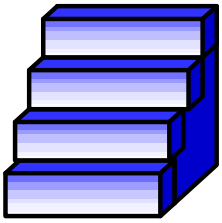
4.0 Challenges Facing Implementation of CEA



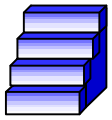
Most Alberta cumulative effects assessments have been conducted to support a proponent's application for approval to build a particular project and the bulk of this report has focussed on practices and limitations of project-specific CEAs. Although practice has been improving generally over the past few years, much more can be done to realize CEA's potential for helping evaluate impacts and planning future management options. Broadly speaking, the issues can be divided into two categories: systemic challenges and approaches to current practice. Challenges which extend beyond the assessment method itself are discussed in Section 4.1, Systemic Challenges. Challenges related to approaches taken by proponents and practitioners when conducting a specific, project-oriented cumulative effects assessment are discussed in Section 4.2, Approaches to Current Practice.

4.1 Systemic Challenges

Systemic approaches are directed more towards overall environmental management as it relates to CEA and include improvements in:

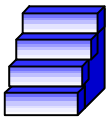
- regional databases, their understanding and use;
- definition of the purpose and content of CEAs;
- integration among regional, sectoral and project-specific management; and
- establishing of thresholds.

4.1.1 Regional Data and its Interpretation



A major challenge facing regulators and proponents alike is the lack of sufficient data on baseline and regional conditions. In addition, knowledge of complex environmental interactions is still somewhat limited. Apart from the need to understand more about how things work, improved access to information is required. Data deficiencies detract from the accuracy of any cumulative effects assessment, regardless of the purpose for which it is conducted. Practitioners can create models which attempt to portray or approximate reality, but model outputs are only as good as the data and assumptions used to create them and they require constant updating and verification by field data to prevent misinterpretation of reality. Developing accessible regional databases would enable practitioners to produce better, more useful CEAs.

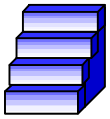
4.1.2 Defining a CEA's Purpose and Content



As noted in Section 1.0, although definitions of CEA abound, none provide a good operational definition of cumulative effects assessment. Moreover, Alberta regulators have yet to issue guidelines which might give some direction to proponents and practitioners. Given the present degree of uncertainty in terms of what a CEA should contain and what constitutes preferred or acceptable approaches, it is not surprising that current practices show considerable inconsistency from case to case. A clear statement of a CEA's purpose as a set of tools which assist in planning for and making decisions about future management practices would aid in improving practice. A straightforward description of what type of information is required would also be helpful. Proponents and practitioners would welcome a simple analytical framework, one which could be applied to both EIAs and regulatory review of other developments in a region, and be applied by both large and small companies.

Another challenge is to ensure that terms of reference are clearly expressed, in order to provide sufficient detail without fettering the regulator's discretion or constraining the proponent's innovation. Terms of reference are used to clarify CEA requirements but they rarely detail specific items to be considered in a CEA. Understandably, regulators do not wish to fetter their discretion by prescribing precise approaches and methods to be used by proponents when applying for project approvals. Unfortunately, some stakeholders have developed exaggerated expectations for cumulative effects assessments. Such expectations exceed the technical capabilities of most current CEAs as predictive tools. These expectations also often extend beyond the scope of current assessments by looking to CEAs to resolve conflicting resource uses such as traditional land use, silviculture and forest products development and hydrocarbon exploration and development. Furthermore, interveners in formal proceedings occasionally attempt to use CEAs to increase regulatory scrutiny of proposed projects and to raise philosophical differences about the acceptability of certain types of projects, subjects which are more appropriately addressed by the political process.

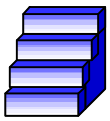
4.1.3 Integrating Regional and Project-Specific Management



The objective of achieving sustainability presents a primary challenge for environmental management both at the regional level and at individual development sites. Cumulative effects assessments can muster an impressive array of tools to address sustainable development issues at any level. In particular, its very nature makes CEA irreplaceable when bridging the gap between site specific and regional management. Cases in which regulatory approval is sought for a single project, cases in which a single project application triggers a regional development review (Monkman) and cases in which regulators initiate an information gathering process solely for regional planning purposes (NRBS) can all employ CEAs to good effect. As Hegmann and Yarranton point out (1995):

> Cumulative effects assessment, idealized, implies the eventual recognition of a qualitative or quantitative level of sustainability against which impacts can be compared to determine if incremental impacts are acceptable.

The dominant purpose of any given case drives the process design. Project-specific approaches focus on potential project effects and how they will impact the environment. Regional planning exercises focus on characteristics of the environment and what level of development it can support. Each has advantages, but the project-specific approach may not adequately capture the complexity of environmental interactions between a number of activities in the region, whereas an assessment designed for a regional planning exercise is unlikely to be sufficiently specific to evaluate individual project proposals.

