measured in ppm) as a proxy for impacts of concern that are harder to measure (such as adverse visibility impacts due to air quality impairment). However, proxy measures are less informative than natural attributes because they only indirectly indicate the achievement of an objective.

The third type of measure, *constructed metrics*, is used when no suitable natural measures exist or when the relevance of a proxy measure is tenuous. An example is a scale to measure community support for forest management practices. Because no natural scale exists to measure support, an index (e.g., 1–5 or 1–10) is created, with each rating denoting a different level of support. Many such constructed scales are in widespread use in society: the GNP is a constructed measure, as is the Dow Jones stock average in the US or the Apgar score used to track the health of newborn children. When thoughtfully designed, constructed indices can greatly facilitate a manager's decisions by defining precisely the focus of attention and by permitting tradeoffs across different levels of the concern and other attributes (e.g., is it worth postponing harvest of an area for x years in order to increase support from level 2 to level 4?).

All three types of measures are made operational through the development of scales. Scales serve two major purposes: they provide a means for distinguishing among different levels of impact, and they provide a way to distinguish the endpoints of the range of anticipated impacts. In general, scoring methods used to select scales should be accurate, understandable, and at an appropriate level of discrimination. The development of scales also facilitates the examination of tradeoffs relevant to the choice of indicators; within the same context (e.g., loss of wetland habitat), for example, one indicator may be preferred in terms of its decision relevance but a second indicator may be preferred in terms of the quality of supporting data.

An example application to aboriginal cultural losses comes from a project conducted in northern Alberta to help assess impacts of oil and gas production on several Metis settlements (McDaniels and Trousdale, 2005). An important analytical challenge for this case was to find an effective way to incorporate traditional values, including traditional ecological knowledge (TEK), alongside the findings of scientific or academic communities. This was accomplished by introducing information about impacts based on the observations of Elders and resource users within the Native community. As a first step, maps were drawn to aid communication and to record the distribution of oil and gas activities over the past 25 years. Interviews with Elders and other local community residents then established the extent, timing, and level of impact on local subsistence hunting and fishing activities. These interviews clarified the type and importance of cultural activities and opportunities that had been lost as the result of ongoing degradation of the natural environment. Many testimonies are moving and eloquent: as one elder stated, “A lot of food we ate was fish and all of the rivers were nice and clean. Today we get told: Don't eat the ducks anymore. We get told we have to watch out for the water. We used to be able to go anywhere on the Settlement and take a cup with you and drink water, anywhere. Now we don't trust it.”

Six dimensions of loss were identified by elders and council members: Employment values (e.g., jobs for settlement members, improved self-esteem), Community improvement values (e.g., land planning opportunities), Community revenues, Social values (e.g., health and safety, privacy), Traditional values (protection of traditional sites, practicing traditional skills) and Bush environmental values (e.g., fish and water habitat, environmental services). Some of these values (such as employment) were easily measured in

⁸ This is not to endorse schedules of damages for cultural losses suffered by First Nations, in part because the context in which the injury occurred is likely to matter. Instead, a standardized approach would usefully describe a benchmark, which then could be altered in light of specific circumstances and history; given the current general neglect of emotional damages, even an imperfect process could be beneficial to the extent that it helped to bring attention to the emotional components of Aboriginal cultural losses.

quantitative terms, using dollars or other numbers. Other dimensions of cultural loss were introduced using constructed scales. For example, impacts on cultural values associated with access to open “bush” country were included by constructing the following three-point scale, which shows impacts (ranging from high to low) associated with various development activities.

High impacts	intensive, long-term alteration of natural conditions and human use due to oil and gas wells or cutlines
Moderate impacts	Sporadic alteration of landscape and aesthetics from wells, pipelines
Low impacts	Minimal alteration of landscape from temporary motor vehicle access, cutlines

This constructed scale, along with several others that covered traditional values such as learning of traditional skills and protection of traditional sacred sites, was developed by convening a small group evaluation workshop (McDaniels and Trousdale, 2005). The consultants met with community leaders and asked for help in identifying settlement members whose views would be representative of community interests. The different components of loss were then ranked and weighted, in terms of their overall contribution to the cultural losses experienced by the Metis community.

