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Forest values, perceptions, criteria and indicators, and sustainable forest management in Ontario

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Forest Values, Perceptions, Criteria and Indicators, and Sustainable Forest Management in Ontario

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Sustainable Forest Management through Co-management in North-western Ontario

Project Report:
Forest Values, Perceptions, Criteria and Indicators, and Sustainable Forest Management in Ontario

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1.0 Background (Research Questions and Objectives)

In Canada, the federal government has recognized the active role of Aboriginal Peoples in Sustainable Forest Management (SFM) in the National Forest Strategy and the Canadian Council of Forest Ministers (CCFM) Criteria and Indicators (C & I) of SFM. In 1994, the Ontario Environmental Assessment Board (EAB) directed the Ontario Ministry of Natural Resources (OMNR) to incorporate various conditions related to Aboriginal groups in forest management plans, and these conditions have become the part of the *Crown Forest Sustainability Act (CFSA)* (1995) of Ontario. Section 23 of the *CFSA* provides a legislative basis for the province to enter into co-management with First Nations. In recent years, many decisions in the Canadian courts such as *Sparrow* (1990), *Delgamuukw* (1997), *Halfway River First Nation* (1997), *Haida* (1997) and *Paul* (1998), have also directed the provinces to recognize and protect Aboriginal and treaty rights in their resource development and planning.

In light of these developments, the present challenge to forest managers is to design co-management institutions based on equitable and cohesive relationships with Aboriginal people and the basic principles of SFM. The challenge to forest academia is to take a leadership role in guiding forest managers in this task. In this project, we addressed some of the challenges associated with design of co-management institutions.

The four objectives of this project were (i) to document and compare the economic, cultural, ecological and other values of forests to different stakeholders - Aboriginal groups, other local groups, forest industries, environmental non-government organizations and the provincial government; (ii) to document and compare the perceptions of each group about the forest values of other groups, (iii) to develop a typology of co-management institutions and analyse different Aboriginal co-management institutions in this typology, and (iv) to conduct a gap analysis between criteria and indicators of sustainable forest management and forest management institutions in Ontario. The long-term objective of the project is to develop an institutional framework for designing co-management institutions based on the relationships between the values and institutions of each stakeholder, the relationships of the values of one group to the institutions of another group, and vice-versa, and the associations of these relationships to the elements of SFM.

The key research outcomes of this project include:

(i) A methodology of forest values elicitation was developed and used for the elicitation of forest values of the members of Aboriginal groups, Forest Industry, Environmental groups, and Ontario Ministry of Natural Resources, in north-western Ontario. The same methodology was also used to elicit the perceptions of the members of a group about the forest values of other groups. The methodology is general and can be used in other areas. The results are very interesting and are available at SFMN website (SFM Research Communications, April 2003).

(ii) A methodology for gap analysis between the Criteria and Indicators of Sustainable Forest Management and Forest Management Institutions was developed and used for gap analysis between the Canadian Council of Forest Ministers C & I of Ontario's Forest Management Planning Manual (OFMPM). The gap analysis methodology can be used in other jurisdictions for similar analysis. The outcomes of the gap analysis for OFMPM are alarming and are available at the SFMN website (SFM Research Communications, April 2003).

(iii)An institutional typology for the analysis of co-management institutions was developed, and used to analyse number of Aboriginal Co-management Agreements in Canada. The typology can be used for similar analysis of other co-management agreements.

(iv) An economic analysis, using property rights approach and transaction costs, of co-management institutions was conducted. The analysis demonstrates that co-management institutions, similar to private and public institutional arrangements, may be economically efficient depending upon the socio-economic factors of user groups, and the relationships between the user groups and forest resources. The research outcomes are available at the SFMN website (Working Paper 2002-4).

(v) An economic theory of emerging forest property rights was developed. The main features of the theory are multiplicity of forest attributes, non-market based values of different attributes, production process based value of attributes, and transaction costs associated with different set of property rights. The main argument is that any set of property rights can be economically efficient, and economically efficient property rights will be evolutionary in nature.

(vi) A preliminary framework for social choice approach to sustainable forest management has been suggested, and data collected on forest values was used to developed intra-group aggregation rules. Research work on this component will be continued to develop inter-group aggregation rules and full framework for social choice approach to SFM.