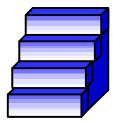


A significant challenge facing project or resource management in Alberta is the task of integrating project-specific assessments, including consideration of cumulative effects, with regional policies, plans and management. A systematic process providing integration at the provincial level would substantially improve the practice of CEA and the implementation of consequent decisions. Without such integration, complementary contributions from both assessing project-specific effects in a regulatory context and managing them in a broader context will not be fully realized. Proponents, practitioners and the public are likely to become sceptical about the value of project-specific CEAs, and Alberta will not receive the full benefit of the assessment process.

Considerable debate has centered on who should take responsibility for conducting CEAs. Again, the primary purpose of any given case drives the process design and helps point to who should be responsible. Typically, primary responsibility for assessment design and execution rests with the proponent in a project approval exercise and with government in a regional planning exercise. Governments have imposed substantial responsibility on industry participants in cases in which they stand to gain direct benefits from regional resource exploitation. Assessment responsibility should follow management responsibility.

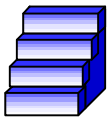
Still, the real question remains: how should project-specific cumulative effects information be integrated with regional planning exercises such that Alberta develops an effective capacity to respond to and manage regional cumulative effects? Developing such a capacity will require research, monitoring programs, integrated management and planning initiatives, and systematic evaluation and feedback loops to demonstrate that management actions continue to be reasonable and necessary as well as effective and enforceable over a period of time.

4.1.4 Thresholds



In weighing the net environmental, biophysical, social and economic costs and benefits of a development, regulators are faced with the challenge of making decisions in the absence of clearly defined goals, standards or thresholds. It is a challenge which faces environmental managers everywhere, not just in Alberta.

A key part of this challenge is the lack of — and difficulty of establishing — definitive goals for most biological resource groups such as soils, vegetation, aquatic ecosystems and wildlife, and for human pursuits such as recreation and traditional use. Water and air quality data, on the other hand, have been collected by industry and government for some time. Sophisticated models have been developed and tested to quantify and predict changes in specific parameters such as air quality and groundwater flows. In some cases, model outputs have been extensively tested in terms of implications for human health, effects on vegetation and soils and changes in aquatic ecosystems. Objectives and guidelines for air and water quality are based on this extensive body of data and some agreement has been reached on what constitutes an acceptable level of effect.

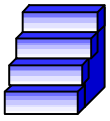


A major challenge is establishing the ability to develop and refine accepted goals for environmental quality and minimum criteria for a cumulative effects assessment with respect to most biological resource groups. Ideally, the goals would be comparable to those set for water quality, air quality and some human health parameters. Granted these latter parameters are more straightforward than complex biological interactions, but many practitioners feel that thresholds are essential. Eccles et al., for example, took the view that planning without a target is somewhat ineffective (1994, page 195):

> Regional thresholds for specifying acceptable habitat availability must be established for key wildlife species based on sound biological knowledge to permit the cumulative effects of oil and gas activities to be monitored and safely accommodated within the region of interest. These thresholds can then be used to develop land use guidelines for industrial development.

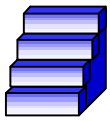
4.2 Approaches to Current Practice

4.2.1 Issue Identification



CEAs conducted to support applications for project approval currently focus primarily on the effects of the proposed project in combination with those of other large projects in the surrounding region. However, future trends may be more important than any one single project. Furthermore, smaller projects and dispersed human activities may affect some regional resources substantially. For example, forestry or agricultural operations can contribute significantly to regional cumulative effects, and increased fishing or hunting pressure may result from the proliferation of new linear access routes. Identifying issues with respect to future trends, smaller scale projects and dispersed human activities is needed to avoid progressive “nibbling losses” or the “death of a thousand cuts” in a region. This challenge may be more relevant to regional management than to project-specific regulatory reviews.

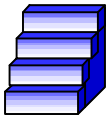
Another challenge evident from the 19 projects reviewed is identifying issues on the basis of common effects. It is the combined effects of various aspects of development on ecological systems and human health which ultimately matter. Practitioners must learn to look first at regional effects and second at professional disciplines. For example, if habitat fragmentation is occurring due to many dispersed developments, practitioners need first to look at the issue (fragmentation) and then to evaluate how fragmentation affects each discipline (vegetation, wildlife, biodiversity and resource use).



