RURAL ECONOMY

In Search of Forest Resource Values of Aboriginal Peoples: The Applicability of Non-Market Valuation Techniques

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Introduction

The purpose of this paper is to present an interdisciplinary model[1] and a process for considering the applicability of non-market valuation techniques to Aboriginal Peoples.[2] These techniques are widely used in non-Aboriginal contexts as methods of providing information about preferences over natural resources.

Concern about the basis for the management of natural resources is a global phenomenon. Central dimensions of this issue include: who shall make decisions about the environment, by what criteria, and what process of valuation will be used. Policy and enterprise failures in the area of natural resource management are numerous and widespread. Many of the conflicts apparent in natural resource management can be characterized as conflicts of culture and values between persons of European origin with those who are Aboriginal. In North America, these conflicts have centred around the rights of Aboriginal groups to land and other natural resources. Vatn and Bromley (1994, 139) have noted that social context determines whose interests count in the decision process related to choices about the environment. Ultimately this process is a discussion about actual and presumed rights. In North America and other continents, the European value systems of former colonial regimes affect decisions about natural resources which may be to the detriment of Aboriginal Peoples. The resource issues associated with these decisions include land reform measures, wildlife management options and misdirected aid programs which sometimes fail to

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[1] The disciplinary perspectives represented are primarily sociology and economics although elements of psychology and anthropology are also present. Although these disciplines share many of the same concerns and concepts, different assumptions are used and ideas are often framed in language with unique meanings, even for the same words. In this paper an effort has been made to make the meanings of concepts explicit and to apply them to the process of determining the value of natural resources in a cross cultural context.

[2] The term Aboriginal Peoples is used to represent descendents of original inhabitants of North America prior to European settlement. All of the examples used are based on North American cases, however, the concepts and ideas herein may also be relevant to Aboriginal Peoples in other parts of the world. We employ the term Euro-Americans to represent those peoples who are not Aboriginal Peoples, recognizing that there is considerable diversity in this group, but that the group is predominantly of European extraction.

reflect the needs of indigenous cultures. Decisions which fail to include the input of local people and ignore Aboriginal value systems can lead to inappropriate and unenforceable resource use patterns, skewed income distributions and unintended loss of social welfare.

As one response to these resource decision problems, researchers have been trying to develop a better understanding of Aboriginal societies. In pursuing this approach, respect for local people is shown through attention to *indigenous knowledge* and *participatory resource appraisal techniques*. One of the central premises of these efforts is the recognition that positive interactions between different cultures require the development of a mutual understanding of the cultures involved. Such an effort requires the development of an understanding of value differences between cultures.

As researchers spend increasing amounts of time trying to understand Aboriginal cultures, they bring with them a variety of methods and analytical tools from their respective disciplines. Some sociological efforts focus on defining and comprehending the structure and functions of roles, values, decision making processes and institutions within these cultures. Economic efforts often focus on examining the preferences of the individuals in the group in an attempt to understand choices and resource allocation decisions. One group of tools used by resource economists is non-market valuation.[3] Since the original attempt at valuing recreation by Hotelling (1947), methods have evolved to the point where they may play prominent roles in resource management decisions. Currently these methods are being used cross-culturally (Brisco et al, 1990; Whittington et al, 1990; Whittington, Lauria, and Mu, 1991; Whittington et al, 1992; Boadu, 1992). At issue in this paper is the extent to which these approaches are useful in obtaining information that may lead to the resolution of resource management issues which arise from interactions between cultures.

In this paper we examine the applicability of non-market valuation techniques to Aboriginal societies. We note that there are also many concerns about the application of these techniques within Euro-American cultures. However, we focus on a set of issues that may arise due to

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[3] Another group of tools used to "value" losses is the replacement cost method. This has been applied to value subsistence hunting losses experience by Aboriginal Peoples (eg. Chibnic, 1978). Replacement cost is only a valid measure of benefit in very specific circumstances and, for example, in the case of substistence hunting, will probably only measure a fraction of the total value (see Smith, 1991 for a theoretical discussion of these issues).

differences between Aboriginal and non-Aboriginal cultures. Also, we primarily concentrate on theoretical issues associated with non-market valuation and not on empirical/technical issues (survey design, information provision, data collection, etc). While the latter are important elements of non-market valuation, the theoretical issues must be addressed before these techniques can be implemented.

The paper is structured as follows. First, we present a multidisciplinary model of natural resource values. We then present an outline of non-market valuation theory, in particular, the theory behind the contingent valuation method. Next, we examine some systematic differences between Aboriginal and non-Aboriginal values towards natural resources. Based on the differences between Aboriginal and non-Aboriginal natural resource values, we outline three areas in which non-market valuation efforts may fail. These are: (1) difficulties in eliciting individual valuation responses, (2) difficulties in aggregating responses over Aboriginal Peoples, and (3) difficulties in aggregating Aboriginal and non-Aboriginal responses. We conclude with a discussion of suggested directions which future research may take in order to develop valuation methods responsive to Aboriginal value systems.

A Model of Natural Resource Values

Conflict between cultures over natural resource allocations may be due to the fact that particular cultures hold and assign different values of natural resources. In sociology and economics, there has been some interest in developing a nomenclature to describe value of individuals and groups. We present such a model below.

Held values are those ethical values or beliefs that individuals hold or groups share (Brown and Manfredo, 1987, 12). Held values are associated with ideas, behaviours, outcomes and experiences. They may reflect the goals or ends one seeks in life or the processes or means by which one lives one's life. Hecter (1992) notes that held values differ in the degree to which they are shared socially. However, the work of Rokeach (1973) suggests that groups can be differentiated by their reported held values, even with the existence of differences among individuals in that group. Timmer and Kahle (1983) conclude that cultural location, age, sex and race all heavily influence values. While held values may be adapted over time, in general they are seen to be stable rather than easily modified.

