

# FORUM

## The Impotence of Cumulative Effects Assessment in Canada: Ailments and Ideas for Redeployment

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**ABSTRACT** / Cumulative effects assessment (CEA) in Canada is in dire straits. Despite a huge amount of talk and a flurry of developmental activity associated with CEA concepts, it has not lived up to its glowing promise of helping to achieve sustainability of diverse valued ecosystem compo-

nents. This article aims to articulate that failure, to examine it in terms of six major problems with CEA, and to propose solutions. The six problem areas include (1) application of CEA in project-level environmental impact assessments (EIAs), (2) an EIA focus on project approval instead of environmental sustainability, (3) a general lack of understanding of ecologic impact thresholds, (4) separation of cumulative effects from project-specific impacts, (5) weak interpretations of cumulative effects by practitioners and analysts, and (6) inappropriate handling of potential future developments. We advocate improvements not only within the purview of project-specific EIAs, but also mainly in the domain of region-scale CEAs and regional environmental effects frameworks (or perhaps land use planning). Only then will the CEA begin to approach the promise of securing sustainability of valued ecosystem components.

Cumulative effects assessment (CEA) is by now an integral component of many environmental impact assessment (EIA) processes. In Canada, CEA is a requirement under the Canadian Environmental Assessment Act of 1995, section 16(1) which demands consideration of “any cumulative effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out.”

We have followed the conceptual, regulatory, and practical development of CEA since the early 1980s. Between the two of us (and frequently together), we have researched, taught, discussed, reviewed, and implemented CEA for some two decades (e.g., Duinker 1994; Greig and others 2003, 2004; Jeffrey and Duinker 2002). Our experiences relate both to formally required CEAs as part of federal and provincial EIA processes and to various academic and consulting studies that technically resemble CEAs. We have come to the conclusion at this time that the promise and the practice of CEA are so far apart that continuing the kinds and qualities of CEA currently undertaken in

Canada is doing more damage than good. In this article, we explain how and why this is the case, and propose some redirections for practice that would bring CEA at least *toward* the promises.

What was the promise of CEA? First, let us establish that EIA is a process of informing decision makers about the likely environmental consequences of alternative development options (Duinker and Baskerville 1986). The whole point, of course, is environmental protection. When EIA processes were started up in the 1970s, that was the language used—environmental protection. In current vocabulary, we might recapture that thought in the broader concept of sustainable development (Sadler 1996; World Commission on Environment and Development 1987). Thus, EIA can be seen as a process designed to sustain environmental values when developments (projects, undertakings, human actions, and activities) that might compromise those values are proposed. In the early 1980s in Canada, the term “valued ecosystem component” (VEC) (Beanlands and Duinker 1983, 1984) was coined to help provide focus for EIAs. Previous EIAs seemingly tried to examine all environmental values, with the result that effort was distributed so broadly and thinly that few values, if any, got sufficient consideration for anyone really to know whether undesirable impacts would occur.

Therefore, we now can recast the central task of EIA as contributing to sustainable development by

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safeguarding VEC sustainability in the face of development that might compromise that sustainability. Such a recasting in no way begs for changes in the way science ought to be practiced to reveal environmental impacts. We firmly believe that the guidance available in earlier EIA literature (e.g., Beanlands and Duinker 1983; Holling 1978; Munn 1979; Ward 1978) on how to proceed with incisive impact science still fully applies. Our observation is that guidance has been largely ignored in the domain of actual EIA practice, and that this has led to the situation in which EIA, particularly the branch of EIA known as CEA, has largely failed to deliver on the early promises.

If EIA is to address VEC sustainability properly, it must be implemented as if VECs were center stage (Duinker 1994). In other words, instead of focusing on whether a single project may have unacceptable impacts on a specific VEC, the sustainability of that VEC can be understood properly only by examining the full range of human-generated stresses on the VEC. It must be recognized that VEC conservation depends on ensuring that the total effects of all stresses are kept within tolerable and acceptable levels. This, in our view, is where CEA comes in. People realized that examination of the interactions between a single project and a specific VEC was largely incapable of securing VEC sustainability (Ross 1994). How could we address the sustainability of a moose population that faced habitat change because of timber management if we did not also address, simultaneously, the effects of hunting that population (Duinker and others 1996)? Thus, EIA had to be transformed so that analysts would examine project-VEC interactions in the context of interactions between the VEC and all the key human-generated stresses. This is the only way to begin to understand VEC sustainability in the face of human activities, and it underlies the central promise of CEA.