2.0 Summary of Key Research Components

2.1 Elicitation of Forest Values and Perceptions of Forest Stakeholders in North-western Ontario: In order to contribute to the development of a co-management framework, forest values of the members of different stakeholders are identified and compared. Specifically, individuals' personal forest values within each participant group and their perceptions for why they believe their own group and the other groups might value forests are identified and compared. The methodology used is Conceptual Content Cognitive Mapping, 3CM, which allows individuals to identify their values and to share their perceptions of the other groups' values. Participants include members from the forest industry, environmental groups, Aboriginal communities and the Ontario Ministry of Natural Resources. The study area is north-western Ontario, which contains Treaty #3, Treaty #9 and Robinson Superior Treaty areas. Data are analyzed to find the dominant forest value themes through hierarchical clustering, resulting in ten value themes. Subsequently, inter-group and intra-group similarities and differences among the rankings of participants' personal values and their perceptions are determined through various non-parametric statistical tests. The implications of the outcomes, of forest values and perceptions, for sustainable forest management and co-management are discussed.

2.2 A Gap Analysis between C & I of Sustainable Forest Management and Forest Management Institutions: Sustainable forest management (SFM) cannot be achieved just by developing national level criteria and indicators (C &I). An understanding of the gaps between existing forest management institutions and C & I, at the given level, is critical. Hence, a gap analysis framework is developed, and used to analyze gaps between the Canadian Council of Forest Ministers C & I and the provisions of the Forest Management Planning Manual (FMPM) for Ontario's Crown forests. The examination is aimed to establish gaps and highlight forest management planning aspects requiring gap-bridging interventions at the forest management unit (FMU) level. The three levels (parts) of the FMPM - Management

Planning, Annual Operations, and Reporting & Monitoring – are examined. Gaps are categorized in three groups – major, intermediate, and minor gaps. Major gaps are recorded for 5 out of 22 elements of the CCFM C & I framework, and these gaps indicate inadequate prescriptions for the corresponding elements at all the three levels. Minor gaps are also recorded for 5 elements, and these gaps indicate inadequate prescriptions at the monitoring level. Intermediate gaps are recorded for 11 elements, and depending on the specific element and indicator, inadequacy of prescriptions may only be for operations, reporting & monitoring, or may also include the planning level. On the basis of the gap-category of the majority of the elements in a criterion, we are inclined to rank the six criteria in this order - Global Ecological Cycles, Society's Responsibility, Soil and Water Conservation, Multiple Benefits, Biological Diversity, and Ecosystem Productivity (highest to lowest gaps). Hence, reforms in forest management institutions have been good on biological aspects, poor on social aspects, and worst on global ecological cycles. The dominant features of the gap analysis are that none of the six criterion of SFM has been fully incorporated in the FMPM; the Part C (Reporting and Monitoring) has the highest degree and Part A (Plan Contents) has the lowest degree of non-conformity with respect to CCFM C & I framework; at the criterion-level the Global Ecological Cycles has major gaps while three criteria - Soil and Water Conservation, Multiple Benefits, and Society' Responsibility – have intermediate gaps; and the changes in the FMPM have been incremental while the shift in the concept of forest management from Sustained Yield Timber Management to SFM was a drastic change.

2.3 A Multi-level Typology for the Classification and Comparative Evaluation of Aboriginal Co-management Agreements in the Forest Sector: This work addresses the shortcomings that exist in the current collection of classificatory frameworks by developing an alternative, multi-dimensional typology for categorizing Aboriginal-involved co-management arrangements in the Canadian forestry sector. Many valuable elements from existing frameworks are drawn upon, but there is an attempt to both consolidate and move beyond what is currently available, to create a more comprehensive typology than that which is available to date. In addition to the proposed typology, a broad set of inter-category "principles of comparison" and category-specific 'comparative criteria' based on those principles, are developed and the entire framework is used to classify and compare a sample of existing co-management arrangements. The first part consists of a review of the existing literature concerning the co-operative management of natural resources and the range of ways in which co-management arrangements have been classified, which is followed by the presentation of our proposed multi-dimensional typology. In the second part, the typology is applied to a diverse sample of nine different forest resource-related co-management arrangements, selected from different areas of the country. A different set of descriptive and comparative criteria are developed and presented for each general category of arrangement (as outlined in the typology) and these criteria, along with the more detailed levels of the typology, are applied to the selected example arrangements, in order to achieve a more detailed characterization and perform a comparative evaluations of each of the basic types of co-management arrangements. Finally, a discussion of the general similarities and differences between the results obtained for the general categories of co-management arrangements is provided.