Assigned values are defined as the relative value or worth of things (Brown and Manfredo, 1987,12). Assigned values tend to be associated with goods, services and opportunities. Assigned values are influenced by held values in that the basic values we hold determine the value we assign to goods, services and opportunities. Assigned values are not assumed to be stable, rather they reflect adaptations to changing conditions, either in the goods or services themselves or in market supply or demand, or in the larger environment.

Figure 1 illustrates a hypothesized relationship between held and assigned values. Further, it assumes a particular socio-cultural setting in which changes in social welfare occur in response to changes in the quality and quantity of natural resources. Within this setting there is an expectation of some degree of congruity or agreement on held values among members of this group, even though there are some differences in the hierarchy of values that some individuals hold.

However, the model illustrated in Figure 1 recognizes that there is a subset of values which are defined as *sacred values*. As with other values, held sacred values determine what objects, practises or places will be revered or considered taboo. Values that are taboo may be defined as goods or services for which no monetary amount can be set or which individuals will not consider substitutes. They are sacrosanct and non-negotiable. Taboo goods or services are non-quantifiable, essential assigned values. For example, a person who considers a certain piece of ground as sacred or taboo will not enter that place for any amount of money, regardless of personal or family need. In some cases, sacred held values may be reflected in assigned values that are *revered*. Revered goods are services are not inviolate. While retaining an element of sacredness, they may be used or consumed. For such goods and services societies are willing to substitute benefits derived from using a resource for values which may be obtained from leaving a resource in its natural state.

The model represented in Figure 1 postulates a dynamic relationship among held values, preferences and assigned values. Preferences, in this case, are defined as favoured options. Held values are seen to influence assigned values through preferences. Individuals use their held values to determine the relative importance of particular objects or services. This relative importance of certain assigned values can be expressed in a number of ways including in monetary terms. Over time the collective assigned values of a given culture may influence held values. The view in this model is in contrast with that of Brown (1984) who notes that the connection between held and assigned values is a one-way linear relationship from held values through preferences for particular

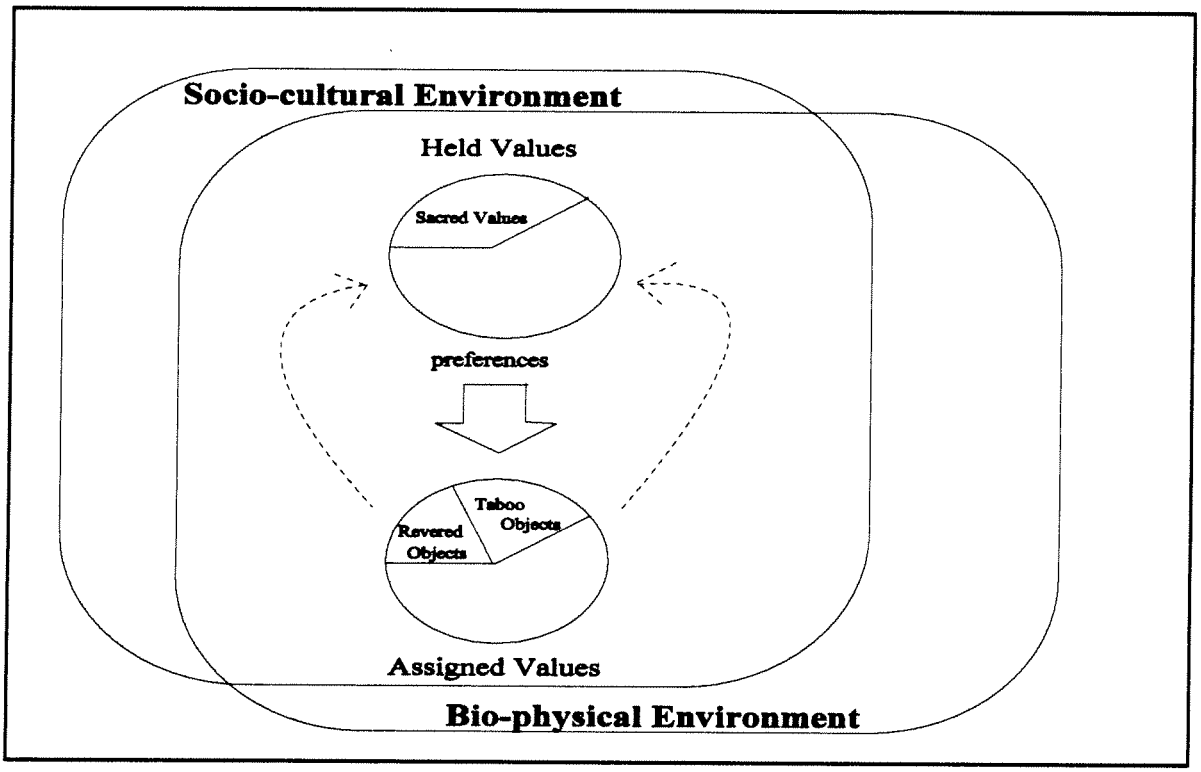

Figure 1: A Model of Values

assigned values.

The outer dimensions of Figure 1 represent the reciprocal relationship between the broader socio-cultural and bio-physical environments. Changes in the socio-cultural environment may result in concomitant changes in the bio-physical realm. Of particular concern in this paper are natural resources and the assigned values with respect to these resources that are measured in non-market studies. As changes in quality and/or quantity of natural resources occur, it is assumed there will be a corresponding change in the monetary or other currency value that members of a particular group will assign to them. The resulting assigned values will alter the social welfare of members of the specific group, either positively or negatively. Social welfare is assumed to be net benefits to society. The entire set of assigned values of a given group represents that group's social welfare. Only a subset of assigned values may be accurately or effectively measured by market prices. People may possess latent assigned values for goods and experiences. This means that if presented with possible options, some individuals may articulate an assigned value for a good that is not generally traded. Non-market valuation techniques attempt to increase the proportion of assigned

values that may be measured.