The ability to evaluate changes in one component of value relative to another means that it is possible to translate across the different components and to estimate a dollar-equivalent value for at least some of the non-monetary components of loss. Particularly in cases where legal or legislative requirements favor the adoption of dollar measures, and with the understanding and cooperation of members of the Native community, the conversion of cultural losses to a monetary measure of value can be useful in terms of setting a minimum standard for the compensation of at least a portion of experienced losses.

In this respect the approach used in Alberta is similar to damage schedules, which are widely accepted by the courts as an approach for developing scaled rankings of the relative importance of various personal and environmental harms (Chuenpagdee et al., 2001). In a typical case, people are asked to make a series of pair-wise comparisons in which each combination of a set of possible outcomes⁹ is compared, with the person asked to choose the most important of the pair. The elements of the damage schedule—for example, impacts related to different levels of contamination or loss of critical habitat—are based on judgments of the relative importance of the different losses, so that monetary values do not need to be assigned directly to each loss. Although estimates of value derived from damage schedules should be viewed as interim valuation tools, the approach can encourage consistency across contexts in judgments of loss while providing an enforceable payment mechanism (Rutherford et al., 1998). And it has been reviewed extensively by the courts, particularly as the basis for personal injury losses and for workers compensation claims regarding permanent workplace injuries (Bovbjerg et al., 1989). For these reasons, damage schedules have been used to estimate environmental losses; Florida and several other U.S. states, for example, have developed pollution discharge natural resource damage assessment compensation schedules.

4.5. Address uncertainty in facts and values

The use of an SDM process for estimating compensation helps to address three important sources of uncertainty. The first is

uncertainty about values, because the members of an Aboriginal community who are suffering a loss are likely to find it difficult to think clearly about—let alone communicate with an outsider about—the different dimensions of the loss or its extent and scope. A SDM process establishes a basis for encouraging dialogue about what matters (what has been lost, why it matters, what it means to daily life), brings to the table a variety of techniques for helping to structure values, and recognizes that assistance is likely to be needed to obtain clear and informed and stable expressions of value. It also recognizes that individuals may need some help in clarifying their thinking and reasoning about the relative importance of various impacts, thus gaining an opportunity to self-reflect and also to learn from each other.

An example, from a multi-interest water use plan consultation in B.C., involved the local First Nation in helping to consider new water flows for a major hydroelectric facility. Scientists from the federal and provincial governments initially developed a value tree showing “fish” and “wildlife” as separate objectives. First Nations participants were instrumental in linking fish and wildlife into a more fundamental “ecological health” objective (Failing et al., 2007). They also linked ecological health and heritage protection into a broader fundamental objective of “First Nations Culture.” This helped to integrate concerns about the spiritual and cultural significance of the natural environment and also formalized the recognition of these linkages, providing a forum for openly discussing less tangible values in a decision-relevant way. As an immediate consequence of the values structuring exercise, all subsequent technical meetings at the subcommittee level were joint meetings of fish and wildlife experts, which significantly increased the profile given to wildlife and vegetation issues relative to fish issues and, in turn, influenced the allocation of research funds by broadening the perception of “what mattered” in terms of possible fish and wildlife impacts.

