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Participatory Management In The Canadian Oil Sands

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Large-scale developments in the Canadian Oil Sands Region conflict with Aboriginal land-use. To understand the urgency of concerns voiced by Aboriginal communities we measured the rate of land cover disturbance. In a 30,000km² area, almost half of the land that is used by Aboriginal communities is within 250m of an industrial feature. At the current rate of development, the remaining land > 250m from an industrial feature will vanish by 2060. We reviewed the EIA process on its ability to plan for industrial impacts on Aboriginal land-use. Current scoping for EIAs does not allow for community participation in identifying environmental and social concerns. Community concerns are only addressed in EIAs that result in the proponent making commitments to find resolutions during follow-up phases. However, follow-up programs typically lack scientifically testable targets to measure the effectiveness of mitigating the impacts on Aboriginal land-use. Governments are now inviting Aboriginal communities to contribute to regional planning.

Introduction

After Saudi Arabia, Canada's oil reserves are the largest in the world. Developments in the Oil Sands Region of Alberta are based on approximately 1.7 trillion barrels of bitumen, of which 173 billion barrels are proven reserves recoverable with current technology (Government of Alberta 2007). The oil sands land area is about 140,000 km². Numerous Aboriginal communities exist within this area; some remain largely dependent on the local ecosystem.

To many of these communities, natural landscapes are seen as the source of essential ecosystem services that are required to sustain societal development and progress (Folke et al. 2003). Changes to the ecosystems likely result in changes of the services which, in turn, can result in cultural impacts to the societies that depend upon them. In a recent study we found that in our 30,000km² project area within the oil sands region, almost half of the land used by Aboriginal communities is within 250m of an industrial feature (Komers and Stanojevic in prep). At the current rate of development, the remaining land >250m from an industrial feature will vanish by 2060. Communities are concerned about how natural and traditional resources will be sustained for future generations.

Impact assessments (IA) are an environmental management tool that should assure local communities that potentially significant impacts from a planned project have been identified (Wood 2003). The term IA denotes the entire process, from scoping to environmental impact assessment (EIA) and follow-up. In the Oil Sands Region of

Alberta, the IA process is applied to protect the environment and local communities from environmental degradation (Alberta Environment 2004). However, this process is increasingly complex and requires the integration of science into management. The application of science should assist communities to understand environmental change and to manage it. Here, we review how scientific rigor is implemented in the assessment process of oil sands development. We start with the premise that predictions made in an EIA should be testable and should lead to environmental monitoring that tests the predictions in a scientifically rigorous manner.

In the spirit of participatory management that integrates science and community concerns in decision making, we assess the role of Aboriginal communities in the IA process. Scoping should lead to the design of EIAs that alleviate potential impacts on the resources that are fundamental to the culture of Aboriginal communities. Subsequently, monitoring should include testable questions that are formulated by the communities to assure them that mitigation measures are effective. Successful mitigation is the quintessential foundation of a greener future that balances intensive industrial development with the continued use of culturally significant natural resources.

Review Methods

We reviewed 72 environmental planning documents related to wildlife and vegetation ecology that were provided to government regulators between 1999 and 2008, approximately 7,000 pages of information in total. All of the reviewed documents were prepared for bitumen extraction projects in the Canadian oil sands region.

Documents were categorized into one of the three phases of the IA process: 1) Scoping phase (ToR = terms of reference); 2) Environmental Assessment phase (EA = environmental assessment of small projects / EIA = comprehensive environmental impact assessment of larger projects); and 3) Follow-up phase (C&R = conservation and reclamation plan / Monitor = monitoring reports).

Our reviews were conducted as they would be for any peer-review of a scientific manuscript. Firstly, for each phase, we assessed how well the methods were described and whether objectives were clearly stated, we evaluated the soundness of interpretations and the conclusions, and we determined whether the information provided is adequate for environmental protection. We also analyzed the quality of the data, trends and confidence limits, and results of statistical analyses (if present). For issues related to follow-up programs we looked for the use of before-after and control-impact comparisons (BACI; Smith 2002), the application of targets, definitions of mitigation success, and the development of testable predictions and questions (Burns & Wiersma 2004).

We then examined each document for evidence of Aboriginal community involvement in the IA process. We also looked at how science was used to address community concerns. In the ToR, we focused our questions on whether or not the description and quantification of traditional resources (TR) was required. In the EIA phase we asked whether TRs were described in the baseline data and whether impacts on TRs were predicted. In C&R plans we looked for detailed methods for re-establishing the TRs. In the monitoring reports we asked whether the success of re-establishing TRs

was monitored with statistical rigor and whether the benchmarks and targets were set to reflect community concerns.

For each document reviewed, we assigned a value of 1.0 if we were satisfied with the information provided and a value of zero if we were not satisfied. We assigned a value of 0.5 if some aspects of the review, but not all, were satisfactory. For example, we were satisfied (rating 1.0) when baseline data, including visible trends, the variation or confidence limits, and the statistical power of the analyses were provided. We were partly satisfied (rating 0.5) when means and measures of variation were provided, but statistical tests were either absent or incorrectly applied. We were not satisfied (rating zero) when none of the above were provided.