The relationships represented in Figure 1 are central to the purposes of this paper. They may be used as a conceptual framework to examine the following: (1) the influences that held and assigned values have on each other; (2) the effects that these values have on transformations of social welfare in response to changes that occur in the quality and/or quantity of natural resources; and (3) the differences in valuations of natural resources made by two distinct cultural groups - in this case Aboriginal Peoples and Euro-Americans.

Non-market Valuation Techniques

Given the differences between Aboriginal and Euro-American cultures, an examination of the applicability of non-market valuation, and the economic theoretical foundations upon which it rests, is of paramount importance if non-market valuation of natural resources is to provide meaningful information in an Aboriginal cultural setting. While there have been some cross-cultural applications of these techniques, the bulk of them have centred on European-based cultures. Non-market valuation techniques, in some circumstances, may be well adapted to measuring assigned values of natural resource uses and other goods and services that are not priced in markets. If a suitable level of confidence can be achieved concerning these techniques, then there is considerable potential for using these methods in assessing changes in assigned values.

Non-market valuation techniques are designed to measure the impact of changes in quality and quantity of natural resource goods and services for which markets (and hence market prices as monetary value measures) are absent. Non-market valuation attempts to provide measures that allow comparisons of benefit streams using a common (monetary) scale. There are two general approaches to non-market valuation, (1) the inferential approach and (2) the direct survey approach. The inferential approach utilizes information on actual behaviour of resource users to develop models that represent this behaviour. A commonly used method in this category is the travel cost model (TCM). The approach is limited because it requires that the good or service has associated with it some market purchase (e.g. travel cost). The direct survey approach, on the other hand, seeks values associated with a change directly from respondents. A common direct survey technique is the contingent valuation method (CVM) where responses are contingent upon the creation of a

hypothetical market for a natural resource.[4] While much more flexible than the inferential approach,[5] the direct survey approach is somewhat controversial and must be used with caution (Mitchell and Carson, 1989; Adamowicz, 1991).

The application of non-market valuation techniques in non-Euro-American value systems has largely been limited to the use of contingent valuation methods. There are probably two reasons for this. First, the data required for inferential market based measures may be relatively difficult to collect.[6] Second, indirect methods can only measure use values and in many cases the values of most interest are passive use values (existence values, spiritual values, etc).[7] Thus, in the remainder of this paper we concentrate on the measurement of non-market values using the contingent valuation method.[8] Most of the points we consider, however, also apply to indirect valuation methods.

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[4] Alternative structures for eliciting values include referendum settings and a variety of stated preference approaches (choice experiments, conjoint tasks, contingent behavior tasks, etc.).

[5] CVM methods are considered more flexible in that they are not bound by restrictive behavioral assumptions found in inferential approaches, and may be used to assess passive-use values discussed below.

[6] Sampling strategies required for indirect measures of value may be difficult to follow in Aboriginal contexts. Also, the costs of data collection will probably be greater in Aboriginal settings due to translation costs and other aspects of survey administration. We expand on these points below. However, despite these concerns, the indirect methods may be very useful in modelling economic (behavioural trail) information from Aboriginal peoples and measuring use values.

[7] Resource economists distinguish between use values (values from market and non-market goods and services used) and passive-use values (such as existence or inheritance values). Existence values are derived form the utility individuals receive from knowing that a given resource exists, even if the individual will never use the resource. Inheritance values are derived from individuals knowing that a resource will be available to their heirs (Adamowicz, 1991). Although economists generally assume that use and passive-use values are distinct concepts, these values may be difficult to separate in valuation exercises. Also, these values may be more distinct in some cultures than in others.

[8] Contingent valuation is still somewhat controversial, especially when applied to passive use values (eg. Hausman, 1993). However, we examine the conceptual problems that may arise when applying contingent valuation to Aboriginal cultures, even if the method functions "correctly" in non-Aboriginal settings.

Despite the recent interest in applying non-market valuation techniques in new cultural settings, economists have not tested for potential "biases" that may arise from applications in non-European cultures. As well, there has been little study of traditionally identified "biases" (eg. response bias, starting point bias, embedding, etc; see Mitchell and Carson, 1989) in Aboriginal based CV studies. This study seeks to focus on the additional problems that may arise in applying these techniques in a non-European cultural context.

The Contingent Valuation Method

The contingent valuation method (CVM) is based on economic utility theory. Individuals are assumed to possess preferences (based on their held and assigned values) that are represented by a utility function. People value natural resources and therefore derive utility from these resources. The greater the utility or satisfaction, the higher the level of welfare and the greater the assigned values placed upon natural resources. In its simplest form, utility theory assumes that each individual selects a combination of goods and services that represents maximum satisfaction while not exceeding his/her resource endowment in a particular time period. An individual may even be borrowing against future endowments to finance consumption in the current period. Appendix I contains a more formal outline of this basic theory.

If natural resources are altered in quantity or quality, the individual's utility level, and hence assigned values, will also change. An economic measure of welfare or utility change is the amount of money that will make a person indifferent between a base situation and situation with changed resource quantity or quality. Economic welfare from market goods and services are revealed by prices through exchanges in the market place. Given the prices of the goods it is relatively easy to determine how much (income or other goods) a person would be willing to give up (or accept) for a quantity or quality change. Non-market goods (i.e. goods which are not traded in markets) from which utility, and hence assigned value, is also derived, call for a non-market approach (such as CVM) to elicit these values. Assigned values can be viewed as the amount an individual is willing to exchange (i.e. willingness to pay, WTP) for a natural good or service, or the minimum amount the individual would accept (i.e. willingness to accept compensation, WTAC) in exchange for the good or service (Adamowicz, 1991). Thus values can be revealed through exchanges, whether such exchanges occur in markets or are elicited through survey techniques. In Euro-American cultures,

the exchange is usually measured in monetary units.

