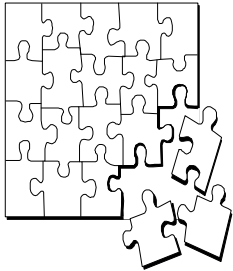


5.0 Future Options



Cumulative effects assessments provide a set of planning tools with both an information gathering and an evaluation component. They are employed to help prepare for future management of developments, projects or resources in a manner that protects and enhances, or at least encourages the wise use of, the environment. The utility of a CEA is not restricted to any one kind of planning and decision making process. An array of tools is available for assessing cumulative effects and choices are made in the context of each particular decision making exercise to match the tools to the specific nature and extent of the inquiry being made. The great value in using CEAs lies in their implicit and explicit recognition that ecological interactions and processes are necessary to sustain ecosystem composition, structure and function. The better such interactions are understood, the more likely that appropriate management decisions will be made. CEAs provide a means to evaluate interactions and some rationale for stakeholders to determine if incremental impacts are acceptable.

Cumulative effects assessments offer managers a strategic device for anticipating potential environmental consequences of proposed initiatives. Compared to single-project assessments, CEAs are more comprehensive, and therefore better suited to managing in the complex, real world which is filled with uncertainties. Given that the province is increasingly industrialized and is facing strong external competition from global markets and global issues such as climate change, it is important that Alberta foster development of as many sophisticated planning and decision making tools as it can muster. Cumulative effects assessment is one such tool.

Alberta has done well to advance the practice of assessing cumulative effects as far as it has. Nevertheless, more remains to be done if a CEA's full potential is to be realized.

5.1 Options for Systemic Improvement

Options for systemic improvement relate primarily to broad environmental and resource management issues, rather than to regulatory reviews as mandated under EPEA. They are, however, also relevant to project-specific regulatory reviews, particularly with respect to establishing policy, management and information contexts for such reviews.

5.1.1 Regional Data Bases and Data Interpretation

A lack of sufficient recent data on baseline and regional conditions can hamper a cumulative effects assessment. In addition, individual corporations often assert ownership of data they collect, either because of the resources they expended or because they claim confidentiality to protect competitive positions. Good regional assessments which account for cumulative environmental change need access to relevant, up to date and reliable data. Proponents, regulators and interveners would all benefit if ways to share data were found.

Regional databases provide one future option which would go some distance both toward facilitating integration of project-specific and regional management information and toward improving the quality of CEAs. They could also be used to identify further research or data collection needs, to assess significance of existing data and to predict trends. If constructed in such a manner that they flag or post warnings when thresholds, goals or objectives in particular regions are being approached, regional databases could further serve as a regulatory device giving time for managers to evaluate, respond and take appropriate action.



Preliminary design considerations with respect to regional databases include an impartial custodian, equal access and financial support. To ensure acceptance by regulators, industry and ENGOs, a regional data base needs an impartial custodian. Government, an independent third party or a multi-stakeholder consortium would satisfy the need to avoid allegations of self-interest. Equal access would be assured by operational conditions. Financial support would be provided, at least in part, by charging a fee for information. Credits could be distributed to agencies archiving information in the database.

The EUB's Core Research Centre may serve as one precedent. Virtually all core samples taken when drilling oil and gas wells in Alberta have been archived at the Centre since the EUB was first established (as the Oil and Gas Conservation Board). The Centre is located at the University of Calgary Research Park and is open to the public. A person wishing to view any of the core samples simply attends at the facility, pays the service fee and books a station to view the material. Some core samples are kept confidential for one year, during which they are only accessible to those authorized by the licensee of the well. Apart from that, all core samples are considered public information. Some photos and tests are available in addition to the core material. The Centre developed a computer system for in-house use with respect to keeping inventory and service records.

The Centre is managed by the EUB with input from, but no direct supervision by, industry. Roughly two-thirds of the operating costs are covered by service fees, with the remainder coming from the EUB's general revenues. The Centre does not itself play a research role in organizing or collating material, but geologists for the EUB may do some work in looking for trends.

