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METHODS

Resource compensation and negotiation support in an aboriginal context: Using community-based multi-attribute analysis to evaluate non-market losses

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Abstract

Compensation for losses of non-market values experienced by aboriginal peoples, due to adverse impacts on their land or resource base caused by others, is an important issue for law and social justice. Yet the standard methods of economic valuation as a basis for determining compensation are not always suited to addressing the diverse values of aboriginal people. This paper discusses an approach to valuation that employs concepts and methods of decision analysis, informed by behavioral decision research, in an applied context. It uses a multi-attribute value assessment as a basis for characterizing the relative significance of resource damages that affect deeply held, complex, intangible values. We draw on the experience of conducting analyses for three Metis settlements in Alberta, Canada, to illustrate the approach using a case study. Interpretations of the results as a basis for negotiation regarding compensation are examined.

Keywords: Aboriginal people; Compensation; Negotiation; Valuation; Non-market losses; Multi-attribute approaches; Community-based approaches; Common property

1. Introduction

Compensation for losses of non-market values experienced by Aboriginal Peoples[1], due to adverse impacts on their land or resource base caused by others, is an important issue for law and social justice. Yet the standard methods of economic valuation as a basis for determining compensation (Knetsch, 1983) are often not suited to addressing the diverse values of aboriginal people when important resources are impaired. Many important intangible values, such as loss of spiritual locations, or loss of opportunities for cultural practices, do not arise in contexts in which market-based values are meaningful to the affected people.

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[1] The term "Aboriginal Peoples" as used in Canada, refers to First Nations, Inuit and Metis people.

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This paper provides a different approach. It makes use of a conceptual framework and set of applied procedures from the field of decision analysis, combined with insights from behavioral decision research, to provide a sound and practical approach to this complex valuation task. The diverse, culturally-based values important to the affected parties are clarified with methods of *value-focused thinking* (Keeney, 1992) a problem-structuring approach important in decision analysis practice. The valuation task relies on a simplified version of *multi-attribute value assessment* (von Winterfeldt and Edwards, 1986) as applied in a group context. While multi-attribute methods have been employed as a basis for analyzing complex value tradeoffs in a wide array of contexts (Keeney and Robilliard, 1977; McDaniels and Roessler, 1998), they have not, to our knowledge, been employed to characterize culturally significant values of indigenous people regarding resource damages.

This paper makes four contributions. First, it draws on judgments from a community-based representative group about the importance of different aspects of resource losses, to provide an aggregate characterization of the significance and implicit value of these losses to the community. This approach does not rely on individual willingness to sell judgments (as in welfare economics) to characterize the value of the losses. Instead relies on the informed expressed values of a representative group of community members, who hold the resource base in common. Hence it is an attempt to characterize losses from the viewpoint of a set of common property resource owners, in measures meaningful to them. A second contribution is the use of value-based interviews to develop the set of criteria and performance measures to characterize the consequences of resource developments that are relevant to the wide array of culturally-significant values of indigenous people for their land and resources. A third contribution is the way in which the workshops with the group structured questions and judgment tasks minimize recognized biases that may arise in value elicitation with Indigenous Peoples. A fourth contribution is the framework developed to characterize the values, which help serve as the basis for compensation and mitigation decisions that are identified under provincial laws.

The example presented in this paper to illustrate the approach is drawn from actual case studies we have conducted for three Metis[2] settlements in Alberta. Each study is part of an ongoing dispute over the nature and value of surface damages from energy and resource developments on Metis settlement land, which are still being considered within the legal process. Hence the specific example presented here is a hypothetical amalgam of the three cases, created to avoid breeching confidentiality. Nevertheless, the example reflects the contexts, spirit and practice of the actual case studies. The methods reflect how the projects were conducted, including the implementation through a valuation workshop. The objectives and tradeoffs presented below are illustrative of the values of Metis people affected by energy and resource developments at the three settlements.

Section 2 of this paper briefly outlines the historical and legal basis for claims of compensation regarding adverse impacts of resource developments on Metis Settlements. Section 3 discusses multi-attribute value assessment as a basis for characterizing the relative significance of damages that affect deeply-held, complex, intangible values. Section 4 presents the context of the hypothetical *Muskeg Lake* case study, while Section 5 outlines how the workshop involving community representatives, including elders and young people, was conducted. Section 6 presents the results of the workshop. Section 7 discusses how the results could be interpreted as a basis for negotiation regarding compensation. The Final section offers conclusions.

2. Historical and legal context

There are currently eight Metis settlements in the province of Alberta. The settlements comprise about 1.25 million acres of land, which provides a resource base and an opportunity for limited self-government to over 6000 Metis residents (Population Research

[2] Metis are people of mixed First Nations and European heritage (mostly French and British), who do not fit under the definitions of the Indian Act of Canada, and thus never had a land base (i.e., reserves) until the Metis Settlements of Alberta were created. "Métis" is the French term for "mixed blood".