Regulators in Alberta influence the IA process by providing two types of documents: Decision Reports and Approvals. Decision Reports are developed by review panels to communicate recommendations to federal or provincial Environment Ministers. Approvals contain the terms and conditions under which a proposed project will be allowed to operate. We assessed both types of documents based on how they deal with scientific rigor and the concerns of communities. The approval phase documents are qualitative and general. We therefore used simple indices such as number of recommendations and number of pages to evaluate their sophistication and detail.

Results of Scoring

The overall low scores suggest that pre-disturbance conditions are not rigorously quantified, targets for mitigation are not clearly defined in C&R plans, and the success of re-establishing vegetation and wildlife communities is not objectively tested in monitoring programs. We think that the low scientific rigor of the IA process in the oil sands region is largely responsible for the absence of successful reclamation programs (Johnson and Miyanishi 2008).

Our results indicate that the ToR were given a higher rating significantly more often than EAs, EIAs and C&R plans (Kruskall-Wallis pair-wise comparisons (Siegel and Castellan 1988), $p < 0.05$, Figure 1). Monitoring reports were ranked similarly to ToRs, indicating that both these types of documents were, on average, partly satisfactory (mean rating score was 0.37 for ToRs, and 0.25 for Monitoring; by comparison, the means were for: EA=0.03, EIA=0.14, C&R=0.12).

Scoping Phase

The ToR were often partly satisfactory because quantitative assessments were generally requested by Regulators. However, we could not assign a higher rating because the ToRs often fell short of requesting specific data to address specific questions for ecological parameters. Moreover, details about analytical approaches or parameter selection for traditional resources were not requested.

Some ToRs required that the reclamation progress be measured. Again, however, these requirements fell short of asking for specific methodology or requesting that testable questions and targets for reclamation be developed. Typically, ToRs only asked for a conceptual description, giving the proponent the freedom to decide how detailed

the reclamation and monitoring programs should be. Consequently, by the time the details of monitoring are being developed, pre-disturbance conditions often no longer exist.

EIA phase

The ToRs requested, in general, the application of quantitative analyses to be included in the assessment. For example, the term "*discuss initiatives, to enable quantitative estimates of future conditions with the highest possible degree of certainty*" was often specified in the ToRs. However, quantification in EIAs was rare. Overall we found that EAs are essentially devoid of adequate baseline data for the application of benchmarks and targets in follow-up programs. The comprehensive EIAs sometimes presented satisfactory baseline surveys; however, the methods were typically inadequate to determine how models were developed, what assumptions they were based on, or what the unit of replication might be for any of the rarely applied statistical tests.

Follow-up Phase

We were not satisfied with the use of baseline data in most of the C&R Plans or the Monitoring Reports we reviewed. Most C&R Plans did not refer to baseline or pre-disturbance data and did not show concrete methods for the sampling design or statistical analyses. Monitoring reports rarely demonstrated any quantitative comparison between pre- and post-disturbance conditions in vegetation, wildlife, or traditional resources. However, the Monitoring Reports were more likely to include quantitative analyses and models than did any of the documents in the earlier phases of IA (Figure 1). Where quantitative comparisons between impact and control sites were presented, statistical analyses, if applied, were rarely rigorous. Moreover, data were seldom compared against targets and benchmarks.

Aboriginal Community Participation

We were partly satisfied with the requirements in the ToRs for identifying and reporting community concerns. However, ToRs did not specifically ask to address these concerns in the assessment, mitigation, or follow-up phases. The focus was often on involving communities, but not on providing solutions for their concerns. A serious flaw of this process is that the collection of information about community concerns is a part of the EIA phase, as opposed to being a precursor to it. If communities had meaningful input during scoping, the proponents would develop the EA or EIA based on the concerns raised by communities. This way, communities would be part of strategic decision making.

There were several instances where an EIA presented findings from public consultation sessions leading to commitments for cooperation with communities in the future. However, a more productive, interactive, and timely method for community participation would be to present concerns as a list of questions in the EIA, followed by

answers attempting to resolve these concerns. This method was not used in any of the IA phases we reviewed. While wildlife species and vegetation communities were usually described, no direct link to traditional resource use, predictions of impact on that use, or mitigation of impacts were apparent in any of IA documents.

Currently, community concerns can only be fully addressed during follow-up programs, but we found no evidence in C&R Plans that questions would be developed to test whether or not the community concerns would be alleviated. Monitoring Reports occasionally presented actions that were taken towards understanding traditional resource use, but we found no evidence that the effects on traditional resources were specifically measured.

Approval Phase

In Decision Reports, there was a significantly increasing trend for the number of explicit recommendations to the Environment Minister between 1999 and 2007 (Figure 2). This was true for both the number of recommendations that address actions to manage ecological parameters (Spearman rank correlation $r_s=0.73$, $p<0.05$), and the number of recommendations that address monitoring which must involve "stakeholders" (including communities) ($r_s=0.95$, $p<0.02$).