The amount of income that makes an individual indifferent between the base case and the change is an individual welfare measure. These amounts when aggregated across individuals represent the aggregate or social values associated with the change (Just et al, 1982; Adamowicz, 1991). In evaluating the economic efficiency of a policy or project, the sum of welfare measures over all relevant people is considered the social benefit.[9]

Ideally, a complete assessment of assigned values is desirable in order to measure fully the effects of an environmental change on social welfare (see Figure 1). Despite efforts to measure both use and passive-use values, it may be argued that utility theory, and its applications, may not go far enough in encompassing the full spectrum of assigned values in a cross-cultural setting. We now examine some of the problems associated with the use of non-market valuation techniques in Aboriginal cultures.

Cultural Differences and Resource Values

Conflicts over natural resources that arise between Aboriginal and Euro-American cultures may result from specific differences in assigned values. Ultimately these conflicts may reflect differences in held values of the two groups.[10] The attempt to understand the nature and extent of differences between the two cultures is confounded by a number of dilemmas. In some instances non-Aboriginals' assumptions about Aboriginal Peoples' values have been investigated through content analysis of traditional oral histories, usually by an Euro-American. Ethnographic data have also been used as a basis for determining the nature of Aboriginal Peoples' culture, practices and value; however, critical analysis of this literature has characterized much of this work as "self-fulfilling prophesies" (Fisher, 1988). Aboriginal cultures were reported as others wished to see them

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[9] The use of the sum of individual welfare measures (or the sum of consumer surpluses) as a measure of social welfare is also somewhat controversial (Blackorby and Donaldson, 1990). Only under certain circumstances can this be considered a true social welfare measure. Nevertheless, in most applied economic analyses, this is the measure of choice.

[10] Many resource allocations involving Aboriginal Peoples in North America have been imposed by the dominant Euro-American culture. This history will affect Aboriginal Peoples' preferences over present resource endowments (and will probably affect the way they respond to valuation questions).

rather than as they were. Finally, the value structures of decades ago may not be an adequate representation of those of today.

There are few studies of contemporary Aboriginal Peoples' value systems (Stevenson, 1992) While Timmer and Kahle (1983) present responses from Aboriginal Peoples, these must be considered as reflecting a specific group at a specific point in time. There is no reason to believe that all Aboriginal groups share the same value systems, even though existing stereotypes tend to group diverse nations of Aboriginals Peoples. Wasinger (1993, 92) cautions that one must keep in mind the immense diversity among Aboriginal groups in world view, traditional ceremonial practises, religious beliefs, language, and habits. Value systems are developed from shared experiences and there is great variability among particular nations on this continent. As an example of significant differences, Churchill (1986) indicates that contrary to popular belief, many Aboriginal peoples were not hunter-gatherer economies. Many nations were based on sedentary agriculture.

An attempt must be made to avoid over-generalization about Aboriginal and Euro-American value systems. However, within each of these broad groups there appear to be common elements in their value systems. Several studies have noted systematic differences between these groups' values toward natural resources. Pobihushchy (1986,118) has characterized the European world view as homo-centric or focused on man, while that of Aboriginal populations is eco-centric or focused on man as a part of a community.[11] The tendency for Aboriginal Peoples to place group welfare above individual welfare is also noted by Wasinger (1993). These views may also inhibit interaction with non-Aboriginals particularly in conjunction with other values such as privacy and silence which are held by Aboriginal Peoples. Wasinger also indicates that group cohesion, indifference to ownership and the value of sharing predominate in Aboriginal values. This value configuration may result in indifference to the accumulation of individual wealth or property on the part of Aboriginal Peoples. One's social standing within the community is enhanced by *sharing* or *giving*. This leads to sharing of what one has when one has it, as in the case of meat from hunting, with the expectation of reciprocity when one's neighbour has such provisions. In contrast, increased

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[11] These views affect not only the stance with respect to environment, but they also affect approaches to decision making.

social standing in Euro-American culture appears to be more a function of *accumulation* than sharing of individual wealth or property.

Another source of differences among Aboriginal nations and between Euro-Americans and Aboriginal Peoples is the nature and impact of contact with each other. Fifty years ago in Canada, large numbers of young people were taken from their local and family settings and placed in boarding schools, frequently run by various churches in the name of a "civilizing" process. As a result, there have been significant dislocations of tradition including language and cultural practices. This is one reason why, when studying values systems of these particular groups, it is very important to consider generation as a determinant of held values. In this case, the term generation is used to imply more than age and maturity. The intent is to reflect the transformation of value systems by unique experiences. While the older generation may have lived in traditional ways out on the land and dependent upon natural resources, the younger generations may only have learned about these traditions and their meanings as adults, often after significant negative experiences of family dysfunction and substance abuse (Uncle Gabe, 1993).

A further difference between Aboriginal and Euro-American value systems is the aspect of sacred values. For example, Pavel, Miller and Pavel (1993) note that for the Skokomish tribe natural resources such as water, clay, native plants and indigenous wildlife form the basis for ceremonies, rituals, history and everyday activities. They are the basis for the unique aspects of traditional culture and as such are considered revered. The symbolic connection of people and natural resources is important to the survival of traditional culture because a spiritual relationship with other life forms pervades all aspects of life (Pavel, Miller and Pavel, 1993,55). This view is shared by the Haida as reported by Shapcott (1989). The land is seen to sustain human society, the environment as a life source, a kind of extended self. Their value is derived from the multiples uses of the environment. Indeed, Shapcott reports that Haida believe that words such as *resource* and *management* imply a human superiority that is incompatible with the holistic values these people hold. These held values relate to the sacredness of the environment, and the premise that no one can own natural resources. This means that establishing assigned values for such resources will be difficult, if not impossible, for those groups.