2.4 Co-management of Forest Resources in Canada: An Economically Optimal Institutional Arrangement: Co-management, referring to sharing power and responsibility between the governments and local resource users, is usually justified from political and legal perspectives. However, it is also justified from an economic efficiency perspective. Property rights and transaction costs are used in this paper to demonstrate the option of co-management

as a case of Pareto-improvement. Non-pricing of many attributes of forests, high transaction costs associated with delineation of attributes-specific property boundaries to different stakeholders, specialization of different stakeholders in required factors, and user-specific values of different attributes of forests contribute to co-management being an economically optimal option. In Canada, since the early 1970s, the dynamics of values of different forest attributes have called for different property right arrangements: one for increased property rights of Aboriginal people, and another for better defined public rights for environmental and ecological values. These two trends have led to the emergence and development of co-management.

2.5 Economic Theory of Emerging Forest Property Rights: The dominant economic theory argues that the bundles of private property rights will increase as the value of property increases. However, in the recent decades, forest property rights have shown a different trend, the emergence or re-emergence of different forms of community-based and co-management forest property rights with increase in value of forest resources. Economic rational behind these trends is examined. Multiplicity of forest attributes and non-pricing of many forest-attributes, user group specific values of different forest attributes, production or management-process-specific market values of some forest attributes, and high transaction costs associated with delineation of attributes-specific property boundaries to different stakeholders, exclusion of non-right holders, specialization of different stakeholders in required factors, are identified as the main determinants of forest property rights. Evolution of forest property rights in India and Canada is examined. Based on the economic rational and field experiences a new theory of forest property rights is proposed.

2.6 A Social Choice Approach to Sustainable Forest Management: The existing market-oriented valuation techniques for forest states (values), having public good features, are subject to some conceptual limitations. Multiple forest values are closer to the concept of "social states" than the market price or monetary value, and the decisions related to SFM are the decisions of "social choice" and not the decisions to be guided by the conventional benefit-cost analysis, based on monetization of all costs and benefits. A non-market oriented stated preference technique is proposed to identify all forest values, and elicit people's preferences for different forest values. Using this technique, peoples' preferences for forest values are collected from the members of four forest user groups in North-western Ontario. Intra-group preference aggregations are done for the four groups, and inter-group preferences are compared using non-parametric statistical tools. A need for developing context-specific social welfare maximizing inter-group preferences aggregation rules is highlighted.

3.0 Contributions to Improved Understanding and Policy Analysis:

All the components of the study have improved our understanding on different aspects of co-management and sustainable forest management. The improved understanding will be very useful for policy analysis and policy design. Some of the main contributions to improved understanding are discussed next.

3.1 Contributions of the Study on Forest Values and Perceptions

(i) Since ecological, environmental, and spiritual values of forest cannot be measured in monetary terms, forest management objectives can be identified through understanding people's ranking of forest values. Generally, comparable rankings

were found across the participant groups' personal ranking of the value themes. The dominant three value themes that were consistent across the groups were Recreation, Environment, and Spirituality, while Aboriginal Values were included for Aboriginal participants and Economic Impact was included for industry participants. These commonalities are valuable information that can be used to assist in developing a co-management framework. While, organisational values may differ, the similarities across personal values could as a minimum provide a foundation on which to base a discussion.