Recent Approvals list more conditions (i.e. pages) than earlier ones, clearly reflecting the increasing complexity of the issues in the decision process ($r_s=0.87$, $p<0.02$). It was striking, however, that even though the number of conditions increased, they did not become more specific over time. For example, more recent Approvals require the developer to "*address vegetation and traditional land use*" but they do not define what is meant by "*address*." There are no targets prescribed for reclamation of ecological constituents, let alone for traditional resources. There was also no evidence that proponents would be specifically required to quantitatively measure the success of the proposed mitigation measures.

Conclusions

In ensuring a greener future for Aboriginal communities, the IA process in the oil sands is weak in two ways: not only is there a poor quantification of impacts and mitigation success, the Aboriginal communities are not explicitly involved in strategic decision making. However, in the course of the past ten years, regulators seemed to have heard concerns and have responded with increasingly complex decision and approval documents. It remains to be seen if the regulatory process will continue evolving to eventually fully integrate the concerns of Aboriginal communities.

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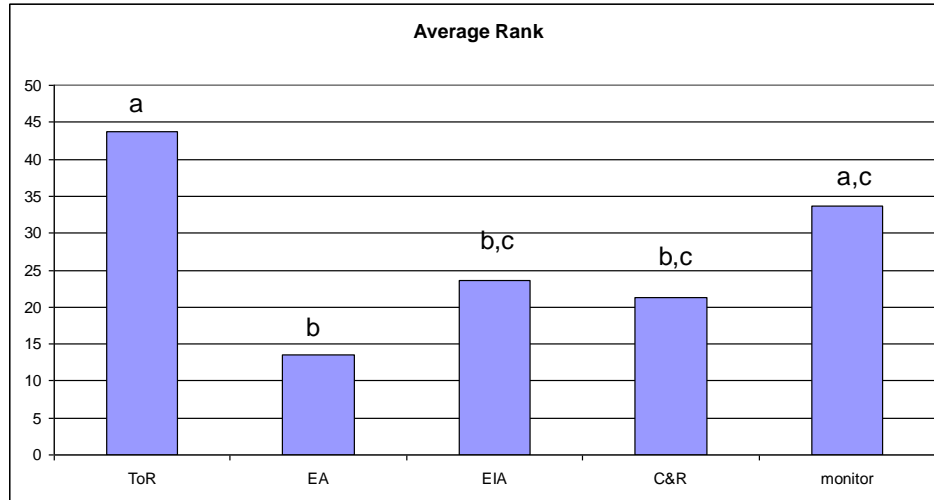


Figure 1: Average ranks of each of five document categories of the impact assessment process in the Oil Sands. Bars not sharing same letters are significantly different from each other, indicating that, for example, reviewers were consistently more satisfied with the ToR than either with EAs, EIAs, or C&R. Sample sizes are 10 documents reviewed for each category except for EIA where 13 were reviewed.

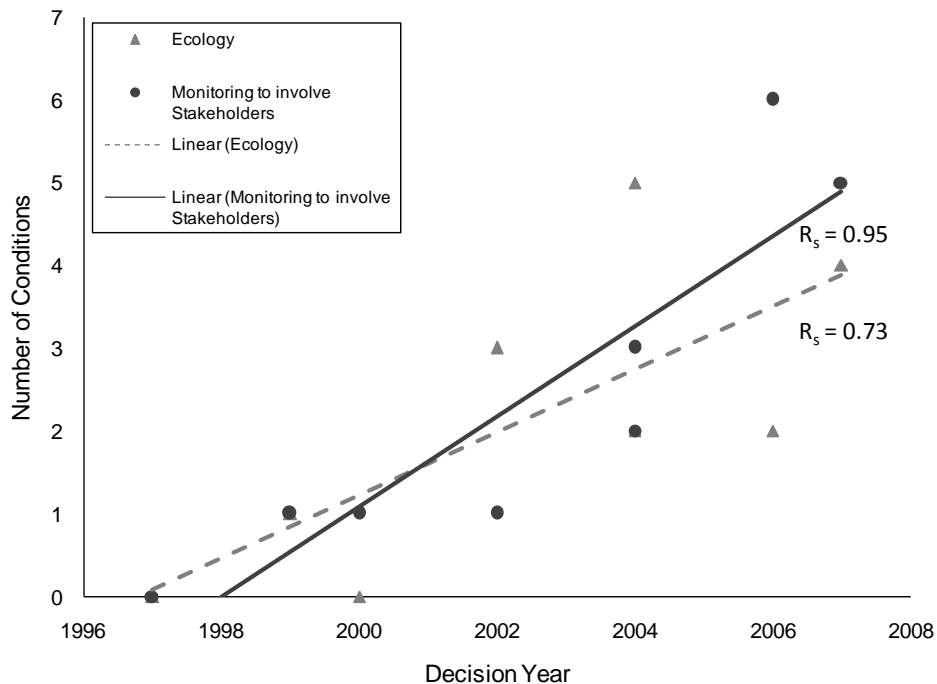


Figure 2: The number of conditions explicitly listed in Decision Reports on proposed industry projects in the Canadian Oil Sands. Circles and full line indicate the number of conditions that specifically require stakeholders to be involved in

monitoring. Triangles and dashed line indicate the number of conditions that specifically mention ecological parameters that must be addressed by the projects.