The databases themselves must be well designed. Rather than transferring all data to one location, for example, the possibility of linking existing databases needs to be explored. A substantial quantity of information exists in Alberta, much of it stored on computers maintained by various entities including government agencies, industrial corporations and environmental consultants. Examples include the Alberta Natural History Information System (ANHIC) which provides information on rare and endangered species and environmentally-sensitive areas, and the recently developed provincial and regional wildlife database maintained by AEP's Wildlife Branch. The "Oilsands Regional Database" is another example. Primarily developed and compiled by Golder Associates Ltd., the database includes three main components: GIS map coverage of major themes such as

vegetation, hydrology and anthropogenics; environmental assessment and monitoring sites; and a list of all regional issues raised during recent regulatory proceedings related to oilsands developments. Golder has shared parts of the database with other consultants pursuant to a formal data sharing agreement signed by several proponents. The Internet might also offer some practical possibilities. The US Geological Survey disseminates regional data through the Internet, allowing users to browse the data freely although a fee is charged to download most GIS files.

While access to data is necessary, information alone is insufficient. All participants in environmental management need to advance their understanding of how whole ecosystems work and how human activities interact with them. Increasing academic and applied knowledge of complex relationships, which is then applied to information collected in regional databases, will improve ability to co-manage the economy and environment successfully.

5.1.2 Defining a CEA's Purpose and Content

Considerable uncertainty in terms of what a cumulative effects assessment should contain and what constitutes preferred or acceptable approaches has led to inconsistent CEA practices. A practical, effective future option to address this uncertainty consists of issuing a simple analytical framework sanctioned by regulators for the purpose of guiding stakeholders who conduct or evaluate CEAs in Alberta. The framework must recognize that different approaches in scope and emphasis are needed for guiding project-specific CEAs and ones supporting regional management.

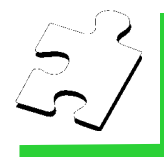
As a first step, a definition or functional description of cumulative effects or cumulative effects assessments could be established by AEP as a policy statement or, more formally, under the *Environmental Protection and Enhancement Act*.



Building on the official description of CEAs, regulators could collaborate with one another and with other stakeholders to develop a framework document designed to guide practitioners and others in the application of assessments. Likely issued in the form of guidelines, the policy paper would:

- include an operational definition;
- outline minimal expectations with respect to spatial and temporal bounding;
- identify preferred criteria for choosing which projects and indicators to include;
- provide some direction with respect to characterizing and interpreting the significance of impacts and devising impact management and mitigation initiatives;
- encourage practitioners to articulate and justify all assumptions adopted in an assessment; and
- emphasize public participation.

The framework could also include criteria for evaluating CEAs over a full range of contexts from project-specific applications to broader scale regional assessment and management initiatives. Clearly enunciated definitions, goals and informational requirements for CEA would improve the general understanding of cumulative effects assessments and would likely help CEAs meet the expectations of proponents, regulators and other stakeholders with direct interests in a region.



A framework document, or guidelines, would also serve to improve terms of reference for project-specific CEAs. Not only would standard criteria be applied to components such as spatial and temporal boundaries, but the guidelines would take advantage of the longstanding and improving practice among proponents of conducting their own workshops and engaging stakeholders when scoping a cumulative effects assessment. As CEA practice becomes better established and more consistent, it may be possible to move from providing general CEA guidelines toward providing more detailed direction with respect to specific types of analyses.

5.1.3 Integrating Regional, Sectoral and Project-Specific Management

To derive the greatest benefit from a CEA's potential for strategic planning, the assessments must be applied at the regional, sectoral and project-specific levels. Moreover, information gleaned from each assessment must be integrated with information gathered from all other assessments, so that understanding grows as well as data banks, and individual or collective decisions take advantage of and build on previous experience. Various mechanisms are available to integrate CEA information into overall management practices, including the following:



- formal legislative or municipal schemes (New Zealand, Town of Canmore);
- formal regional plans (similar to Alberta IRPs);
- formal regional protocols (California ReCap program);
- ongoing regional research and monitoring programs (BREAM, WKSS, Bow Corridor Ecosystem Advisory Group);
- ad hoc regional studies (Monkman, Banff Bow Valley Study, NRBS); and
- ad hoc collaborative initiatives (industry consortium in the Athabasca oilsands region).