(ii) In the context of co-management, conflict is inevitable, and results from the study of forest values and perceptions provided insight into the importance of forest values, as they may assist in both clarifying misperceptions of groups and illuminate similarities in values and thus, SFM goals. It is observed that personal values for some participants within a group consisted of the customary values one assumes for them because of their affiliation to that group, however they are ranked different to one's assumptions. Results showed that industry participants ranked Spirituality and Recreation no different than Economic Impact, and Environment was ranked similarly with Societal Benefits. It is evident that values held by the members of the forest industry have evolved, and industry participants and other individuals who are unaware of this progression need to be informed to prevent misunderstanding, and to highlight similar goals. An additional clarification revealed that the majority of Aboriginal participants indicated within their personal ranking of value themes to rank 'clean air and water' with great importance, while participant groups as well as themselves perceive that they primarily want economic development for their communities. Although this claim is not inaccurate, Aboriginal participants ranked Environment similarly to Aboriginal Values and Economic Impact was ranked second with Spirituality and Recreation. This is indicative that Aboriginal People are not as economically oriented as everyone perceives. In addition, the study revealed similarities between OMNR and ENGO participants' personal ranking of the value themes, which neither group may be aware of this.

(iii) Differences also existed when comparing each participant group's perceptions concerning the ranking of the value themes, and that group's personal rankings. For instance, perceptions regarding the ranking of OMNR's forest value themes consisted of both Economic Impact and Societal Benefits being ranked first across all groups, contrary to OMNR participants' personal rankings which consisted of Spirituality and Environment being ranked first. Comparable results were found with the other groups. Participants seem to base their perceptions on stereotypes of that group or misperceived notions that are possibly shaped from working or interacting with one another. Results from participants' perceptions indicated that for each group the two eminent value themes were similar across the perceptions, however, these differed with participants' personal values.

3.2 Contributions of the Study on Gap Analysis between C & I and Forest Management Institutions:

(i) Twenty-one elements, out of twenty-two, spread over all the six criterion have some degree of gap, and this means that none of the criterion of SFM is being fully incorporated in forest management. Hence, the Canadian goal of SFM is far from sight.

(ii) The Part C (Reporting and Monitoring) of the FMPM has the highest degree and Part A (Plan Contents) has the lowest degree of non-conformity with respect to CCFM C & I framework; while the degree of non-conformity in Part B (Forest Operations) is in the middle. The Parts A, B and C have adequate prescriptions for twelve elements, six elements and only one element respectively. This means that prescriptions in Part A have not been followed through Part B and C, and the government should make special efforts to develop forest management planning manuals which enforce consistency in three stages – planning, operations, and reporting and monitoring.

(iii) On the basis of the gap-category of the majority of the elements in a criterion, the six criteria can be grouped in the same three categories – criterion with major, intermediate, and minor non-conformance. Based on this, the criterion of the Conservation of Biological Diversity and Ecosystem Condition and Productivity will fall in to minor category because two elements, out of three, are in the minor-gaps category. This means that the FMPM has been better on biological aspects of management. The Criterion of Global Ecological Cycles will fall in the major category because three elements out of five are in the major-gaps category. This criterion has not been dealt adequately at any level, and requires special attention from policy makers. The remaining three criteria - Soil and Water Conservation, Multiple Benefits, and Society' Responsibility – will fall in the intermediate category, but in the terms of conformance in Parts A, B, and C, the situations are different for these three criteria. All the five elements of the criterion of Society's Responsibility have non-conformance at all three-levels (Part A, B, and C), which indicates that this criterion has not been taken seriously even at the Management Plan level. But, all the four elements of the criterion of Multiple Benefits have non-conformance only at two-levels (Part B and C). Hence, the prescriptions related to this criterion required at the management plan level have not been followed through at operational and monitoring level.

(iv) In terms of degree of gaps, we are inclined to rank the six criteria in this order - Global Ecological Cycles, Society's Responsibility, Soil and Water Conservation, Multiple Benefits, Biological Diversity, and Ecosystem Health (highest to lowest degree of gaps). Hence, reforms in forest management institutions have been good on biological aspects, poor on social aspects, and worst on global ecological cycles.

(v) The most critical result of this study is that there are huge gaps between the existing forest management institutions and C & I, which clearly indicates that C & I are not being transformed into management practices. Hence, it is necessary for all the provinces in Canada and other countries, aiming for SFM, to initiate similar gap analysis at the FMU level. The gap-analysis framework and analytical procedure of the study can serve as guiding tools for scaling national C & I to sub-national levels; analyzing institutional arrangements for the implementation of C & I; analyzing gaps for the purpose of improvement of policy and management practices; and increasing efficiency of data gathering and aggregation. The framework, used in this study, is flexible and can be used at any scale – local, provincial, and national. However, we have used only the horizontal component of the framework, but the outcomes clearly prove the utility of the framework. Outcomes demonstrate the need of scaling C & I from the national level to the FMU level and hence the utility of vertical component.