The second source is uncertainty about facts, including a defensible reconstruction of what conditions were like in the past as compared to what is taking place in the present or what might happen looking ahead into the future. Often there is resistance, from both scientists and Native knowledge holders, to using formal tools for clarifying uncertainty; the worry is that SDM methods may prove overly analytical or impractical, particularly in the context of participatory and cross-cultural environmental deliberations. However, we have found that this resistance largely dissipates once the elicitation process is understood. In one project, we elicited judgments from aboriginal knowledge holders about the conditions and relationships related to the health of white sturgeon (Failing et al., 2007). When knowledge holders offered that, in the past, they had often seen many sturgeon at a particular place, we asked respondents to clarify their qualitative statements by using quantitative ranges (for example, a respondent might clarify the statement “we often saw many fish there” by adding “between 50 and 100 fish, observed in about 6 years out of 10”). To address uncertainty, we asked questions about the source of the reported information, the respondent’s degree of belief in the knowledge, and the existence of corroborative observations (did other people observe this?). Knowledge holders were willing to provide this additional level of detail concerning their responses once we explained that we would ask the same questions of scientific experts, and after they understood that the purpose was to improve communication and understanding among all the participants in the decision process.

Formal techniques provide a valuable tool for understanding factual uncertainty that links well both to traditional means for sharing experiences in Indigenous communities and to more technical methods for incorporating uncertainty as part of scientific debates (Gregory & Failing, 2002). One way to include

⁹ The descriptions of outcomes can be either qualitative or quantitative, comparing events (e.g., an oil spill of specified context and magnitude as compared to the loss of fisheries habitat due to poor logging practices) or outcomes (e.g., the death of 20 ducks as compared to 50 riverine birds).

uncertainty about facts is in the analysis of the anticipated future base-line environmental conditions and the likely consequences of management actions. It is standard practice in risk assessments, for example, to include uncertainty in impacts on animal and plant populations and the associated human uses of environmental services (days of fishing or hunting, availability of catch or game) through the use of impact ranges or through the inclusion of probability distributions or frequencies (Cullen and Small, 2004). When information is controversial or estimates are contested, techniques such as expert judgment elicitation can be used to identify key areas of uncertainty and to clarify areas of agreement and disagreement among experts (Keeney and von Winterfeldt, 1991).

The third source of uncertainty stems from a general lack of precedent in the courts for addressing issues of cultural loss and compensation in a full and rigorous manner. Despite recent court cases (as noted in the introduction) that point the way to a more complete recognition of the extent of First Nation losses, analytical approaches that measure up to the spirit of the law have been slow to emerge. Multi-attribute based methods, such as SDM or decision analysis, that have solid standing in academic and resource management communities, remain largely untested in terms of legal precedent. It is also true that standards for the introduction of evidence concerning compensation, relating either to dimensions of loss or to highly uncertain facts, are still being worked out. This suggests that judges may be quite unfamiliar with what constitutes a rigorous method for estimating compensable losses and the associated evidentiary requirements, and in turn implies that key issues such as the scope of compensation, requirements for the conduct of interviews, or anxiety related to uncertain health effects (e.g., associated with possible groundwater contamination), may receive inconsistent treatment.

4.6. Recognize impacts over time

In a conventional analysis of compensation payments, attention typically is placed on ways to lessen the future burden of an activity on a First Nation community. This has the result that past damages, from the time that the activities in question began to the present, are often not included in damage settlements. Losses occurring in future years typically are discounted using a positive factor—similar to a negative interest rate—so that their time stream can be expressed in terms equivalent to present losses.

Both ways of handling time work to the detriment of First Nations and decrease compensation. By minimizing past losses, the legacy of inappropriate compensation for decades of impact is maintained. By discounting future losses, the ongoing nature of damages is minimized and an explicit reduction in future values is imposed on a First Nations culture that may well find it abhorrent to place a lower value on the health and well-being of the future environment or of future generations. This not only has the unfortunate consequence of depriving the First Nation community of justified compensation, it also diminishes crucially important aspects of context that serve to shape both community values and future development options. Although discounting future losses sometimes is necessary, for example so that a compensation request can conform to existing legislation, the significance of the choice of a discounting procedure argues for full disclosure: to openly display the impact of different discount rates on a settlement request, and to recognize that there exists a sound basis for discounting different impacts at different rates, including the possibility that the appropriate discount rate for some types of impacts might be as low as zero (Chapman, 1996).