What went wrong? How come this most promising improvement to EIA processes—CEA—is not delivering? Why are people so frustrated with CEA? These are the questions we address in this article. The urgency in this discussion is that because some prominent EIA processes (e.g., the federal one in Canada) require CEA, and to some extent are performed as part of project-specific EIAs, people could have an expectation that VEC sustainability is indeed being looked after. That would be a serious false expectation.

To set the historical stage, we first remind readers about the development of CEA concepts and practice in Canada. Then we examine several CEA-related issues that we posit have stood between exemplary CEA practice and current reality. Our conclusions and sug-

gestions for redeployment of CEA may not be novel or unique. We have heard some of them before. However, our point in making them again is first to stimulate serious discussion and debate on the issues, and second to urge EIA decision makers and practitioners to move without delay to improve matters.

Some of our suggestions relate to improvements in the way CEAs are conducted in the context of project EIAs. We do not favor this as the main avenue for improvements, but we believe that the legal requirement for CEA in project EIAs will continue for some time, and that society certainly would benefit from improvements in such practice. Our main suggestions, however, focus on fundamental changes in how CEA is carried out in Canada. The main theme is regional environmental assessment and regional environmental effects frameworks. Such frameworks might best be interpreted as the technical assessment components of regional land use planning processes.

Our main experiences with CEA have been in Canada, although we do have limited experience with CEA in other countries. The observations and conclusions presented in this article are meant for application in Canada, although readers also may find them applicable elsewhere. The reader should clearly understand that the following discussion is based on career observations and experiences, and not on an explicit formal review and analysis of CEA documents, cases, and institutions. This is a key reason for presenting few examples of unfavorable CEA practice in Canada.

## A Brief History of CEA in Canada

“CEA really rose onto centre stage in Canada shortly after the founding ... of the Canadian Environmental Assessment Research Council (CEARC) [in 1984]. From the beginning, CEARC put CEA high on its priority list, and quickly sponsored several projects on the subject (e.g., Beanlands and others 1985; CEARC 1988; Peterson and others, 1987; Sonntag and others, 1987)” (Duinker 1994, p. 13). Thus began a series of CEA developments in Canada that continue currently. Of major significance is that assessment of cumulative effects became mandatory for all EIAs required under the Canadian Environmental Assessment Act of 1995.

In anticipation of this requirement and similar ones in the EIA processes of some Canadian provinces, the Alberta Society of Professional Biologists (ASPB) organized a conference to begin laying out for the assessment community how to move from

concept to practice with CEA (Kennedy 1994). A subsequent ASPB conference (Kennedy 2002) focused on management of cumulative environmental effects, and was characterized by several calls for CEA in a regional planning context. Meanwhile, various agencies mounted initiatives to provide guidance on how CEA ought to be done (e.g., Parks Canada (Kingsley 1997). The agencies included the Canadian Environmental Assessment Agency (CEAA) (Hegmann and others 1999) and the Department of Indian Affairs and Northern Development (Greig and others 2003).

At the same time as CEAA's Practitioners Guide was released, the Agency also published a so-called Operational Policy Statement (CEAA 1999) entitled *Addressing Cumulative Environmental Effects Under the Canadian Environmental Assessment Act*. The statement updated CEAA's position on CEA, with advice on defining cumulative effects and identifying future projects to be included in CEAs. The preparation of this statement and the timing of its release were surely inspired by two court battles associated with EIAs for projects in the province of Alberta (Barnes and others 2002; Logan and Ferster 2002; Sunpine and Cheviot in Kennett 2002), where environmental groups successfully mounted legal challenges against federal agencies regarding the soundness of their decisions related to CEA.

Continuing education related to CEA was abundant until recently. In the late 1990s, CEAA mounted a series of short courses on CEA for EIA practitioners and took these across Canada. The Banff Centre for Management in Banff, Alberta, ran week-long CEA courses annually from 1996 to 2001. Research on various aspects of CEA also has been noticeable. A study on the use of scenario analysis in CEA was sponsored recently under CEAA's research program (Greig and others 2004), and academic institutions have focused on CEA in some of their contract work (e.g., Griffiths and others 1998).