The outcomes also demonstrate the need of comprehensive forest management institutional reforms to incorporate all the elements of C & I.

3.3 Contributions of the Study on Multi-level Typology and Its Use in the Analysis of Aboriginal Co-management Arrangements:

(i) Co-management arrangements which stem from the settlement of Comprehensive Claims are constitutionally protected and extremely comprehensive in their coverage, often including renewable and non-renewable resources, as well as economic and social development-related projects. In contrast, the terms of crisis and policy-based co-management arrangements are not subject to such strong legal protection, nor are they as comprehensive in their coverage. Due to their urgent nature of the circumstances under which they tend to be negotiated, crisis-based co-management arrangements tend to be relatively ad-hoc and temporary in nature, although their terms are often subject to renewal. Policy-based co-management arrangements tend to be associated with greater legal and temporal security than crisis-based arrangements are, as they are often supported by general legislation. Both types of co-management arrangement are considerably less wide-ranging in their coverage in comparison with those stemming from Comprehensive Claims settlements and they often focus specifically on forest resources.

(ii) In relation to the "level of participation" classification scale, the Comprehensive Claims-based co-management arrangements are relatively similar to one another. In contrast, both the crisis and policy-based arrangements evaluated, exhibit a considerable degree of variation in relation to the level of Aboriginal participation.

(iii) There is some variation both within and between the three basic types of co-management arrangement, in relation to the extent to which Aboriginals are involved in the full complement of management stages covered under the "management scope" classification scheme. All of the Comprehensive Claims-based arrangements evaluated contain specific commitments with regards to the involvement of Aboriginals in management planning. While the commitments regarding participation in operational and manufacturing activities are comparatively vague, participation in the full scope of activities is possible under the general economic development-related provisions contained in the different agreements. Like the Comprehensive Claims-based arrangements, two of the crisis-based examples evaluated include specific commitments regarding involvement of the respective Aboriginal parties in management planning, while general pledges relating to economic development could enable Aboriginal participation in any or all of the operational and manufacturing activities included in the "management scope" classification scale. However, in its narrow focus on the development of general guiding objectives and a vague commitment concerning the facilitation of economic development-related activities, one of the examples can be viewed as an exception to this pattern. The specific pattern of variation in relation to "management scope" exhibited by the policy-based arrangements evaluated, is somewhat similar to that observed amongst the crisis-based examples.

(iv) Other important similarities and differences between the three different catalyst-defined types of co-management arrangement, can be summarized as follows**.** In

relation to the "scope and content of management objectives" criterion, the scope of the management objectives formulated under Comprehensive Claims-based arrangements, are consistently broad, while both the crisis and policy-based arrangements range from broad to relatively narrow in scope. In terms of content, most of the guiding objectives developed under the examples evaluated, relate to the general ecological, economic and social goals of the participating parties and include commitments "conservation" and "sustainability" concepts. In terms of the "protection and incorporation of Aboriginal values and knowledge" criterion, all of the co-management arrangements evaluated include some provisions for the identification and incorporation of Aboriginal values. There is some between-arrangement variation in terms of whether there are any provisions concerning the incorporation of Aboriginal knowledge, however this variation appears to be independent of the catalyst-based categories.
The results of the application of the "support/involvement of external authorities" criterion, exhibit a high degree of variation amongst all of the co-management arrangements evaluated in a number of respects, including whether the authorities in question are influential in the development, implementation stages, or have leant their general support in reaction to a given arrangement, as well as the nature of the external parties themselves (i.e. governmental or non-governmental bodies, local or international in scale). This variation appears to be unrelated to the initial impetus for the development of the co-management arrangement. In contrast, a comparison of the "conflict resolution mechanisms" associated with the different co-management arrangements, yields substantial differences between the different catalyst-based categories of arrangement. While all of the Comprehensive Claims-based arrangements contain detailed provisions for the establishment of dispute resolution mechanisms, similar mechanisms amongst crisis-based arrangements are not always clearly defined, although they generally appear to be less complex. And finally, none of the literature available concerning the specific policy-based arrangements evaluated, includes discussion of formalized mechanisms or processes for the resolution of conflicts. With the exception of the funding of the operations and activities of the different co-management bodies, the results of the application of the "economic inputs and returns" criterion are generally similar. The differences that do exist appear to be independent of arrangement type.