Each mechanism offers advantages, but it is not clear that any one mechanism provides the whole solution. Formal legislative or municipal schemes appear to offer the tidiest resolution but need to be examined more closely. Certainly two precedents (New Zealand and the Town of Canmore) impose a requirement on proponents and regulators to consider cumulative effects when approving specific project proposals. Alberta has adopted a similar requirement in the *Environmental Protection and Enhancement Act* for particular industrial activities.

Formal regional plans such as Alberta's Integrated Resource Plans (IRPs) address overall regional goals for resource management in several areas across the province. However, while they provide a policy context of integrated objectives and guidelines, most IRPs are not specific enough to address individual environmental effects or to provide explicit management options. For instance, the Fort McMurray-Athabasca Oil Sands Subregional Plan offers little specific information on implementation in terms of thresholds or management. Nor are the guidelines and objectives specific enough to address individual project impacts, which would require more detailed knowledge.

A formal regional protocol such as the California ReCap program appears to offer a solution, provided one is content to accept a mechanism designed to deal with a single region. Ongoing regional research and monitoring programs also provide an effective vehicle for particular regions, as is demonstrated by BREAM, WKSS and the Bow Corridor Ecosystem Advisory Group, although formal approvals are not components of these programs. Ad hoc regional studies (Monkman, Banff Bow Valley Study and NRBS) illustrate a practical, effective option when the study results are incorporated into regional management decisions. Any tendency toward a patchwork of inconsistent approaches to CEA could be mitigated by regulatory guidelines outlining minimal expectations for practitioners in the conduct of cumulative effects assessments. An ad hoc collaborative initiative such as that undertaken by an industry consortium in the Athabasca oilsands region also works well provided that standard approaches meet generally accepted standards of CEA practice.

Although no single mechanism provides the whole solution, four themes emerge from the review of mechanisms considered for integrating project-specific and regional management information:

- constant dialogue;
- access to accumulated data;
- clear thresholds; and
- consistent practices.

The four themes are each underscored by one common denominator – stakeholders' desire for regulators to sanction the process, prescription or practice in question.

The more successful mechanisms to integrate project-specific and regional or sectoral management information involve a constant dialogue sanctioned in some fashion by government. Provided the dialogue is endorsed by formal legislative or municipal schemes, by regional protocols or simply by government participation in ongoing regional research, monitoring and management programs, participants derive a degree of confidence when discussions continue over time.

Precedents from Alberta, Canada, New Zealand and the US are described in more detail below.

5.1.3.1 Alberta Precedents

At the furthest end of the spectrum from project-specific CEAs is the cumulative effects assessment conducted specifically for the purpose of regional management or planning and primarily undertaken by government, although public and industry participation is usually included. Alberta initiatives include the Policy for the Management of Threatened Wildlife which is discussed in more detail in Section 5.3. Other examples located wholly within Alberta include the Banff Bow Valley Study (Banff National Park), which was led by the federal government, and the Bow Corridor Ecosystem Advisory Group, which involved federal, provincial and municipal governments and arose from NRCB recommendations in its Three Sisters decision. Integrated Resource Plans (IRPs) are another mechanism employed by the Alberta government. For instance, the Fort McMurray-Athabasca Oil Sands Subregional Plan outlines its purposes as follows (page 1):

- To resolve issues and conflicts on public land and resources through the integration of objectives by providing guidelines to achieve these objectives;
- To provide agencies with a framework within which to develop and implement their own programs;
- To promote a broader perspective of the interdependence of all aspects of resource and land management in the planning area;
- To improve communication between the public and the government; and
- To inform the public, government agencies and industry about the objectives and activities of agencies managing public land and resources in the planning area.