Cultures and values are not static. They evolve over time. For this reason, held values and their meaning with respect to assigned values must not be assumed to be the same for all groups of

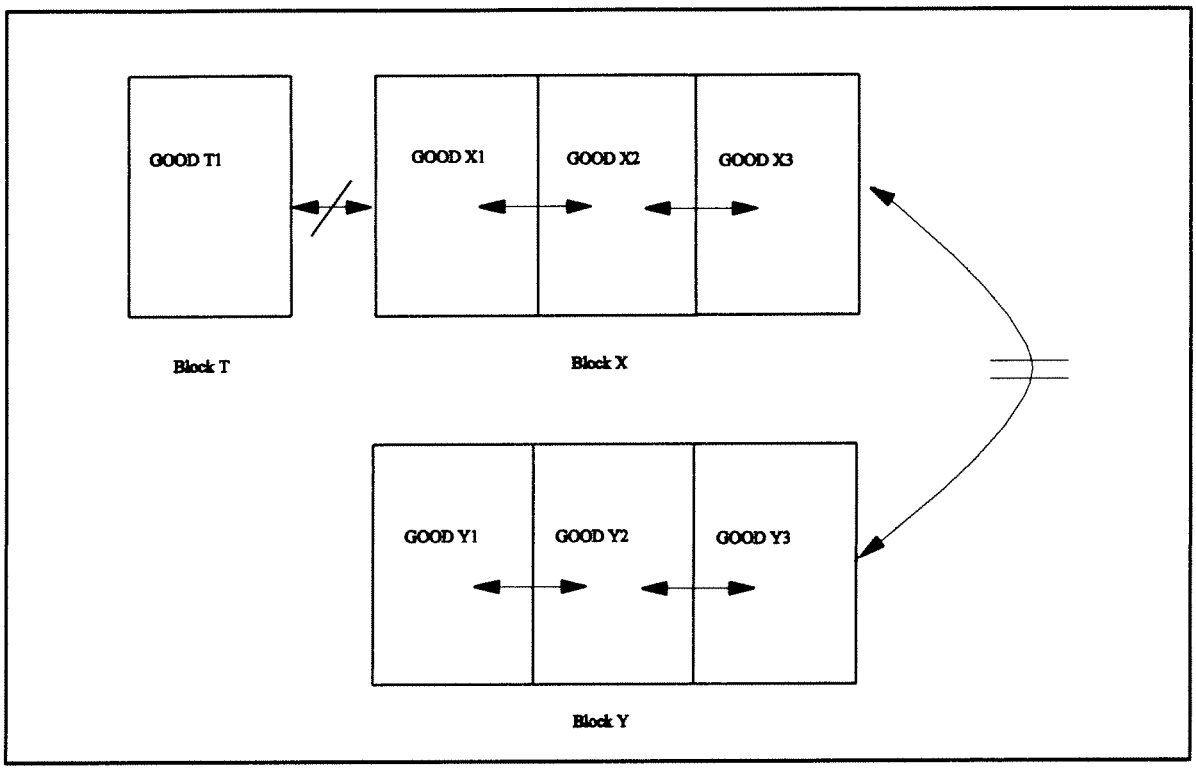

Figure 2: Substitutability Between Blocks of Goods

Aboriginal Peoples, nor the same as those of Euro-Americans. The process of non-market valuation for natural resources should include some assessment of values of specific groups. Some specific challenges that arise when applying non-market valuation techniques to Aboriginal cultures are discussed below.

Problems in Eliciting Responses from Individuals

Economic welfare measures are based on specific assumptions about the form of an individual's preferences. Below, we examine preference structures that make welfare measurement problematic.

Lack of Substitutability Between Goods

Substitutability is an integral component of non-market valuation. Substitution of income for goods is a basic assumption in deriving monetary welfare measures. Non-monetary measures

of welfare can also be derived through substitution. In such cases, a certain good (numeraire) is used in place of money. In deriving welfare measures it is important the that substitutability among non-numeraire goods and services be recognized in the valuation process as the availability of substitutes for the good being valued will affect the WTP and WTAC amounts, regardless of the metric being used.

Several types of situations could cause valuation problems with regards to substitutability among goods and services in an Aboriginal context. One set of goods that may pose substitutability problems are taboo or revered objects. As defined above, there is no substitute for a taboo good or service (i.e. it is impossible to establish a contingent market). Therefore, it may be impossible to elicit monetary, or other currency value, estimates. These types of goods (also called essential goods, Bockstael et al, 1991) may exist in all cultures but ethnographic evidence suggests they may be more common in Aboriginal cultures. In the case of revered goods, the substitutability issue is less clear. For example, a natural resource, such as wildlife, may be respected but used for consumption, and there may be a contingent market that allows for value responses.

A more complex substitution issue that exists in Aboriginal cultures is the potential for complete non-substitution between groups of goods. Ethnographic evidence suggests that in some cultures, groups of goods are defined and trades (substitution) occurs within these groups and not between them (e.g. Bohannan, 1955). Figure 2 illustrates this situation where there are three blocks of goods, X block, Y block and T block. Within the X block, substitution occurs and valuation of a change in one X good can be measured using amounts of another X good as the numeraire. However, there are no trades between X goods and Y goods and one could not "value" a change in an X good using a Y good numeraire. The T block represents a taboo good and thus there is no trade between X and Y goods and the taboo good. Valuation efforts that attempt to cross these boundaries will probably result in respondents protesting the question or providing answers that are difficult to interpret.

The substitution issue described above is quite different than the notions of separability, branch budgeting, and mental accounts, as described in economics (see Appendix 2). An individual's utility function is separable if the individual can separate the goods into blocks and operate on sub-utility functions over the goods in each block. Similarly, branch budgeting is a process in which the individual is assumed to allocate certain amounts of income to each of several

"branches" of aggregate goods and then maximize utility over the goods in each branch, subject to the income allocated to the branch. The mental account hypothesis suggests that individuals partition their income into separate accounts (corresponding to categories of goods). These concepts, however, do not rule out substitution between the blocks of goods since an overall (or root) utility function is assumed to exist. The substitution may be indirect but it still exists. Where individuals appear follow mental accounting processes, detailed survey questions can be used to encourage individuals to move beyond the mental account categories and consider total income in making valuation decisions. In cases where the norm is to not trade between blocks of goods, it is unlikely that surveys will be successful in convincing respondents to violate the norm.