In contrast, the "inclusion of external stakeholder concerns" criterion exhibits considerable variation between the different types of co-management arrangements. Specifically, detailed provisions concerning the consideration of the opinions/values of parties external to the agreements, are relatively uncommon amongst Comprehensive Claims-based arrangements, while amongst crisis-based co-management arrangements, the priority placed on the inclusion of external stakeholders' concerns ranges from none to relatively high. In contrast, although the relative emphasis placed on third party interests varies, all of the policy-based arrangements evaluated contain commitments to solicit and incorporate external stakeholder concerns as part of the forest management planning process.

(v) The "degree of legal protection and temporal security" criterion was only applied to the crisis and policy-based co-management arrangements, as the Comprehensive Claims- based arrangements are defined in terms of the constitutional protection and practical permanence associated with them. Both crisis and policy-based co-management arrangements are associated with considerably less legal and temporal

security than arrangements established as a result of Comprehensive Claims settlements. That having been said, there are also considerable differences between the two categories of arrangement. Specifically, although subject to renewal, agreements associated with crisis-based arrangements are highly time-limited (generally under 10 years in length) and while the terms of some examples are legally binding, most are not. In contrast, although the examples stemming from government-based policy initiatives have initially been implemented on a trial basis, the temporal commitment associated with them will eventually extend beyond 20 years. There appears to be no specific time limits on the example stemming from industrial policy and along-term commitment to the co-management arrangement established, has made by the industrial party. Additionally, although the legal nature of the policy-based arrangements is often not explicitly stated, both of the arrangements established as part of government policy initiatives are protected to some degree, by the legislation that accompanies the respective policies. The degree of legal protection accorded to the industry-based co-management arrangement, is not clear.

(vi) A further criterion that was considered for application to the different types of co-management arrangements, was the "diversity of products collected or produced". However, because of the almost universal focus of all of the co-management arrangements on traditional, wood-based forest products (with the possible exception of the value-added wood products produced by the Esketemc First Nation and the inclusion of hunted and trapped wildlife species as forest-related resources under some of the Comprehensive Claims-based arrangements), this criterion was not applied. The sustainable use of forest resources, such that the long-term health of the forest ecosystem is protected while the economic needs of the interested parties are met, is at least somewhat dependent on the adoption of a diversified approach to both the items collected/harvested and the final products that are produced from these items, whether they be for community use or commercial sale. It is also reflective of a wholistic perspective of the forest ecosystem on the behalf of parties involved in the co-management arrangement. The lack of diversity observed amongst the different types of co-management arrangements, is indicative of the persistence of a relatively narrow, timber-defined conception of forest resources and products.

3.4 Contributions of the Studies on Property Rights

(i) Forests are a complex of multiple attributes with private, public, and common pool good characteristics. Some of those are traded in the market and others are not. Change in relative values of different attributes will mean the change in relative importance assigned to different attributes by the concerned groups, and not necessarily change in market prices. The changes may be due to market forces as well as environmental and social awareness, court decisions, and international conventions or agreements. An increase in value of a given attribute will not always mean increase in private property rights, but it will mean increase in specification and clarification of property rights for that attribute. Generally, increase in the value of a private good attribute will lead to increase in private rights, while increase in the value of public or common pool good attributes will lead to an increase in public or communal rights, respectively. However, simultaneous increase in the values of the private, public, and common pool good attributes may lead to co-management rights.

(ii) With increased scarcity, dynamics of property regimes may be in any direction i.e., from state to private property or from private to state or co-management rights.

(iii) Any property regime, including private or co-management, will not be efficient in all situations. The efficiency of a property regime will depend upon transformation costs as well as transaction costs. The optimality of a property regime is also not a static outcome, and optimal property regime will evolve along the changes in relative values of different attributes of a resource, changes in relative preferences of different stakeholders for different attributes, as well as changes in population, local economy, and some other factors.