Alberta's proposed water management policy and legislation is another area in which regional information would be integrated with project-specific applications. In 1994, the Alberta government released a discussion package of proposed water management policy and legislation. A Water Management Committee reviewed the results of the public consultation process and unanimously recommended that a Wetlands Policy be developed and taken into account when preparing water management plans and issuing various aquatic and riparian permits (Report of the Water Management Committee, 1997). The policy has not yet been released, but could lead to incorporating regional CEA information into project-specific decisions.

The Town of Canmore provides one Alberta municipal precedent. The Town has developed and implemented a Growth Management Plan in consultation with stakeholders. This plan provides an overall context for management of the area. As part of the initiative, proponents of major projects within the Town's jurisdiction are now required to consider and assess cumulative effects within the context of the greater Bow corridor in which the Town is located, as well as their own incremental contribution to cumulative effects.

Non-governmental initiatives include the efforts of several industrial stakeholders in the Athabasca oilsands region. A number of proponents planning to build various oilsands projects have joined forces to develop a methodological CEA framework. To date, most of the emphasis has been on defining common spatial and temporal boundaries, a list of included projects and standard approaches to cumulative effects assessment. In addition, some form of regional database covering such topics as soils, terrain and ecosites has been discussed.

5.1.3.2 Other Canadian Precedents

British Columbia initiated the Monkman/Grizzly Valley CEA in response to a proposed expansion in the area. The area had been extensively developed and government took the view that a regional assessment was required before project approval could be granted. However, the assessment focussed specifically on the oil and gas industry and did not include other types of activities such as forestry.

An alternate approach to CEA involves intergovernmental cooperation on regional studies which provide the context for project-specific management and planning activities. The Northern Rivers Basin Study covered a region which extended beyond Alberta's borders. It was sponsored by the governments of Canada, Alberta and the Northwest Territories and was designed to address ecological concerns about pulp mill expansion on the Peace, Athabasca and Slave Rivers. The Study's objectives were to gather and interpret sound scientific information about the basins, to develop appropriate recommendations for basin management, and to communicate effectively with the public. The study began in 1992 and was completed in 1996 at a cost of roughly \$12 million. In June, 1996, a final report which included 26 recommendations was presented to the three governments. An inter-governmental response was released in November, 1997 and contained responses from Environment Canada, Health Canada, Fisheries and Oceans Canada, Indian and Northern Affairs Canada, Forestry Canada, Canadian Heritage, AEP, Alberta Health and the Government of the Northwest Territories.

The governments have acknowledged that long-term protection of the basins depends on an integrated, science-based approach to basin management. Accordingly, key elements of the response include action on pollution prevention, ecological management, contaminant and nutrient issues, continuing environmental research and open and full public participation in basin management decisions. Action is already underway on water quality concerns, and a study is being conducted with respect to the effects of pulp mill effluent on fish. The response also envisions a Mackenzie River Basin Board to provide a framework for basin management, using both scientific and traditional knowledge, within which project-specific decisions can be made. An Integrated Ecosystem Monitoring Committee is to be established. In addition, the Alberta government has funded the Northern River Basins Human Health Monitoring Study.

Initiatives in the Mackenzie Valley/Beaufort Sea area provide examples of joint industry/government programs to assess impacts and develop an integrated research and monitoring program in conjunction with oil and gas development in the region (Beaufort Environmental Management Program (BEMP), Mackenzie Environmental Management Program (MEMP) and Beaufort Region Environmental Assessment and Monitoring (BREAM) which amalgamated BEMP and MEMP). The West Kitikmeot-South Slave Study (WKSS) is an example of a joint initiative between governments, First Nations and industry to address regional cumulative effects and research needs in the Slave Geological Province, primarily launched in response to the approved BHP Diamond Mine and the upcoming Diavik Diamond Mine.