Laboratory, 1998). Metis people began migrating to Alberta from eastern Canada in the early 1800s in connection with the fur trade, and later with general trade. When white settlers pressed into Alberta from the east, the natural resources supporting the Metis were gradually appropriated by homesteading and development. By the early 1900s, the Metis suffered severe hardship, with living conditions that were deficient in food, shelter, education and medical care (Pocklington, 1991).

In 1932, the Metis Association of Alberta was formed to bring these dire conditions to the attention to the Province of Alberta. The Ewing Commission was appointed in 1934 to investigate the situation of the Metis, and recommended establishing farming colonies as a low-cost way to relieve hardship and promote self-sufficiency (Report of the Royal Commission, 1936). In response, the Province of Alberta passed the Metis Population Betterment Act, 1938, which established the Metis land base known as colonies, later called settlements.

The Province of Alberta administered the settlements, but ongoing conflicts of interest, poor treatment and growing dissatisfaction led to further discussions between the Metis and the provincial government in the early 1980s. The MacEwan Committee was appointed to address outstanding issues. Its report of 1984 was followed in 1985 by *Resolution 18* in the Alberta Legislature, which committed the province to grant fee simple title to the Metis settlement governments, amend the Alberta Constitution to protect the Metis land base, and address governance issues (Bell, 1994). On November 1, 1990 the government of Alberta enacted several pieces of legislation regarding Metis settlements. This legislation established the legal and financial agreements between the Province and the Metis settlements (Bell, 1994).

One important and complex issue addressed in the legislation, and articulated in *The Metis Settlements Act,* was compensation for petroleum development impacts on Metis settlement lands. Petroleum exploration and development activities occurred on Metis settlement lands starting from the 1950s and continuing to the present, sometimes without the agreement of the Metis, and generally without sufficient compensation for surface damages (Bell, 1994).[3] The *Metis Settlements Act* provides a legal framework for considering what should be a compensable loss; *Section 118* defines specific kinds of damages that may be considered for compensation from petroleum development.[4] These compensable losses include:

> the cultural value [of land and other surface resources] for preserving a traditional Metis way of life. . .the economic value as an asset, and the productive value . . . . effects of development on present or planned use on surrounding areas; damages to improvements, crops, wildlife, livestock, trap lines, and natural vegetation; the project area damaged; effects on surrounding lands; location effects on existing or planned community uses; existing agreements; and, effects on the physical social and cultural environment; and, other specific matters, such as cumulative effect of related projects.

3. Multi-attribute value analysis as a basis for valuation of Metis losses

3.1. Characterizing the nature of Metis losses

Section 118 of the *Metis Settlements Act* provides broad guidance and a legal basis for the values that should be considered when determining appropriate compensation for surface damages due to petroleum exploration. It does not specify how appropriate compensation should be established.

Most compensation methods attempt to establish a market value of the identified loss in terms of willingness to sell an endowment at a competitive price. The reasoning is that alternative market opportunities could substitute other resources or opportunities for those lost (Knetsch, 1990; Schwindt, 1992). For Metis losses, some kinds of values affected can be partially expressed in market-related terms, such as the loss of income that could be derived from renewable resource harvests such as forestry. The non-market losses are far more demanding, and require different approaches.

[3] (Bell, 1994) indicates that the Metis did not have control over the economic development or administration of funds.

[4] Statutes of Alberta, *supra*, note 13.

In general terms, the objective for determining compensation is to find the amount necessary to make the affected party feel indifferent to their losses (Schwindt, 1992). In other words, appropriate compensation should put the affected parties (the Metis) in as good a position as if the adverse effects from resource developments had never occurred. Of course, the notion of 'as good a position' must be defined from a given perspective. This paper assumes it is appropriate to investigate loss in value from the perspective of the Metis, i.e., from the view of those who experienced the losses. Only the Metis can answer the fundamental questions regarding which damages matter and the relative importance of these damages, given the broad nature of the values outlined in *Section 118*. Other perspectives, such as the values that different groups or the general public may place on these losses, are not relevant because they do not have the cultural and personal frame of reference to understand the importance of the losses from the Metis perspective. Hence this compensation task is far different than simpler contexts such as loss of income or loss of economic benefit, which can be more readily handled in market-based terms.[5]

3.2. Multi-attribute value assessment for Metis losses

The approach adopted in this study employs expressed preference, based on decision analysis practice and multi-attribute utility theory (MAUT) (Keeney, 1980; von Winterfeldt and Edwards, 1986; Clemen, 2000), within a series of group workshops involving a panel of community representatives.