Property Rights

When an individual is asked a contingent valuation question, an underlying assumption is that some form of benefit is accruing to the individual who is expressing their WTP or WTAC. In cases where WTP is elicited, the context implies that some other party has the property right that entitles it to "sell" the resource. Alternately, in a WTAC format, the context suggests that the individual being asked the question holds the property right. In either case, the respondent may find the property assignment difficult to comprehend, implausible, or simply undesirable. The value generated by the WTP or WTAC question, however, will depend on the presentation and acceptability of the property context.

In order for a respondent to fathom the hypothetical property rights market being created by contingent valuation questions, they must be able to imagine: (1) that the transfer of property rights could feasibly occur, (2) how the transfer of property rights will affect their individual utility, and, (3) how that utility translates into some unit of currency. Any or all of these conditions could be violated.

With regard to the first point, variations on concepts of property rights in Aboriginal societies may preclude the possibility of trades. For example, if an Aboriginal individual is asked to respond to a contingent valuation question that proposes a reduction in communal resources, there is an implicit assumption that communal resources can be alienated, or traded, to maximize individual utility. Some indigenous concepts of property do not allow for such trades. For example, Pavel, Miller and Pavel (1993) suggest that Aboriginal Peoples did not trade land resources because

their relationship to the land did not include the concept of ownership.

With regard to the second point, there may be cases where individuals do not have a clear idea of how the proposed property right transfer will affect their individual utility. For example, if respondents are used to thinking of property as a communal resource, the benefits of which are shared among the property holders, then they may not be able to think of changes in the terms of how their individual utility is affected. Furthermore, even if individuals are able to think in terms of personal utility, the public good[12] nature of many communally held resources may create incentives for strategic behaviour and bids which reflect "free riding" (Mitchell and Carson, 1989). Finally, the respondent must translate the change in the resource into some currency unit, which may entail some of the substitutability problems discussed above.

In short, contingent valuation questions elicit responses to hypothetical trades in property rights. Accordingly, values which are elicited with contingent valuation techniques are endogenous to the types of property rights which the respondent perceives. Therefore, as perceptions of property rights are varied, so would the response of the individual.

Satiation

Another factor which could cause problems in eliciting responses from individuals relates to how utility is derived from the accumulation of consumed goods and services. In utility theory, it is generally assumed that individuals prefer more consumption to less, although additions to utility are observed to decrease in ever increasing amounts as more is consumed. In the case of Aboriginal Peoples, we may find cases where utility declines in absolute terms after certain thresholds of goods are acquired[13]. The practice of "gifting" or sharing of goods, common in Aboriginal settings, suggests that there are limits to individual accumulation within Aboriginal cultures. These limits may be due to satiation at an individual level, or they may be a social response to environmental conditions. In any event, these limits on individual accumulation lead to difficulties in non-market

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[12] Public goods are defined as having two characteristics: 1) they are non-exclusive in that individual users may not be excluded from deriving utility from the good or service, and 2) they are non-rival in that an additional user does not detract from the utility derived by other users (Varian, 1992).

[13] This possibility is further explored in Appendix II.

valuation. First, if the range of changes proposed to the respondent in a CVM question are beyond a satiation threshold, then the response could be negative, when a smaller change could elicit a positive value. For example, in the case of a revered good, the individual may feel that he/she should consume only what is required to satisfy basic needs. Second, if a respondent is considered to be wealthy, then the individual's response could indicate a negative value with increased consumption of a resource, despite the possibility that the value of a response to the Aboriginal society as a whole could be positive. For example, wealthy members of west coast Aboriginal societies may derive more utility from disposing of "excess wealth" in potlatches, than from keeping wealth or acquiring more.[14] This second point is only one of several factors which could create problems in aggregating individual responses to obtain measures of social welfare.

Difficulties in Aggregating Individual Responses of Aboriginal Peoples into Measures of Aboriginal Social Welfare

The discussion above outlines several factors in which eliciting individual measures of value will be difficult. However, even if such measures can be obtained, there exist several problems in aggregating the values over the group to form a representation of group welfare.

Individual versus Group Sovereignty

The property right systems and satiation characteristics of Aboriginal peoples described above reflect social institutions which may be very different to Euro-American structures. Whereas much of Euro-American culture is dominated by private property and wealth accumulation held at the household level, Aboriginal cultures may hold and accumulate property in larger groupings of individuals. This difference in social structure implies that the aggregation of individual, or household utility to obtain some measure of social welfare, may not be appropriate in an Aboriginal context. Instead, it may be more appropriate to aggregate the welfare measures of larger groupings of individuals. For example, if decisions are made, and utility shared, among all holders of common

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[14] One may hypothesize, in such a case, that the individual is trading off goods (as gifts) for investment in "social standing." Non-market valuation, in such a case, is compounded by the fact that the value of "social standing" must now be calculated.

property, it may be appropriate to aggregate utility measured from groups which hold property rights to resources.

Current research in non-market valuation shows that there is a link between aggregation of individual welfare measures and a notion of direct democracy voting.[15] Benefit cost analysis is consistent with the notion of voting where intensities of preference are expressed in monetary units. This has led to the use of the referendum model[16] in attempts to value non-market goods (Hanemann, 1994). The referendum approach is the preferred method for eliciting passive use values because it may reduce "free riding" and it provides individuals with a "voice" in the decision making process (Arrow et al, 1994). Also, aggregation in such a model is relatively simple since each person votes and thus each person's preferences are being represented in the process[17]. However, in an Aboriginal society, such a political structure may be inappropriate. The political decision making structure within an Aboriginal culture may rely on elders and councils rather than "votes" from individual members. Aggregating individual welfare measures may have little to do with an Aboriginal concept of social welfare. Therefore, while the referendum model appears to be a very useful method for determining values (particularly passive use values) within Euro-American cultures, it may have limited applicability in Aboriginal contexts since it may not reflect the expected or actual decision making process.