5.1.3.3 International Precedents

New Zealand has reduced its national government's direct involvement in major projects, which has resulted in a greater emphasis on regional and local decision making with respect to resource management issues. The *Resource Management Act* was passed in 1991; one of its requirements is consideration of "cumulative change over time" (Dixon and Montz, 1995). The *Act* is administered through regional authorities and district and city councils. Regional authorities have responsibility for resource management and regional planning functions and the district and city councils carry out district planning and land subdivision responsibilities. Environmental impact assessments are implemented at two levels – regional authorities determine policy and prepare overall plans; local authorities use the policies and plans to establish criteria for assessing applications for project permits and approvals (Dixon and Montz, 1995). Regional authorities are required to address development and resource management issues and environmental impacts of the policy and objectives chosen. In evaluating the cumulative effects of projects, local authorities are required to assess applications in the context of regional and district policies and plans which, in turn, must reflect the purpose of the *Act* – sustainable management.

In California, the Coastal Commission Regional Cumulative Assessment Project (ReCAP) was initiated by the US Congress as a result of growing concerns over the ability of state coastal management programs to address the cumulative impact of growth and development (California Coastal Commission, 1995). The assessment was conducted by commission staff, who recommended various policy and program changes. Management and implementation of the recommendations will be carried out jointly by three levels of government: the California Coastal Management Program (CCMP), which reviews specific projects in the context of regional development; local and municipal governments, which issue coastal development permits; and the federal government, which conducts consistency reviews. The ReCAP program is designed specifically to address inter-jurisdictional issues associated with cumulative effects, to provide a regional data base and to act as a catalyst for better regional resource management by:

- Helping coastal managers see beyond the routine review of individual sites;
- Linking individual sites and development proposals to regional resource trends;
- Recognizing sources and impacts from both inside and outside the coastal zone;
- Developing policy and inter-governmental tools to address cumulative and secondary impacts; and
- Helping authorities to realize their full potential to manage coastal resources.

5.1.4 Thresholds

A move towards integrating CEA with regional planning and management has several implications. In particular, Smit and Spaling (1995) point out that planning approaches usually include more normative evaluation than analytical or project-specific CEAs and involve more management issues:



Normative evaluation refers to a process or procedure designed to rank or choose “what ought to be” according to prescribed social goals or evaluative criteria.

Improved, regionally integrated CEAs may lead to established limits for various types of development, as well as for human use and human population size in order to protect environmental integrity for future and current generations. In some areas of the province, the possibility that guidelines for water and air quality are being approached or exceeded is very real. Three questions would immediately engage the government if this key issue were to become the centre of attention:

- Do Albertans acknowledge that there may be limits to development or growth?
- How will such limits be identified?
- Will other sources of environmental impact be required to minimize their effects to make room for new developments, or will the “last-proponent-in” be refused?

Responding to the first question will raise further debate about what constitutes a “limit” – is there a natural cap or does the province define a limit by adopting some index of acceptability? Furthermore, who would make the decision setting the limit?

As a partial answer to the second question, AEP’s Policy for the Management of Threatened Wildlife in Alberta (1985) may offer some guidance. The Policy required a periodic review of the status of selected high priority species. In 1991, the Wildlife Management Division conducted an expanded review to evaluate the status of all non-fish vertebrates occurring in the province. The review also developed a system to:

- Evaluate current and projected status of populations and their habitats;
- Sort species into lists based on similar status; and
- Provide a brief summary of current status and background information for species at risk and those species that may require special management.

The status designations were reviewed by experts in the field and a refined status report and methodology developed (1996). The objectives of the more recent report were to:

- Provide a baseline reference to assist in establishing priorities and directions for management and conservation programs dealing with wildlife species and their habitats;
- Provide information to the public and increase the awareness of what is known regarding the current status of Alberta's wildlife; and
- Stimulate and focus professional and public input in order to improve the evaluation process and the accuracy of individual species status designations.

The status designations will be reviewed every 5 years using literature information and information from knowledgeable individuals in government, industry and the public. The document comments:

It should be recognized that wildlife populations can change relatively rapidly particularly in areas affected by human land use. There is a continuing need to monitor these changes to ensure populations remain viable and to anticipate the effects of changing habitat conditions.

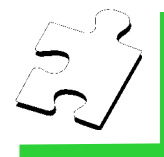
The information from the reviews could both provide valuable input into a regional CEA database and aid in identifying thresholds and the "state of the environment" for wildlife.