The objective of these workshops was not to develop dollar-based economic measures of all the Metis losses from energy developments on their lands, based on willingness-to-sell or willingness-to-pay measures as in the welfare economics paradigm. Rather, the intent was to characterize and quantify, in terms meaningful to the Metis, the common property resource owners, the relative significance of the various kinds of resource losses from their viewpoint.

Decision analysis and MAUT have been successfully employed to establish value-based measures in many complex valuation tasks (e.g., McDaniels, 1992; Keeney et al., 1996; Hobbs and Horn, 1997; Keeney et al., 1995). The evaluation efforts begin by eliciting and structuring the relevant values affected into a set of multiple objectives and performance measures. Then the consequences of the alternatives (or, in this case, the *without* and *with* petroleum development scenarios) are characterized, based on the objectives and associated performance measures. Finally, judgments about the relative importance of these changes are elicited, to create a multi-attribute index (in this case, characterizing the relative value of settlement lands to the Metis, with and without petroleum development).

The approach uses discussions among the participants, facilitated by the analyst, to build a defensible expression of the participant's value, while not directly forcing the respondents to think about non-monetary values in terms of direct purchases or sales and thus amounts of compensation. The core of the analysis is participants' judgments of the relative importance of the values affected.

The first task is to clarify the specific kinds of values affected by petroleum development that matter to affected settlement residents. We employ Keeney's *value focused thinking* (Keeney, 1992) which relies on interviews with the affected parties to identify the fundamental values affected by petroleum development. These values are structured into a value hierarchy, separating ends from means and avoiding redundancies, to provide a compact, multi-dimensional summary of the consequences of petroleum development that matter to the settlement. This structure can then be used for several purposes: defining the information that matters to characterize the severity of the impacts, creating attractive alternatives that could extend beyond compensation to mitigation of impacts, and conduct-

[5] The principles of ex ante and ex post compensation for a wide range of affected aboriginal values is also well grounded in Canadian government precedence, due to the extent and seriousness of aboriginal people's losses from resource development. In some pre-project situations, combining compensation, mitigation and avoidance have resulted in successful development agreements (e.g., the 1975 James Bay and Northern Quebec Agreement). There are also examples of examining the principles of compensation, mitigation and avoidance to address past damages (e.g., The Grand Rapids Project in Manitoba — see Osler, C., S. Davies, H. MacKay. *Post-Project Evaluation Grand Rapids Project Impacts on Aboriginal Communities*. Prepared for Manitoba Hydro. (1990)).

ing qualitative or quantitative evaluation. The approach has similarities to that of negotiation analysis (Raiffa, 1982), in which the scope for more attractive agreements is explored by focusing on values. Hence it both supports valuation of losses and developing alternatives to redress the adverse impacts.

Once the values are identified and structured into a set of objectives, the next task is to create a multi-attribute value index for characterizing the value of the settlement lands to the settlement, with and without petroleum development. When certain independence assumptions are appropriate, it is possible to use a structured set of fundamental objectives to construct an additive value index (Keeney, 1992). Technically, the assumptions are that the relative values of the consequences should depend only on the marginal probabilities of consequences of each objective. For the Metis participants being asked to make value judgments, this point means that if each stated value in the hierarchy is fundamental to the issue of petroleum development, and if the list of values is comprehensive from their perspective, then an additive representation should be at least a good approximation to the overall value. An additive function, given attributes $x_1, \ldots, x_N$, can be written as:

$$V(x_1 \ldots, x_n) = \sum_{i=1}^{N} k_i u_i(x_i)$$

where V is the overall value (or utility) and the k_i are the weights (or scaling constants) showing the relative contribution to the overall value from a given change in a specific fundamental value, x_i. The u_i are the single attribute utility functions, one for each of the x_i values. In this way, it is possible to establish clear mathematical relationships among the established values.

3.3. Overcoming biases in value elicitation

A crucial aspect of efforts to elicit value judgments is to minimize the potential for bias, particularly in complex tasks. Here we discuss four main sources of bias and how the adopted approach addresses those biases in the context of evaluating resource losses on Metis lands.

3.3.1. Asking questions that do not fit how the participants view the context

Understanding how the participants view the context of the resource valuation task is a fundamental step in framing the evaluation questions. In this case, we addressed a valuation context that is completely familiar to the Metis community and has been part of their lives for decades. We conducted workshops with elders to characterize past uses of these resources, and with community residents to document how the lands have been affected. We rely on judgments to articulate Metis values and performance measures that should serve as the bases for any analysis of losses. Finally, we ask the participants questions that allow them to express their views on the relative importance of these losses in ways that are meaningful for the community group. All these steps help to ensure the context is clear and meaningful for the participants.