Gender, Generational and other Demographic Effects on Values of Natural Resources

When attempting to aggregate utility over individuals, or groups, demographic variables such as gender and age, may affect valuations. Contingent valuation procedures frequently involve sampling a portion of the population of people who value the resource, and then extrapolating the

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[15] In a direct democracy decision making model, individuals make binding decision through voting, without the intervention of representatives (van den Doel and van Velthoven, 1993)

[16] A referendum contingent valuation model asks individuals (respondents) to accept or reject (vote yes or no to) a proposal as they would in a standard referendum. In the contingent valuation approach, however, there is a monetary payment attached to the acceptance of the proposal (see Hanemann, 1994).

[17] This corresponds directly with the economic notion of the sum of consumer surplus being the aggregate social welfare measure.

value derived from the sample to the population. In many North American studies, identifying a representative sample is relatively straight forward. In studies where use values are of primary interest, lists of historical users may be readily available. For example, lists of big game hunting licence holders are obtained from provincial governments. Since these lists reflect the demographic characteristics of the population of users, such studies frequently are able to ignore social variables in their sampling. In cases where passive-use values are important, random dialling telephone samples or randomly selected addresses from telephone books can, in many cases, attain a reasonable level of representativeness. Stratified or sequential sampling techniques may also be used to improve on the random sampling strategy. Finally, census information provides a basis for weighting of sample strata in cases where the sample is not perfectly representative.

In contrast to the situation described above, in Aboriginal societies historic users are frequently not part of a written record. This poses problems for the analyst who must identify from the overall population those individuals or groups which are likely to value the resource in question. Aboriginal peoples may have specific gender and generational roles with regards to the management, use and subsequent valuation of natural resources.[18] Accordingly, specific attention may have to be paid to the proportion of each gender sampled. Similarly, historical events experienced by Aboriginal peoples may cause the age of respondents to have a significant influence on resource values. In short, there may be systematic differences in the way in which individuals, or groups of Aboriginal people, value resources. These differences need to be integrated into a sampling framework to ensure that the sample may be extrapolated to represent the group.

Problems in Aggregating Aboriginal and Euro-American Measures of Social Welfare

After a measure of social welfare is estimated using non-market valuation techniques, there remains the question of whether the measure is comparable with similar measures derived from Euro-American cultures. In principle, a researcher would like to aggregate Aboriginal and non-Aboriginal values in order to develop overall measures of the value of the natural resource good or

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[18] With respect to gender, the research from southern nations shows that women and men value resources differently, have different knowledge bases and therefore make different choices (eg. Fortmann and Rocheleau, 1985).

service. Several factors could cause such aggregations to be difficult.

First, if the resource must be valued using different currency (for example, money in the non-Aboriginal context and another good in the Aboriginal setting) this lack of comparability will preclude aggregation. Such a situation will arise if there is no substitution between the resource being valued and money in the Aboriginal economy. Furthermore, if the resource is a taboo good, substitution using any currency is impossible, as is aggregation.

Second, if a referendum structure is employed to evaluate whether individuals will vote for a change in the use of a resource, the differences between the political structures of Aboriginal and non-Aboriginal societies may preclude aggregation. Also, issues of property rights and ownership that may be in dispute between Aboriginal and non-Aboriginal communities will exacerbate the problems in measuring and aggregating welfare, since clear definition of ownership (including public or communal ownership) is a precursor to any valuation process.

Third, a well established issue in the CVM literature is that an individual's willingness to pay (WTP) and/or accept (WTAC) may be affected by their income (eg. Adamowicz, 1991). The upshot of this issue has been a realization that values are likely endogenous to the amount of wealth which individuals or groups possess. Accordingly, where there are systematic differences in the income levels of peoples within Aboriginal and Euro-American cultures, one would expect systematic differences in valuations. One may also experience an increased incidence of "protests" from lower income groups, on the grounds that their preferences will be dwarfed by the responses from higher income groups. This suggests that one must ensure that all income levels are appropriately represented in the aggregate measure.

Towards a Means of Evaluating Non-Marketed Values for Aboriginal Peoples

The above discussion should not be taken as implying that economic theory is of no use in evaluating Aboriginal assigned values. Utility maximization theory seems sufficiently flexible to address many of the differences that may exist between cultural systems. Problems with non-market valuation techniques may arise because the specific form of utility theory that the technique relies upon may be somewhat limited in cross-cultural application. The challenge for social scientists is to explore means of adjusting utility theory and non-market methods to account for these differing systems. This will likely entail combining ethnographic analysis and qualitative research

with traditional social science / economic survey techniques.

To address the substitution problem, empirical tests could be conducted to determine whether blocks of goods are completely or partially separable, and whether respondents are able to translate values of goods between partially separable blocks. Considering the sacred or taboo resources, the values associated with such goods or services are, by definition, beyond valuation in an economic context. Such goods must be treated as constraints, as respondents' values do not allow any tradeoffs with respect to these resources to be made. Ethnographic research could be used to examine the nature, scope, number and implications of taboo goods within Aboriginal and non-Aboriginal cultures. If Aboriginal societies hold more values in the sacred realm than Euro-American societies, and if taboo and revered resources remain external to valuations, then non-market valuation approaches will systematically under-represent Aboriginal Peoples values relative to Euro-American values.

Findings from ethnographic and qualitative research may also be useful in constructing economic behavioural models that are relevant to Aboriginal cultures. For example, these models may employ time constraints and budgets, and may be able to reflect preferences that are specific to Aboriginal Peoples. Such approaches may be able to "value" goods based on models of observed behaviour, rather than the hypothetical questions that are used in CVM.