5.2 Options for the Practice of CEAs

Options related to the practice of cumulative effects assessments can be applied in the context of either project-specific reviews or broader regional management efforts.

5.2.1 Issue Identification

Identifying issues on the basis of common effects rather than on the basis of separate professional disciplines would lead to improved CEAs. One approach to screening common effects is to use a matrix which systematically addresses common cumulative effects such as the addition of contaminants, habitat loss and fragmentation and water withdrawal together with their potential effects on a range of key resource groups. If a potential for significant impact can be confirmed (and justified), indicator species and specific measurements can then be selected to measure that impact. By employing this approach, specialists are encouraged to integrate their analyses through examination of common issues and interactions.



5.2.2 VEC and Indicator Selection

The practice of selecting indicators could be improved if standard criteria were applied. One useful set of criteria, for instance, stipulates that indicators should be (based on McCanny et al., 1995; Woodley, 1991):

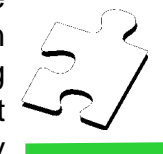


- Easily understood by, and reported to, the public;
- Sensitive to changes as a result of land use and human activities (in addition to natural changes);
- Capable of serving as an early warning indicator of change;
- Capable of characterizing the relationship between the variable and ecological integrity;
- Capable of addressing concerns for rare and endangered species;
- Capable of providing a continuous assessment from unstressed to stressed conditions (e.g., pristine to polluted conditions); and
- Cost-effective for monitoring reliably in future studies (e.g., can be monitored during routine patrols inside and outside of parks, monitoring programs already in place).

Any range of indicators is improved if the specific indicators represent a wide range of spatial and time scales from individuals and communities, to ecosystems and landscapes, and are able to capture a cross section of ecosystem responses to environmental change. Linking indicators to environmental change may be beyond the scope of current methods and require more information about ecosystem processes and interactions. Regional, integrated CEAs incorporating measures of cumulative environmental change will be an important step in further characterizing ecosystem integrity and functional processes.

5.2.3 Spatial Bounding

Effects-based scoping of spatial boundaries is important for focusing the assessment. Preferably, a study area is defined as the spatial area within which cumulative effects are most likely to occur and be significant. Using a single regional study area for all or several disciplines, and even different types of effects within the same discipline, can mask significant effects by including too large an area in the CEA which dilutes the magnitude of effects.



Spatial boundaries identified for each discipline need to be defensible and preferably reflect an ecological unit such as an airshed or regional aquifer that may be affected. They should also reflect the zone of influence of the effect on a resource. For example, if topography and climate are likely to concentrate some air emissions more than others, different spatial boundaries may need to be considered in order to conduct an accurate assessment of potential cumulative effects associated with each type of emission. Similarly, a single regional study area may distort assessment results because populations or sub-populations will be defined differently for various wildlife species, and the area that will need to be considered for these population units will also vary. In many cases, both local and regional study areas are required for a single discipline or effect. Whatever spatial boundaries are chosen, practitioners need to be encouraged to provide clear justifications for their selection.

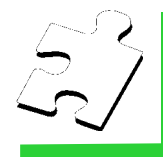
5.2.4 Temporal Bounding

Effects-based scoping of temporal boundaries is also important for focusing the assessment. To avoid distorted conclusions, practitioners need to be encouraged to characterize cumulative environmental changes; evaluate relevant historical cumulative effects; restrict future scenarios to include reasonably defensible data; and take natural variability and future events caused by both natural and human agents into account. For long-term effects, it would be of value to assess changes not only for one or two discrete intervals, but over the full time continuum.



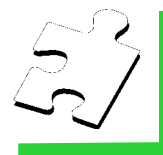
5.2.5 Included Projects

If project selection criteria were established by way of guidelines, CEA practice in Alberta would improve. Criteria could refer to existing activities having the potential to affect the same resources that are likely to suffer impacts from the proposed project; to small scale projects; to activities such as expansion, reclamation or decommissioning likely to be undertaken by existing projects; to “reasonably foreseeable” projects and to “induced projects”. In addition, practitioners need to be encouraged to include consideration of environmental changes in the absence of the proposed project, as well as to general population changes and their impact.