3.3.2. Asking questions about unfamiliar values that are cognitively demanding of the participants

Slovic and others have written about the need to help participants construct their values regarding unfamiliar goods or valuation contexts, because people do not have well-formed tradeoffs in mind for such situations (Slovic, 1995). Helping participants construct their values with methods that start simply, involving relatively easy judgment tasks, before progressing to more difficult ones, fits with the precepts of measurement theory (Krantz et al., 1971). The value-based approaches employed here have been shown to work well in fostering more-informed judgments through the use of multiple framing of questions and feedback to participants (Hobbs and Horn, 1997). The workshop approach also involves mutual learning so participants can form a collective understanding of the judgment tasks and community values.

3.3.3. Hypothetical bias

This potential bias is a concern in contexts involving questions about willingness-to-pay in markets for resource access. The concern is that the hypothetical questions about market payments where resources are not routinely sold may lead to subjects providing arbitrary (hypothetical) responses rather than true market values. In this context, we are not dealing with hypothetical resource changes, but documented losses that have occurred in community lands for decades.

Community ownership of the lands is well established, and the legal basis of compensation for resource losses due to petroleum development is clear, as discussed previously. Hence, there is no reason to expect hypothetical responses.

3.3.4. Strategic bias

This potential bias involves the concern that participants may state values different from their true market-activity based values, in order to affect the outcome of the evaluation efforts and related policy decisions. Discrete choice valuation approaches (often a yes or no to a referendum-type question) are used to address this potential bias in contingent valuation studies, by asking an array of subjects different questions to impute a welfare-based demand curve for provision of the good in question (c.f., Loomis, 2000). In this case, we start with the assumption that there are no true market-based values for the resources in question, because they involve deeply held cultural values. Second, we designed the valuation judgment to minimize the potential to state extremely high values, by separating the judgments about relative importance of the various impacts from the process of characterizing an overall valuation of losses in dollar terms. The latter step was completed by the analysts after the workshops were completed. Third, within the workshops, individuals were asked to clarify their thinking and reasoning regarding the relative importance of the various impacts, so the participants could learn from each other.

4. Muskeg Lake case study

4.1. Setting and history of damage

We use "Muskeg Lake" as a hypothetical, but representative, Metis settlement to illustrate the approach we have employed in the three actual cases. Muskeg Lake has 850 members living on 1000 hectares of land in Northern Alberta. Like other Metis communities, nearly half of the population is under the age of 15, and there is continuing pressure for improved housing, employment, infrastructure, social support and education.

The community has been significantly affected by petroleum exploration and development which began on the settlement in the 1960s, but increased substantially in the late 1970s and early 1980s and has been a dominant industry on the settlement ever since. Employees of the provincial government, hired to administer the settlement, struck deals with petroleum companies. As a result of the new Metis Settlements legislation, some of the revenue eventually came to the settlement. However, for many settlement members the losses they experienced to their culture, community and the environment far exceeded the revenue that was returned to them under the new Metis Settlements legislation, and they pressed their council for action.

The council faced difficult decisions. First, they needed to respond to the members that felt non-economic values were being disregarded in pursuit of development. Working with lawyers, they were alerted to the opportunities under *Section 118*, which included the potential to be compensated for past, present and future damages on their land. Second, they recognized the petroleum industry as one of the best opportunities to achieve the community's goal of becoming economically resilient and self-sufficient. Third, they needed to find a way to communicate the importance of these non-market values to companies they were negotiating with over future developments.

4.2. Establishing the impacts and values

A first step was to identify and characterize the changes that took place as a result of petroleum development. The most significant obstacle to identifying the impacts was that development began over forty years ago, and there was little written documentation regarding historical conditions before development. To overcome this challenge the research relied on oral histories and recollections of the elders, because their knowledge constitutes the most comprehensive information available about Settlement conditions both before and after petroleum development. This approach is consistent with recent legal decisions in Canada, such as the 1997 Supreme Court of Canada decision in *Delgamuukw v. British Columbia,* which supports aboriginal peoples' oral histories as evidence of historical facts (Delgamuukw v. British Columbia, 1997).

Several rounds of interviews and workshops with elders were held to establish impacts and how Metis

values were affected. Bio-geographic data collected during interviews were transferred to maps by elders, or by the interviewer at the direction of the elder. These maps were drawn on base-maps that ranged in scale from 1:250,000 to 1:40,000, depending on the type of information being discussed. All information was verified and validated in subsequent interviews and workshops.

All elders interviewed were made aware of the purpose of the project at the outset. All agreed to have their stories, maps and words used by the Settlement Council to assist with the analysis of loss related to the petroleum development. This process encouraged elders to identify issues and discuss topics that were of importance to them and the community. Some elders spoke in their native Cree language during interviews and an interpreter was present in these cases. All interviews were tape-recorded and transcribed.