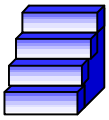
4.2.2 VEC and Indicator Selection

The terms “Valued Ecosystem Component (VEC)” and “indicator” were often used interchangeably in the 19 projects reviewed. Strictly speaking, a VEC is a particular component of the environment whereas an indicator is a parameter or measure of project effects on that component. A moose or a patterned fen may be chosen as a VEC, for example; a corresponding indicator would be numbers of moose or spatial extent of patterned fens. Indicators can be multi-level, ranging from measures which represent specific project effects on an individual component to measures which represent a wider range of interactions between effects induced by human activity and ecological integrity or health. Indicators may also be specified broadly or particularized in greater detail. Habitat fragmentation in a region, for instance, is an indicator of overall ecological health. Habitat pattern, shape, dominance, connectivity and configuration at a landscape scale exemplify particularized indicators (CEQ, 1997, page 26).

Because indicators address broad concepts such as ecosystem functions and capture interactions among various resource groups, they can be linked to sustainability and ecosystem integrity more directly than can VECs. Choosing broader VECs may be an option in certain circumstances, but a reliance on discipline specific VECs often results in a fragmented analysis which bears little connection to overall environmental quality or health. Linking indicators to environmental change may, however, extend beyond the scope of current assessment methods. Practitioners face the challenge of gathering more information and gaining more understanding about ecosystem processes and interactions in order to adopt indicators as an accepted approach when conducting a cumulative effects assessment.

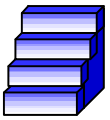


4.2.3 Spatial Bounding



Practitioners have yet to adopt standardized criteria for choosing the spatial extent of study areas. As described in Section 3.3.3, six different approaches to spatial bounding were identified in the 19 projects reviewed and many proponents chose a single regional study area regardless of which effects were being assessed. Some proponents only selected study areas within which various significant cumulative effects were deemed most likely to occur. Both local study areas, encompassing the activity's footprint, and larger regional study areas are needed when evaluating certain indicators or issues. This practice could be reinforced if Alberta regulators were to issue guidelines encouraging proponents to apply a set of standardized criteria when selecting study areas. Preliminary analysis based on the criteria would be applied prior to setting reasonable and appropriate boundaries.

4.2.4 Temporal Bounding



The choice of appropriate periods to study, with respect to the past and future study periods, poses another major challenge to CEA implementation in Alberta. As to the past, practitioners currently tend to choose contemporary conditions as a baseline. Such an approach can distort conclusions based on a cumulative effects assessment in at least two ways:

a) Incremental changes attributable to a single project may be termed insignificant when compared with cumulative environmental changes caused by previous and continuing activities. Nevertheless, the incremental changes may in fact be significant when compared with some overall measure of ecosystem integrity.

   In the case of greenhouse gas emissions, for instance, a single project's contributions are likely to be negligible compared to existing regional (or global) cumulative emissions. However, many now hold that current greenhouse gas emissions have reached an unacceptable level globally and that any additional emissions, no matter how small, would therefore be significant.

b) Incremental changes attributable to a single project may be termed insignificant when compared with contemporary environmental conditions. Nevertheless, cumulative changes taken as a whole, including changes caused by previous and continuing activities, may in fact be significant when compared with some overall measure of ecosystem integrity.

   In the case of habitat loss, for instance, a single project's contributions are often negligible compared to regional availability of habitat. If cumulative habitat losses caused by past developments and continuing human activities are considered, however, a significant portion of the regional habitat diversity may already have been modified or lost. It may therefore be inappropriate to approve a project , or to approve a project without imposing mitigation measures or to allow existing activities to continue, without introducing general regional mitigation measures.

With respect to study periods for the future, many practitioners focus on the duration of a proposed project rather than on the duration of anticipated effects. In these cases they address effects at discrete intervals such as project construction, commencement and abandonment. Such an approach can distort conclusions based on a cumulative effects assessment in at least two ways:

a) Far future scenarios rely on long-term projections which by their nature cannot be verified and which may support the illusion that participants are better at predicting than is in fact the case.

   The accuracy of any assessment depends in large measure upon the degree to which detailed information is available. In the case of information related to included projects, a lack of project-specific information about inputs, emissions and effluents will significantly affect quantitative air and water quality predictions. Forecasts are less problematic for some biological resource impact analyses which primarily rely on the size of a proposed project's footprint.

b) The significance of effects is assessed and mitigation measures are predicted to succeed in the context of environmental conditions which are assumed to remain the same throughout the study period. In fact, anticipated results may be altered by natural variability and events which exert considerable forces on ecosystems.

   The environment is constantly changing in response to both human-induced and natural effects. Vegetation succession is but one example. Time lapses between the onset of an effect, implementation of mitigation measures and a resource's response to mitigation may also alter anticipated results. Even assuming that reclamation and mitigation efforts will be successful over the 30 to 80 year duration of industrial activity in the Athabasca oilsands region, for instance, the question of how wildlife will be sustained and respond to habitat restoration activities throughout the period remains to be addressed. Furthermore, the sequence in which a number of adjacent, large-scale disturbances occur in the region needs to be addressed to ensure they do not overlap important wildlife corridors, blocking wildlife movements for an extended period before the benefits of reclamation are realized.