Decision aiding methods are able to take account of losses over time explicitly by directly including associated consequences. An

example is the inclusion of a measure of social disruption or disorganization, to try to account for the changes in customs and lifestyle experienced by a Native group as a result of the loss of their traditional resource foundation. In the case of many coastal First Nations, for example, reductions in, or the contamination of, fisheries resources have meant that a people whose lives have for centuries been tied to the water now need to redefine both their livelihood and their cultural base (Trousdale, 2008). One B.C. Chief, when comparing his culture to that of the mainstream community, said “If you are white, then you want to leave your children lots of money. For us, we want to leave our children a clean ocean; the water is our legacy. And we’re not able to do that, because of the pollution from the fish farms. How do you think that makes us feel?” (pers. comm.). Using a SDM approach, this fundamental sense of disruption and powerlessness can (at least in part) be expressed through the direct inclusion of a constructed “community disruption” scale, which in turn can be used to evaluate different compensation or mitigation packages.

Cumulative environmental impacts, which need to be considered as part of the CEEA, also are handled differently as part of a SDM approach to compensation. For the people living in a Native community, development activities often have occurred over an extended period of time (30–50 years) and over a significant portion of their lands. Although development will have been more intensive in a few locations, adverse impacts often transcend the boundaries of directly affected lands. This conjunction of events over time and space means that the associated activities—building roads, establishing cutlines, drilling wells, production and the associated traffic, noise, and occasional spills—may have created adverse effects over a substantial portion of a Native settlement or territory. Only by including a measure of the cumulative cultural effect of these losses over the relevant geographic area is there an opportunity to account for their full impact on a First Nation community.

5. Concluding discussion

Issues that arise as part of compensating Aboriginal populations for losses incurred as the result of damages to their resource base are among the most fundamental facing industrialized societies. They reach to the heart of how we define ourselves, as representatives of one culture in relation to another. Compensation helps to affix meaning to this relationship, in a way that is tangible because it involves the possibility of transfers between people of physical things that matter—money, land, access to natural resources—which, in turn, have the potential to address, at least in part, emotional and physical and psychological qualities that also matter: well-being, guilt, regret, shame, and self-identity.

This paper promotes the use of structured decision making approaches as a guide to addressing cultural losses in Aboriginal communities that stem from changes in the natural environment. It sets out as a standard for compensation the recognition that those who have experienced losses are the only true experts about what might address, in whole or in part, their sense of loss. Thus the goal of compensation is neither silence nor appeasement; instead, it is to help make visible the source of losses and their extent, and then to explore the adequacy of different approaches that might address them. In our view, neither “good” science nor “good” law holds the answers to fully address issues of Aboriginal compensation, because what is needed at this point is a transparent and defensible process for making better compensation decisions.

To base compensation for First Nation communities on shared decisions and a shared dialogue represents a substantial shift from the current reliance on either economic or legal frameworks. Yet a decision-focused compensation process also will be imperfect:

analytical approaches may never fully bridge the gap between aboriginal and non-native societies, and any successful application of SDM approaches will require the presence of common sense, flexibility, and cultural sensitivity in addition to methodological rigour. Nevertheless, substantial improvements can be made over current compensation practices.

Aspects of the proposed compensation framework, reflecting principles of sound decision making, are well known and contain elements—the clear definition of the problem and objectives, the articulation of consequences, the need to balance pros and cons of options—that experience suggests are likely to be thought of in similar ways by the different parties (federal or provincial government representatives, agency resource managers, First Nation community members, industry, and academic or consulting scientists). However, other elements of the framework are less clear and are likely to be more contentious: the decomposition of values, the use of specific measures to evaluate achievement of objectives, the incorporation of uncertainty, and the evaluation of losses over time. Incorporating these elements in compensation agreements, in ways that are culturally appropriate and fit within evolving legislative and legal frameworks, will require learning and good will on the part of all participants. What is now needed is a continuing and collaborative dialogue about conduct of the analyses, combined with the courage to move beyond existing precedent and the political will to go forward.