4.3. Impacts, values and performance measures

The results of these interviews and mapping sessions established the context, clarified the impacts and identified the affected values. Community members indicated that petroleum development has increased pollution and contamination from noise, light, chemical spills, gas leaks, burning, flaring and exhaust. They also cited increased land degradation, such as erosion, weeds and poor vegetative regeneration at drilling sites. Members noted that new roads, seismic cut-lines, and slash windrows have caused poor drainage, flooding, and habitat fragmentation. Roads and cutlines improved access and subsequently led to poaching, increased natural predation, and caused displacement of wildlife. Community members also expressed annoyance and frustration with not being consulted nor having their views considered, resulting in impacts that could have been avoided or mitigated by petroleum companies. Metis participants indicated there was an increase in uncertainty, fear and anxiety due to petroleum development and also many social impacts, such as adjusting to rapid increases in income disparity from the boom in petroleum development, which benefited only a small number of families on the settlement.

The next step was to translate these issues, often revealed in the form of stories, into a framework for evaluation. We sought to structure the values in a way that captures what is important to the Metis and capture their way of thinking about the changes. It was thus possible to identify which values benefited from resource development and which suffered losses. After several iterations with the Metis, four fundamental values were identified (a more detailed description is supplied in the parenthesis):

- traditional values (traditional knowledge and skills, traditional sites, spiritual values);
- bush values (all plants — especially berries, all wildlife — especially moose, respect for the land);
- community values (health and safety; community cohesion);
- economic values (financial income to the settlement as part of the new Metis Settlements legislation payments related to historical rents).[6]

Performance measures were formulated through dialogue, to develop practical and understandable ways to convey the impacts from petroleum-related surface disturbances. Some of the measures for the fundamental values were readily established. For example, Economic Values, reflecting the financial income from retroactive payments made to the Metis under the *Metis Settlements Act,* were measured in constant year 2000 Canadian dollars. Other values also have commonly understood measures, such as wildlife habitat, which can be measured in terms of area affected. Nevertheless, in-depth descriptions based on information from members were also incor-

[6] Another economic related value discussed was the employment created on the settlement by petroleum development (for land clearing). In the simplified case study example presented here, this potential benefit was not included because historically the amount of local employment was minimal as trained settlement residents were limited and few had the heavy equipment required (as was the case in some real world cases). It was not considered significance by residents, as well as being cost/benefit neutral, and therefore not included in the analysis. However, in some cases even minor employment benefits are highly valued, not only for the wages but also for non-market aspects of employment such as improved self-esteem, improved mental health and better knowledge of the petroleum industry. In these cases employment benefits were included in the analysis by successfully utilizing the same MAUT/decision analysis approach. It is relevant to note that employment is often a prominent interest when negotiating future petroleum agreements.

porated to promote a common understanding, and to establish measures for more complex values (e.g., traditional values). The use of descriptive measures is a common technique for evaluation, often displayed as constructed scales. Scales were not needed in this case because the two alternatives (with and without petroleum development) could be clearly addressed with descriptions.

Descriptions were carefully developed with the Metis to ensure an understanding regarding the intent of each attribute. Metis culture, language and educational background were primary considerations developing the attributes. In addition, the settlement members rely heavily on verbal and visual communication. Therefore, all attributes were explained orally, often in conjunction with visual aids (graphs, maps, photos) and quotes from Metis elders. Table 1 displays the fundamental values and the associated measures.

4.4. Developing scenarios: '*with*' and '*without*' petroleum development

A prerequisite for making informed value judgments about what has been gained and lost is to establish a clear understanding of the relevant changes, in terms relevant to fundamental Metis values. To this end, two scenarios were developed, for a typical current year. The first scenario was a year "without petroleum development", assuming that the land would have remained in a natural state, with a small amount devoted to housing and farming, as was the case before petroleum development. This is a reasonable assumption because it is a conservative use of land; it assumes that only higher and better uses as determined by the Metis were possible.[7] The second scenario, "with petroleum development," described the current situation.

To gain insight into the "without petroleum development" scenario, the analysis considered all fundamental Metis values before petroleum development, and how these would have evolved with no petroleum exploration. For example, when considering traditional knowledge and skills (e.g., hunting), it was determined that, before development, settlement members could hunt on all parts of the settlement, and access of non-members was controlled. The situation "with petroleum development" reflects the present situation: including a direct high loss of 10% of the land base for traditional use due to land alienated by petroleum extraction, with an additional 20% of moderate loss due to such issues as poaching, noise, smell, water contamination and related adverse impacts. Descriptions supporting these measures included facts such as the documented case of thirty-five poached moose kills on a new road in a single year.[8]

Table 1
Muskeg lake fundamental value hierarchy and measures

Fundamental values	Measure**
Traditional values	
• Traditional knowledge and skills	Percent of important sites/area lost
• Traditional sites	
Environmental bush values	
• All plants and wildlife, especially berries and moose	Area, location and severity of land impacts
• Respect for the land	
Community and social values	
• Health and safety	Perception Index
Direct economic values	
• Financial income from petroleum development	Constant year 2000 dollars in present value terms at 5.4%

Simplified for illustrative purposes.
**All measures also supported by a description of the change.