5.2.6 Assessment Methods

Much attention is paid to various models used in cumulative effects assessments. Promising new methods include systems modelling to understand possible interactions between different environmental components. Systems modelling may also be of use in exploring biological thresholds, such as sustainable changes in populations, and in assessing changes over an entire study period. Successional modelling is another promising tool; it can help assess how natural changes in baseline conditions interact with human-induced changes. Useful as these and other models may be, however, practitioners need to be encouraged to update the models and frequently verify predictions by comparing them to current field data. Regulators can reinforce such a practice by periodically evaluating the models themselves and by insisting on receiving information based on current field data.



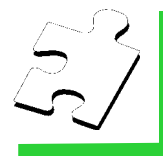
5.2.7 Impact Characterization

A framework document, or guidelines, could encourage practitioners to provide clear definitions of the terms they use to characterize impacts and to acknowledge and delineate levels of confidence in their predictions. Terms need to be defined on a discipline-specific basis since standard definitions and categories for all disciplines and all effects can be misleading. For example, a 1 to 10% loss of a common species is not equivalent to a 1 to 10% loss of a rare species. Findings for value-based or qualitative descriptors such as severity and significance need to be explicitly justified. As discussed in relation to indicators, impacts should also be characterized in the context of cumulative regional environmental changes.



5.2.8 Significance of Cumulative Effects

In general, cumulative effects assessments do not adequately justify findings of significance or insignificance. Inevitably, attributing significance or insignificance to a predicted impact involves a value judgement. The assumptions and values underlying the assessment should therefore be made explicit. CEA practice would improve if standard assessment criteria were established. Criteria could be designed to address the question: What is the likelihood that the incremental change will move a resource beyond a sustainable threshold? Even if the resource is not moved beyond the threshold by the activity in question, how vulnerable will it be to any further, possibly unexpected, activities or occurrences? Significance needs to be determined on the basis of total changes experienced by a receptor over time, not on the basis of incremental changes caused by a project at discrete intervals.



Social and economic effects often result in induced effects on natural ecosystems. For example, in the Athabasca oilsands region, the proposed projects are expected to increase human populations and increased employment in the region could also lead to a higher standard of living, which may result in the purchase of more and higher-powered snow machines and other types of ATVs giving people access to a broader area for hunting, fishing and food gathering. The resulting activity is likely to be one of the more significant pressures on natural ecosystems. Conversely, environmental deterioration could decrease the quality of life for residents and the potential for tourism, particularly ecotourism, in some areas. Current EIA and CEA regulatory requirements do not call for consideration of any of these factors. A framework document, or guidelines, could encourage practitioners to determine the significance of effects caused or experienced by human populations.

5.2.9 Future Management Options

Examples of collaborative long-term regional initiatives to manage cumulative effects include the access management plan for the Caribou Mountains in northwestern Alberta/northeastern BC; and Amoco's proposed access co-ordination plan for the Whaleback. The Clean Air Strategic Alliance (CASA) provides another example. CASA consists of senior representatives from government, industry and non-governmental organizations and is designed to develop practical and innovative responses to air quality issues in Alberta. Initiatives range from improved monitoring programs to management plans. The Town of Canmore's Growth Management Plan provides a municipal example.

Multi-stakeholder assessment and management programs constitute a practical, effective future option. They allow governments to play a strong role in ensuring that a public process for consideration of issues is maintained over time. They also suggest an effective way to deal with resource conflicts because they provide a forum to ensure that all types of activity in an area are assessed, that all industrial and other non-governmental stakeholders are involved and that opportunities for inter-departmental collaboration with agencies from other levels of government or from non-environmental departments such as Health or Agriculture are provided.



One note of caution, however: constancy and responsiveness are hallmarks of a successful multi-stakeholder program. All stakeholders, including government, need to be prepared to implement alternate measures if the initial program fails or is not as effective as expected. Adaptive management techniques must be adopted.