Acknowledgements

Funding for the writing of this paper was received from the U.S. National Science Foundation through Awards SES 0451259 and 0725025 from the Decision, Risk, and Management Science (DRMS) program to Decision Research. We thank Jamie Donatuto, Lee Failing, Michael Harstone, Tim McDaniels, Bill McEllhenny, Terre Satterfield, and Nancy Turner for helpful discussions on this topic. Responsibility for the ideas expressed in this paper rests with the authors alone.

References

- Ackerman, F., Heinzerling, L., 2002. Pricing the priceless: cost-benefit analysis of environmental protection. *University of Pennsylvania Law Review* 150, 1553–1584.
- Avraham, R., 2006. Putting a price on pain-and-suffering damages: a critique of the current approaches and a preliminary proposal for change. *Northwestern University Law Review* 100, 87–119.
- Berkes, F., 1999. *Sacred Ecology: Traditional Ecological Knowledge and Resource Management*. Taylor & Francis, Philadelphia.
- Bovbjerg, R., Sloan, F., Blumstein, F., 1989. Valuing life and limb in tort: scheduling "pain and suffering." *Northwestern University Law Review* 83, 908–976.
- Brown, T., 2005. The judged seriousness of an environmental loss is a matter of what caused it. *Journal of Environmental Psychology* 25, 13–21.
- Brown, T., Burch, E., 1992. Estimating the economic value of subsistence harvest of wildlife in Alaska. In: Peterson, G., Swanson, C., McCollum, D., Thomas, M. (Eds.), *Valuing Wildlife Resources in Alaska*. Westview Press, San Francisco.
- Cane, P., Atiyah, P., 2006. *Atiyah's Accidents, Compensation and the Law: Law in Context*. Cambridge University Press, New York.
- Chapman, G., 1996. Temporal discounting and utility for health and money. *Journal of Experimental Psychology* 22, 771–791.
- Chuenpagdee, R., Knetsch, J., Brown, T., 2001. Environmental damage schedules: community judgments of importance and assessments of loss. *Land Economics* 77, 1–11.
- Cullen, A., Small, M., 2004. Uncertain risk: the role and limits of quantitative assessment. In: McDaniels, T., Small, M. (Eds.), *Risk Analysis and Society*. Cambridge University Press, New York.
- Debruyn, A.M.H., Trudel, M., Eyding, N., Harding, J., McNally, H., Mountain, R., Orr, C., et al., 2006. Ecosystem effects of salmon farming increase mercury contamination in wild fish. *Environmental Science and Technology* 40, 3489–3493.
- Donatuto, J., Harper, B., 2008. Issues in evaluating fish consumption rates for Native American tribes. *Risk Analysis* 28, 1497–1506.
- Eades, R.W., 1993. *Jury Instructions on Damages in Tort Actions*. Michie, Charlottesville, VA.
- Failing, L., Gregory, R., Harstone, M., 2007. Integrating science and local knowledge in environmental science and local knowledge in environmental risk management: a decision-focused approach. *Ecological Economics* 64, 47–60.
- Failing, L., R. Gregory, P. Higgins. A structured decision making framework for adaptive management and meaningful consultation, in preparation.
- Gregory, R., Brown, T.C., Knetsch, J.L., 1996. Valuing risks to the environment. *The Annals of the American Academy of Political and Social Science* 545, 54–63.
- Gregory, R., Failing, L., 2002. Using decision analysis to encourage sound deliberation: water use planning in British Columbia, Canada. *Journal of Policy Analysis and Management* 21, 492–499.
- Gregory, R., Failing, L., Harstone, M., 2008. Meaningful resource consultations with First Peoples: notes from British Columbia. *Environment* 50, 34–45.
- Gregory, R., Lichtenstein, S., Slovic, P., 1993. Valuing environmental resources: a constructive approach. *Journal of Risk and Uncertainty* 7, 177–197.