Predicting the future necessarily is fraught with uncertainty. No forecast can be relied upon without continuous adjustment taking new information into account as it becomes available. The techniques of adaptive management provide a means to respond to changes and should be encouraged.

4.2.5 Included Projects

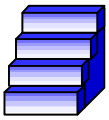
Although it is fairly well accepted practice that existing and reasonably foreseeable regional developments and activities be included in a CEA, selection criteria have yet to be established.

The choice of existing projects to consider during an assessment can be as important as the choice of proposed projects. Current CEAs primarily focus on large-scale projects, for example, and often miss the effects of dispersed or ongoing activities such as agricultural operations which, in the case of water quality or native prairie, can be significant. Furthermore, the critical question in any given region may be whether existing operations are likely to undertake activities such as expansion, reclamation or decommissioning which, in combination with a proposed project's effects, will cause adverse environmental changes.

On a somewhat related point, the Canadian Federal Trial Court recently applied an "independent utility test," an American concept, to determine which projects should be included in an environmental assessment under the *Canadian Environmental Assessment Act* (Friends of the West Country: 1998). It would appear that the courts are willing to take a broad view of the scope of assessment. Sunpine Forest Products Ltd. had planned to build a road giving access to its logging operations. The road needed to cross two rivers and Sunpine had therefore sought approval for two bridges. Environmental assessment reports were prepared for the bridges but the review excluded consideration of either the road or the logging operations. The court held that, as the road would certainly be built (in fact it has been built), the environmental effects of the bridges in combination with those of the road, and perhaps the logging operations as well, should have been considered. The case is currently under appeal.

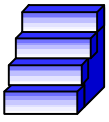
As to future projects, some debate still continues over the meaning of the term "reasonably foreseeable" and the issue of "induced projects" is rarely addressed. A proposed project may induce other industrial or recreational developments in a region by opening new linear access routes, for instance. In all cases, proponents also often face a challenge gathering information about other projects in sufficient detail to conduct a reasonably accurate assessment .

4.2.6 Assessment Methods



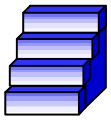
Models are used extensively when conducting CEAs. As mentioned earlier, practitioners can create models which approximate reality, but model outputs are only as good as the data and assumptions used to create them. The challenge is to update the models and frequently verify predictions by comparing them to current field data. Knowledge of complex environmental interactions is still somewhat limited and data deficiencies detract from the accuracy of any cumulative effects assessment.

4.2.7 Impact Characterization



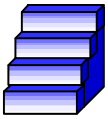
Impact descriptors such as scope, magnitude, duration, frequency, direction, likelihood of occurrence and confidence (in prediction) are fairly standard in current practice. The challenge is to encourage all practitioners to provide clear definitions of the terms they use to characterize impacts and to acknowledge and delineate levels of confidence in their predictions.

4.2.8 Significance of Cumulative Effects



Determining the significance of cumulative effects is perhaps the most challenging aspect of a CEA. However, few proponents in the 19 projects reviewed gave rationales for determining significance. A minimum assessment standard needs to be established.

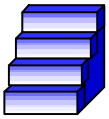
Many proponents relied on statements to the effect that routine monitoring programs or mitigation measures would adequately address potential adverse impacts. In particular, when a project appeared to have a very small incremental effect on a regional resource, it was often concluded that a project's effects were insignificant. The real questions are either not asked or not answered, namely: Is the resource being significantly affected by current pressures on the ecosystem? and, Will the incremental change move a resource beyond a sustainable threshold? To answer these questions in relation to many effects, information about cumulative environmental changes occurring *prior to the present* is essential.



Further challenges include consideration of human factors and of impacts over time. On the first point, cumulative stresses experienced and caused by human populations are infrequently addressed, although quality of life is a major issue in many communities.

On the second point, impacts may become significant during the operational life of a proposed project, which is to say before completion of reclamation or mitigation initiatives. A failure to take environmental changes during the duration of a project into account may result in overly optimistic predictions about the recovery of resources or indicators. If wildlife populations experience significant impacts in the meantime, successful recovery cannot be assured.

4.2.9 Future Management Options



Some proponents and regulators have stipulated collaborative long-term regional initiatives to manage cumulative effects beyond project-specific regulatory review. Planning future management options poses a challenge in that it generally requires a better understanding of environmental changes over the life of a project and of the degree of uncertainty associated with predictions than most participants currently demonstrate. Moreover, it requires broad, collaborative efforts. It will be a challenge to build on current successes, and establish routine mechanisms to engage stakeholders in planning future management options. An agreed upon public process is needed to bring parties together to consider future changes, both before they occur, and, particularly in the case of unexpected or adverse effects, as they occur.