5. Valuation workshop

5.1. Workshop participants

The previous section established the relevant changes to fundamental Metis values through the development of the two scenarios. The next step is to establish the relative importance of each change in

[7] A reviewer of this paper pointed out that other scenarios, and other resource uses without the project, were possible, such as guided hunting with a lodge. The key point is that these alternative uses would involve even larger foregone benefits than the base case described above, and would only be pursued if the Metis had viewed them as better alternatives than no development. Hence the analysis outlined here is a conservative, or minimal estimate of the losses.

[8] Further supporting evidence, such as elder quotes, were also utilized. For example, one elder stated: "That's what I didn't like about the [petroleum] companies around here.... They, and other outsiders using their oil roads, were around there getting all our moose.... Sometimes they would just take one-quarter off and away they'd go, not even bother to skin it."

the values. Simply describing the impact of a loss of fishing or hunting opportunity at a specific location does not characterize the importance of this loss. The importance must consider context, preference and perspective (for example, are there many alternative fishing or hunting locations? How productive was the lost location? What role did fish play in the Metis culture?).

Workshop participants were chosen based on their knowledge of settlement affairs, their knowledge of the issues related to petroleum development, and their understanding of the valuation project. Representation of a broad cross-section of settlement membership was also sought (in terms of families, gender and age). Most of the participants were involved in the earlier phases of the research and all those who assisted with the interviews were present. Ages of participants ranged from 20s to late 60s.

The size of the workshop was important. We requested a small group (seven to eight participants) so that each participant would be able to think carefully about the changes to Metis values and then openly discuss their value judgments. The workshop was organized as a series of tasks that would ultimately lead to the numerical value judgments. First, a review of the project, achievements to date and an overview of the workshop objectives were provided. Then a presentation of the changes to fundamental and specific Metis values established through the scenarios described in the Previous section was given.

5.2. Workshop methods

The workshop was designed with the recognition that the Metis participants would begin the process without well-defined, quantified value judgments. It was also recognized that different approaches may yield different results and that no single method is workable for all individuals. Hence, convergence was sought through multiple views and multiple methods. To address these issues, the workshop employed several principles to help promote rigorous and consistent results. First, the judgment tasks were structured to begin simply with ranking of the relative importance of the various impacts to the settlement. Then, multi-attribute tradeoff methods (swing weighting and pairwise indifference judgments) were used to elicit value tradeoffs, as discussed in the Next section (von Winterfeldt and Edwards, 1986; Hobbs and Horn, 1997). Second, we ensured that participants understood the judgment tasks and were comfortable with the process. Third, discussion of individual views was encouraged, with several iterations before the participants were satisfied with the results.

Questions and comments were encouraged and clarification was provided where needed. Throughout the workshop, individual concerns about petroleum development were expressed and additional perspectives into the impacts were offered. The participants confirmed that the value hierarchy (Table 1) was complete and sensible, and that it adequately represented the affected values of the settlement members. Discussions were also held to distinguish among general impacts and factors influencing the fundamental values (e.g., impacts to traditional Metis values from assimilation and adaptation) and specific impacts from petroleum development (lost hunting areas).

5.3. Ranking and weighting values: judgment tasks and relative importance

Using the two scenarios as a basis, the consequences of development (measured by the attributes) were organized under headings of ‘worst’ and ‘best’. For all attributes except Direct Economic Values, the ‘worst’ was reflected in the “with petroleum development” scenario, since the participants agreed that the current situation reflects the worst level of non-economic impacts, for each category, over the history of petroleum development on the settlement. The “best” for the non-economic impacts was a typical current year without petroleum development, leaving the land in a natural condition. For Economic Values, the worst was before development began as there was no income, and the best was taken as the annualized present value of the financial component included in the *Metis Settlements Act* (as discussed in Section 4.1). These ranges were captured in a simple worksheet (see Table 2). After reviewing the worksheet, the participants were asked which set of attributes they would move from the ‘worst’ to the ‘best’ first, indicating which *change* they felt was most important to the well-being of the community. To foster independent thinking, the participants were asked to make this judgment individually, without influence from other members of the group, before discussing their views.