Differing property right systems highlight the need to identify institutional influences on resource use. To the extent that property is held communally, utility among individuals may be interdependent and it may be necessary to address questions to groups of people who value and manage resources cooperatively. An understanding of the evolution of current property systems and the recognition that indigenous property systems entailed different held values, will be an essential element of any non-market valuation effort within Aboriginal communities.

Simple approaches to the aggregation of values over individuals of different gender and generation may be problematic in many Aboriginal cultures. Empirical research could assess whether systematic gender biases in valuation exist, and could explore the effect that such biases could have on estimates of social welfare.

Many of the issues discussed in this paper can be examined using carefully constructed survey questions, perhaps even valuation questions. Along with valuation questions, survey respondents could be presented with a series of "de-briefing"questions to determine why they

provided a certain response and, in particular, to determine why some respondents protest against valuation questions.

This paper has shown that a variety of challenges arise in applying economic valuation methods to Aboriginal value systems. Other disciplines (such as sociology and psychology) may help to address these challenges. By combining the ethnographic approaches common to anthropology and sociology with generalized economic theory, a richer model of resource valuation may result.

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Appendix I - Basic Theory

The Individual Consumer

The traditional approach in economic texts on consumer theory is to set out the basic properties regarding consumer preferences. The consumer is assumed to be a rational economic agent who is able to rank consistently bundles of goods and services, denoted Q, made of goods and services q_i. Further, consumers are assumed to prefer more of a good to less of a good even though the additional benefit from each additional good may begin to fall after a point. These axioms are sufficient for the existence of a continuous utility function to represent these preferences (Varian, 1992, p. 97).

Maximizing Behaviour

In selecting the best consumption bundle, the individual is said to be maximizing utility based on his/ her preferences.

$$maximize\ U = U(q_1, \ldots, q_n)$$

Individuals are rarely in the position to consume all that they might possibly want. Individuals are usually constrained by total income so the utility maximization problem becomes:

$$\max\ U = U(q_1, \ldots, q_n)\quad s.t.\quad \sum_{i=1}^{n} p_i q_i = m$$

where p_i is the price of good q_i and m is the total income or budget.

The demand for any particular good or services will be determined by this utility

maximization process. The typical (Marshallian) demand functions that arise from this maximization process will depend on the prices of the goods and services as well as income.

$$q_i^* = q(m, p)$$

Substituting these demand functions into the utility function yields an indirect utility function.

$$V(p_1,\ldots p_n, m)$$

The indirect utility function can be used to derived a number of welfare measures, depending on how it is defined. For example, the economic welfare measure for a change in the price of q_i from p_{i0} (the base case) to p_{i1} (the subsequent case) is the value CV in the following equation;

$$V(p_1,\ldots,p_{i0},\ldots,p_n;m) = V(p_1,\ldots,p_{i1},\ldots,p_n;m-CV)$$

The indirect utility function can also be used to examine the welfare impact of a change in quality or quantity, if appropriately defined.

Appendix II - Separability, Mental Accounts and Satiation

Separability and Mental Accounts

In contemplating a series of consumption bundles, an individual may form separate mental accounts for goods which fulfil specific functions in one's life, such as basic and non-basic goods and services. Once these separate mental accounts are formed, it may be difficult to elicit responses that rely on substitution of one of the basic goods for one of the non-basic goods in the immediate

future. These accounts would likely reflect the individual's held values which are stable over the short term. As indicated in the model of values, held values may change over time through the feedback mechanism from assigned values. Once the held values change, the individual would divide up his/her income to form a new set of mental accounts.

Another way to describe these separate mental accounts is to state that the individual's preferences are separable and the utility function can be written:

$$U = U(v_i(q_i))$$

where v_i (q_i) is the subutility function for any goods q_1 though q_n (Deaton and Muellbauer, 1980). Elaborating further, the consumer's preferences may be separable to broad groups such as food (F), clothing (C), shelter (H), recreation (R) and perhaps a revered realm (v). The utility maximization process would then become:

$$\textit{Maximize} \quad U = U(v_F(q_F), v_C(q_C), v_H(q_H), v_R(q_R), v_v(q_v))$$
$$s.t.\ m_F + m_C + m_H + m_R + m_v$$

The Marshallian demand functions that arises from this process will depend on the amount of income allocated to the specific category of goods and the price of that particular category of goods. In the case of food, the amount of income allocated to food is m_F and the relative subvector of prices is p_F.

$$q_F^* = q(m_F, p_F)$$

Satiation

In utility theory, it is usually assumed that individuals prefer more to less. In the case of a

revered good, the individual may feel that he/she should consume only what is required to satisfy basic needs and no more should be consumed. On the surface, this would appear to be a violation of the assumption of non-satiation. There would seem to be at least three ways in which this pattern of consumption might occur. First, an individual may wish to consume more than the minimal amount of the revered good but is not free to do so because of social constraints. The maximization problem can be amended to reflect this situation:

$$\textit{maximize} \quad U = U(q_1, \ldots, q_v, \ldots, q_n) \quad \textit{s.t.} \quad \sum_{i=1}^{n} p_i q_i = m \quad \textit{and} \quad q_v \leq \bar{v}$$

where q_v is the revered good and v is the socially sanctioned (maximum) amount that can be consumed. Second, the individual's held values might be such that his/her utility would fall in absolute terms if excessive amounts of the revered good was consumed. This corresponds to non-increasing preferences or clear satiation. Third, there could be an abstract "good" within the utility function that is some measure of social standing. If an individual consumes more than a threshold amount of certain goods, the level of this social standing variable will fall. Thus, the individual will be trading off utility from consumption with utility from social standing. All of these cases will present problems for the measurement of willingness to pay and willingness to accept compensation.