In conclusion, the past decade has witnessed a flurry of attention on CEA. There have been conferences, books, guides, short courses, seminars, workshops, research projects and papers, position papers, court battles, high-profile CEAs, new legal requirements, and more, all demonstrating that CEA has been perhaps the single most discussed EIA issue in recent years.

### Problems with CEA in Canada

We believe that problems with current requirements for and practice of CEA relate to the following six areas.

#### Application of CEA in Project EIA

We agree with many others (e.g., Antoniuk 2002; Kennett 2002) that both conceptually and operationally, CEA is not well suited for inclusion in project-level EIA. Conceptually, as we argued earlier, CEA demands a VEC-centered approach to EIA. Individual projects often represent relatively small contributions of stress to specific VECs. Of course, this depends on the VEC definition, for example, whether the VEC is defined as a regional population of caribou or as individual animals. As people have developed and specified project-level EIA processes in Canada and elsewhere, they have encouraged a view of the world through a project lens (i.e., what might the project do to the VEC?) Thus, VEC-centered EIA asks: What might the full array of human activities do to the VEC? The VEC-centered lens is difficult to adopt when a proponent is focused on getting a project approved, and regulators are focused on making sure that the impacts of the project are acceptably small.

Operationally, practitioners working on a project-specific EIA are obliged under some legal requirements for CEA to assess effects of other projects and activities, including future projects that may be quite uncertain currently. Even if plans exist or are well underway for some future projects (e.g., for "certain" and "reasonably foreseeable" developments according to advice from CEAA [1999]), they may be poorly specified with respect to implementation details, or, if specified to some degree, kept confidential by the plan owners. We know of instances in which EIA practitioners have been unable to acquire the development plans of other proponents, and having no appetite to invent details for such plans for the purposes of assessment, appeared unable to proceed with incisive CEA (e.g., the Cheviot Mine case; see Logan and Ferster 2002).

#### Focus on Project Approval

Whereas in theory EIA is about environmental protection and VEC sustainability, in practice it is about project approval. Many current development proponents have genuine interests in conserving environmental quality and ensuring VEC sustainability, but that is not their central quest. In the private sector, the quest is to make profits through the production of goods and services. In the public sector, the central quest is usually to meet agency goals of serving the public with specific goods and services. Environment is secondary, unless of course it is a key direct component of making profits or serving the public good. A few current proponents may still see EIA as just another

regulatory hurdle that needs only to be jumped over minimally to get project approval. However, the behavior of many proponents demonstrates that they have the best interests of some VECs clearly in mind and use EIA as an integral instrument in designing environmentally respectable projects. On the other hand, however, faced with the current reality of tight business margins and public fiscal restraint, proponents generally do only what they must in EIA to get a favorable regulatory decision.

Doing only what one must to get project approval usually means minimizing effort concerning cumulative effects. Actually, CEA is a relatively new addition to EIA, which itself can be difficult and expensive enough to implement well. In project EIA, proponents may legitimately ask why they should have to care about other future developments and their potential impacts on VECs. This, they may argue, should be the burden of regulators and the proponents of those future developments, to be addressed either in regional planning carried out by the regulators or in project EIAs focused specifically on the future developments. Given such sentiments carried by proponents and their EIA practitioners into project-focused EIA processes, it is no surprise that attention to VEC sustainability gives way to an emphasis on project approval. Combine this with generally shallow interpretations of what cumulative effects really are and can be (discussed later) among both the practitioners who do impact analyses and those who review them, and it is no wonder that current CEAs lack rigor and clout.

In summary, proponents want project approval with minimal costs related to environmental protection, whereas society wants environmental protection (or VEC sustainability), which demands attention to all the human stresses on specific VECs over meaningful time and space scales. Project-specific CEA thus has a difficult time meeting the requirements of good CEA that can help individuals understand VEC sustainability.