Table 2
Worksheet — ranking affected values from surface disturbances to current generation

Rank	Affected values	Worst	Best
		Brief descriptive attribute	Brief descriptive attribute
	Traditional values		
	• Traditional knowledge and skills. • Traditional sites.	High loss on 10% of the settlement; moderate loss on 20% of the settlement; complete loss of two traditional meeting sites.	No loss from petroleum related development.
	Bush values		
	• Plants and wildlife. • Respect for the land.	Loss of 8,000 ha of quality habitat.	No loss from petroleum related development.
	Community values		
	• Health and safety.	High (significant behavioral changes due to fear, worry and exposure to petroleum related contamination).	Low (freedom from fear, worry and exposure to health and safety dangers).
	Direct economic values		
	• Revenues to the settlement.	No revenues to the settlement from petroleum related activities.	$325,000 annually

This process was continued until all the values were ranked based on the four fundamental attributes. The initial ranking exercise indicated that the participants valued the loss to the environment and traditional values as most important, either first or second, with community values ranked third and economic values ranked last. Because the rankings were similar, the participants discussed the difference between environment and traditional values to see if a consensus could be reached. Consensus was not a requirement as the final results could be reported as a range rather than a single number. After a discussion, the participants agreed to a consensus ranking of the significance of changes in each attribute as follows: (1) traditional values; (2) environment values; (3) community values and 4) economic values.

To make more specific judgments regarding the relative importance of these impacts, an identification card titled “Traditional Values”, complete with each value component and attributes describing the change from petroleum development, was then placed on a wall at one end of the room and a second card titled “Economic Values” was placed on the wall at a reasonable distance.[9] A line with a tic-mark in the middle was drawn between the two cards. As a group, the participants then considered the relative importance of changes to “Environmental Values” (ranked second) as compared to “Traditional Values” (ranked first) by placing a similar identification-card titled with “Environment Values” at an appropriate distance away from “Traditional Values” card. This process was repeated by comparing the changes in “Environment Values” to “Community Values,” then “Community Values” to “Economic Values”.

[9] Other swing weighting methods are possible, see: D. von Winterfeldt & W. Edwards, Decision Analysis and Behavioral Research, (1986).

Once the identification cards were placed comfortable distances away from each other a score of 100 was arbitrarily assigned to "Traditional Values" which had been ranked as most important by the group. The participants then allotted specific numbers to represent the importance of each change in value, comparing the second most important ("Environmental Values") with the first ("Traditional Values"). The participants were then asked what amount of change it would take to "swing" the Environmental Value loss to equal the loss in Traditional Values and to describe this difference with a numerical weight (e.g., 85 for Environmental Values compared to the 100 for Traditional Values), and so on. This "swing-weighting" technique is widely used to develop multi-attribute value measures (McDaniels, 1992; Keeney et al., 1990).[10]

Ongoing discussion concerning the relative importance represented by the numerical weights, iterative consistency and validity checks helped verify the value judgments. Then a computer-aided representation provided an easy way to understand the numerical relationships between values. This step also allowed for easy consistency checks and a better understanding of the relationship between non-sequentially ranked values (e.g., pair-wise comparisons of 1 to 3 and 2 to 5). The participants were never asked to directly make exchanges of non-monetary values for dollars. Instead, relative tradeoffs were made among a range of fundamental values, one of them being measured in dollars.

5.4. Valuation results

As anticipated, weighting the relative importance of the changes in values to the Metis community required a great deal of discussion and thought. The weighting allowed the participants to focus on the underlying meaning of the losses as well as the relative importance of the benefits within the context of the settlement. The end result was better-informed value judgments, which were translated into specific numerical value weights. In addition to the discussion of losses and relative importance of the differences, the participants provided insight into mitigation and avoidance options. For example, they indicated that the historical impacts happened at a time when there were still many opportunities to protect important traditional sites and hunting grounds. Many losses could have been avoided or greatly minimized through greater community consultation. The results of the ranking and weighting are summarized below in Table 3.

5.5. Establishing monetary equivalents

For the purposes of determining compensation to the settlement, it is possible to employ the well-defined "Economic Values" to 'price out' in dollar terms the losses incurred to other fundamental values. This approach to establishing monetary equivalents for intangible values has been used in many contexts, such as nuclear waste repository siting (Merkhofer and Keeney, 1987), electric utility reliability (Keeney et al., 1995) and wastewater planning (Keeney et al., 1996). In essence, the weighting process allows each change in an objective to be translated into an equivalent change in another objective. When one objective is expressed in dollars, the others can be translated into dollars, given the relative weights in Table 3.

Table 4 translates the weighted value judgments, quantified and shown in Table 3, into dollar equivalents using the Additive mathematical formula described in Section 3.2. As agreed to with the Metis at the beginning of the process, an analyst completed the final step of quantifying losses in dollar terms after the workshop. Hence, the participants did not know the dollar value of impacts, or the financial implications of their judgments, in the workshop process. In this example, the total non-market losses exceed $2.6 million per year in 2000 Canadian dollars, or approximately $3,000 per member of the settlement. On that basis, the annual compensation

Table 3
Workshop results

Fundamental values	Rank	Weight
Environmental bush values	2	85
Community values	3	60
Traditional values	1	100
Economic values	4	30

[10] The associated weights from the swing weighting exercise are typically coefficients in a multiple objective utility function. An additive structure for the utility function is assumed in this approach as described in Section 3.2, common in multiple value contexts with group elicitations.