3.5 Contributions of the Study on Social Choice Theory

(i) The concept of sustainable forest management is a social response to economic (including market), social, environmental, and Aboriginal signals prevalent during the last twenty to thirty years. Market-oriented valuation techniques and conventional benefit- cost analysis have no mechanisms or tools to aggregate non-market signals and non-monetary measures, respectively. The economics of a market agent (selfish-individual) is based on individual-centered preferences termed as Prisoner's Dilemma preferences by Sen. However, in the situations where the outcome depends on the actions of other people in addition to one's own action, PD preferences will result in social disasters, and calling such actions and preferences rational is equivalent to Sen's rational fools. Sustainable Forest Management, due to its focus on forest attributes having public good characteristics, is a very good example of such situations. Hence, the SFM paradigm requires a movement from the economics of "rational fools" to the economics of "socially rational citizens".

(ii) A non-market oriented stated preference technique, to identify all forest values and individual's preferences for those values, externalizes the forest values important to the members of user groups from the forest management. Externalization eliminates irrelevant forest values (states) and incorporates all relevant states. Ordinal preference ranking makes valuation possible without monetary measure or market-orientation. A new method, for intra-group aggregation of preferences based on statistically significant differences among preferences for different forest values, provides many interesting results. The inclusion of Recreation, Environment, and Nature in the first two ranks by all the groups provides valuable information that can be used in inter-group preference aggregation. Some unexpected preference patterns of different groups, for example industry participants' ranking of Nature and Recreation with Economic values, Environment with Societal values, Aboriginal peoples ranking of Environment with Aboriginal Values, Economic with Nature and Recreation, the OMNR participants' ranking of Environmental and Nature values on the top rank, and ENGO members' ranking of Aboriginal values as the last rank, will be very useful in inter-group aggregation. Similarly, many interesting outcomes from inter-group comparison, such as, no significant differences (NSD) between the rankings of ENGO and OMNR for all ten forest values, NSD between the ranking of ENGO, OMNR, and Aboriginal people for Economic values, and NSD between the ranking of all the four groups for Tourism and Educational values, will be extremely useful for inter-group aggregation.

(iii) One of the limitations of the preferences presented in this study is that these preferences are of individuals, who are working in the organisation, and are not the preference of the organisation or group. Hence, a study of organizational preferences will be necessary and critical for designing inter-group aggregation rules.

(iv) Designing inter-group preference aggregation rules is a challenge to resource economists as well as resource managers. In fact, universal inter-group aggregation rules for SFM may not be desirable or even possible. However, from a distributional perspective (and even from Maxmin criteria), treating the first preference of all the user groups, irrespective of the preferences of other groups for those values which are ranked first by at least one group, may be the most desired aggregation rule, and we call it First-Equal Criterion. This criterion may be treated as a starting point, and analyses of aggregation rules used by different forest or other natural resource user groups in different countries and states should be used to develop aggregation rules for SFM as well as their theory. In addition, further study of "others-related (OR)" preferences of the members of different user groups will also provide useful inputs for aggregation rules. In view of these findings, we put a call out to forest economists to move away from the economics of "rational fools" and devote their valuable time to develop a full fledged theory and application tools of social choice relevant to SFM.

4.0 Follow-up Research

The methods and data used in this research provide many excellent and note-worthy results, but since this was almost an exploratory research, there is much that can be further examined and researched. The most important outcome from this perspective is the beginning of the research on Social Choice Approach to Sustainable Forest Management. This aspect has to be pursued further for the real understanding and developing non-market based decision making tools for sustainable forest management. Second, an understanding of forest values and perceptions of different stakeholders is necessary for designing SFM institutions. Hence, similar research should be conducted in all other areas. Third, as mentioned in the objectives, the research should be continued on developing an institutional framework for co-management which incorporates forest values of all the stakeholders, local institutions (informal norms, behavioural codes etc) and C & I of sustainable forest management. Fourth, the main issue that came up during our surveys with Aboriginal groups was the recognition of Aboriginal rights and main features of Aboriginal tenures. Hence, future research should address these issues.

5.0 Participating Partners and Affiliates:

National Aboriginal Forestry Association (NAFA), Nishnawe Aske Nation (NAN), Treaty Council # 3, Weyerhaeuser Canada, Bowater, KBM Consultants, and CFS/NSERC/SSHRC Partnership Program.

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7.0 Publications, Posters, and Presentations:

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