- Gregory, R., McDaniels, T., 2005. Improving environmental decision processes. In: Brewer, G.D., Stern, P.S. (Eds.), *Decision Making for the Environment: Social and Behavioral Science Research Priorities*. National Academies Press, Washington, DC, pp. 175–199.
- Hammond, J.S., Keeney, R.L., Raiffa, H., 1999. *Smart Choices: a Practical Guide to Making Better Decisions*. Harvard Business School Press, Boston.
- Harris, S., Harper, B., 1997. A Native American exposure scenario. *Risk Analysis* 17, 789–795.
- Harris, S., Harper, B., 2000. Using eco-dependency webs in risk assessment and characterization of risks to tribal health and cultures. *Environmental Science and Pollution Research* 2, 91–100.
- Kahneman, D., Tversky, A., 1979. Prospect theory: an analysis of decision under risk. *Econometrica* 47, 263–291.
- Kahneman, D., Tversky, A., 2000. *Choices, Values, and Frames*. Cambridge University Press, Cambridge, UK.
- Keeney, R., Raiffa, H., 1993. *Decisions with Multiple Objectives*. Cambridge University, New York.
- Keeney, R.L., Gregory, R., 2005. Selecting attributes to measure the achievement of objectives. *Operations Research* 53, 1–11.
- Keeney, R.L., von Winterfeldt, D., 1991. Eliciting probabilities from experts in complex technical problems. *IEEE Transactions on Engineering Management* 38, 191–201.
- Kirsch, S., 2001. Lost worlds: environmental disaster, "Culture loss," and the law. *Current Anthropology* 42.
- Knetsch, J., 1983. *Property rights and compensation: compulsory acquisition and other losses*. Butterworths, Toronto CA.
- Knetsch, J., 1990. Environmental policy implications of disparities between willingness to pay and compensation demanded measure of value. *Journal of Environmental Economics and Management* 18, 227–237.
- MacGregor, D.G., 1991. Worry over technological activities and life concerns. *Risk Analysis* 11, 315–324.
- McDaniels, T., Trousdale, W., 2005. Resource compensation and negotiation support in an aboriginal context: using community-based multi-attribute analysis to evaluate non-market losses. *Ecological Economics* 55, 173–186.
- Mitchell, R.C., Carson, R.T., 1989. *Using Surveys to Value Public Goods: the Contingent Valuation Method*. Resources for the Future, Washington, DC.
- Nadasdy, P., 1999. The politics of TEK: power and the "integration" of knowledge. *Arctic Anthropology* 36, 1–18.
- Rachlinski, J., 1996. Gains, losses, and the psychology of litigation. *Southern California Law Review* 70, 113–185.
- Radin, M.J., 1993. *Reinterpreting Property*. University of Chicago Press, Chicago.
- Rutherford, M., Knetsch, J.L., Brown, T., 1998. Assessing environmental losses: judgments of importance and damage schedules. *Harvard Environmental Law Review* 22, 51–101.
- Sagoff, M., 2004. *Price, Principle, and the Environment*. Cambridge University Press, New York.
- Slovic, P., 1995. The construction of preference. *American Psychologist* 50, 364–371.
- Stoffle, R., Evans, M., 1990. Holistic conservation and cultural triage: American Indian perspectives on cultural resources. *Human Organization* 49, 91–99.
- Trousdale, W., 2008. *Hith Alis Lax Gwa-yas-dums: Moving from crisis to hope at Gwa-yas-dums village, Gilford Island, B.C.* Plan.
- Turner, N., 2005. *The Earth's Blanket: Traditional Teachings for Sustainable Living*. Douglas & McIntyre and University of Washington Press, Vancouver, BC and Seattle, WA.
- Turner, N., Gregory, R., Brooks, C., Failing, L., Satterfield, T., 2008. From invisibility to transparency: identifying the implications of "invisible losses" to First Nations communities. *Ecology and Society*.
- United States National Research Council, 2005. *Decision making for the environment: social and behavioral science research priorities*. National Academies Press, Washington D.C.