Table 4
Dollar equivalents of annual compensatory losses to Beaver Lake Settlement from petroleum surface disturbances

Annual compensatory losses in 2003 current dollar equivalents		
Fundamental values adversely affected	Total	Per member (850 members)
Environmental bush values	$920,800	$1100
Community and social	$650,000	$800
Traditional	$1,083,300	$1300
Total losses	$2,654,200	$3100
Fundamental value positively affected	Total	Per member
Economic values	$325,000	$400
	Total	Per member
Estimated annual compensation shortfall	$2,329,200	$1100

of $325,000, that is now received by the settlement, under-compensates the Metis at Muskeg Lake by more than $2.3 million per year.

5.6. Implications of time

It is important to consider the effects of time on the results. The results indicate the Metis at Muskeg Lake settlement have not been appropriately compensated for their losses over forty years. There are several ways to arrive at an approximation of the cumulative historical costs. Because the current situation is regarded as the worst over time, one method is to simply assume linear impacts over time, beginning with no impacts in the first year of development and accumulating to the current impacts in dollar terms. Another way would be to utilize the historical drilling record as an indicator of petroleum activity, which would provide a compensation estimate reflecting the pace of actual development activity. A third method would be to elicit relative losses for each value over time from the workshop participants. This third approach is more challenging, but may be more appropriate because it would provide key insights into value changes over time and how the specific impacts from petroleum development impacted these values over time. Given space constraints, these approaches are not applied here, but have been employed in our work with the settlements. The Metis of Muskeg Lake settlement indicated that the land, water, wildlife and fish are important for future generations to use. However, even if development stopped today, the land would need time to recover and the Metis at Muskeg Lake Settlement would continue to suffer residual adverse impacts. Furthermore, there would be no income from land rents, which are based on production and use. Therefore, to illustrate future consequences of losses to Metis values, one option would be assess the monetary implications if all drilling and production under current conditions were to stop, while maintaining a monetary compensation of non-market values beginning at current levels and reducing to zero over a reasonable recovery period (e.g., seventy-five years) period to reclaim and rehabilitate the land.

6. Discussion

Past development activities and the associated losses cannot be changed. One of the few options still open to help address these losses is monetary compensation. Yet, using dollar equivalent terms is a blunt way to describe the losses suffered by the Metis, and does not directly address the more important issues underlying these measures. Nevertheless, the results of our work suggest that dollar measures can and should be used to inform and shape future dialogue and negotiations. One reason is that dollar values characterize non-market consequences of business decisions in business terms, promoting better communication with companies, and within the affected community itself. A second reason is the legal framework discussed earlier, which directly provides an opportunity for compensation for the wide array of cultural and non-market impacts from petroleum development on Metis lands.

Many of the Metis we have worked with stress losing the resource base and the values they attach to it is to lose their identity. Many expressed distrust of short-term economic gains in exchange for the land and the living resources. For example, interviews indicated that simply providing more money may not help, and may even worsen, many of the losses unless these funds are used to replace the resource base and replace the losses to the values discussed. Finally, Metis involved in our workshops still support petroleum development, but seek development that is sensitive to their values. This finding is not surprising considering that these communities must address ser-

ious issues of unemployment, low income, limited opportunities, poor health, low self-esteem among youth, and the need for hope.

The objectives and values outlined here can help to inform negotiations by providing a culturally appropriate framework for developing new contracts. It identifies what is important, what should be monitored and where new revenues should be spent. Finally, this analysis estimates more fully the costs of "business as usual" and the significance of failure to address these issues.

7. Conclusion

Compensation for culturally important resource damages suffered by indigenous people is an issue of enormous importance. These valuation tasks are made dramatically more complex by several factors: the scale of resource changes is often large, beyond the scope of what might be termed marginal analysis; the impacts may have occurred some time in the past; and the impacts involve culturally significant values and resources that are difficult to characterize and communicate to others.

This paper draws on concepts and methods informed by decision analysis and behavioral decision research to help participants construct their own value statements for the kinds of losses, and the significance of these losses. This information can then serve as the basis for quantitative and qualitative analysis of the impacts, and more importantly can serve as the basis for designing relevant ways of redressing these impacts.

The methods outlined in this hypothetical example have been applied in actual cases, working with Metis settlements in Alberta. Our experience is that the approaches have merit and validity to the participants, and are grounded in defensible elicitation methods. We hope other researchers and practitioners will explore these approaches and add to the experience in addressing these complex valuation tasks.

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