#### Ecologic Impact Thresholds

The notion of response thresholds has a long history in ecology. We cite, for example, predator pits in which a shift in the relative abundance of a predator and prey beyond a critical threshold results in ongoing suppression of a prey population, area-sensitive species that require large unfragmented and undisturbed habitats to persist, and the notion of minimum viable populations. When a response threshold is crossed, the behavior of system components can change in a way that is difficult and perhaps impossible to reverse. If the promise of CEA is to be fulfilled, it needs to be either well informed about the existence of such criti-

cal thresholds or conservative with regard to protecting VEC integrity.

The main problem is that thresholds are difficult, sometimes impossible, to determine. In the absence of compelling evidence about thresholds, project-based CEAs may have to proceed on the assumption that there is no threshold for a given VEC or that the system behavior in response to cumulative stress is simply linear. Unfortunately, life is never that simple. Ecosystems do shift in response to human stresses to states from which it is difficult to recover. The fate of the north Atlantic cod fishery is one example of such a transformation in response to resource harvesting. Population responses to cumulative habitat loss are also likely to be nonlinear (Komers 2002).

With project-level CEA, if the question of thresholds is addressed at all, the task of defining thresholds may be based largely on consultation about stakeholder values. That might work well for sociocultural VECs, but not for biophysical ones. In terms of helping us understand what is sustainable, consultation-based thresholds for biophysical VECs are not likely to be of much help. As Ziemer (1994, p.319) observed, "Often the reason to identify thresholds is a desire to allow some management action to proceed unhindered until the magnitude of effect reaches a point at which regulation becomes necessary. That 'threshold' often is not physically or biologically based, but is the point at which the public becomes adequately alarmed and demands action."

Things would not be so problematic if the requisite understanding were already in hand, but alas, for most VECs, it is not. This situation is unlikely to improve if left to the domain of project-level CEA. The research needed to understand thresholds demands attention over ecologically meaningful time and space scales and is simply beyond the capacity of project-level CEAs to address. If CEA is to fulfill its promise, then threshold criteria for biophysical VECs must be ecologically meaningful and much better understood.

#### Separation of Cumulative Effects From Project-Specific Impacts

Despite our view that CEA is a bad conceptual fit with project-oriented formal EIA processes, we hold that exemplary technical practice in any EIA should actually be dominated by a cumulative effects approach (Duinker 1994). By this we mean that, unless human, VECs have no choice but to endure the whole array of stresses inflicted on them by humans. Suppose the VEC in question is a sport fish population in a river. The proposed development of interest is a water-using power plant on the river bank. The project EIA seeks

approval to construct and operate the power plant. The EIA must examine the effects of the power plant on the fish population from entrainment and impingement at the water intake, as well as temperature increases at the outflow. The fish population reacts to the entire set of habitat conditions, which may include some nasty pollutant inputs upstream. It must also endure a relentless mob of sport fishers each weekend and during holiday season. If we are to understand the long-term sustainability of the fish population, we cannot isolate the effects of the power plant and look at these separately because they do not and will not occur in isolation of the other stressors. It is patently wrong to assume that the cumulative effects of all these stressors on the fish population are simply sums of the individual effects of each stressor analyzed separately.

Unfortunately, however, this is how we see most EIAs currently conducted. The usual approach is to call for a normal EIA first, and then to tack on a token CEA in a separate cumulative effects chapter of the main EIA document. Some would make the persuasive argument that any project EIA should first try to determine whether the proposed project, with and without impact mitigation, might itself have any effects on VECs. After all, can assessors not conclude that a project cannot have any significant cumulative effects if it has no significant effects by itself? As attractive as this argument may be initially, it breaks down as soon as we consider the distinct possibility that two projects in the same vicinity, one ahead of the other in sequence, may each have undetectable impacts by themselves, but horrific impacts together. For example, suppose the threshold for water removal from a stream, from the standpoint of effects on fish populations, were 70%. Thus, as long as the stream has 30% of its flow during any low-flow period, one would not be able to detect effects on the fish. If one project is to draw out 40% of the flow, this would have no impact by itself. If another other project is to draw out 35% of the flow, it also would have no impact by itself. However, the two projects together would draw out 75% of the original flow, with devastating (cumulative) effects on the fish. An EIA for either project would miss this possibility if cumulative effects were dismissed because the project itself was deemed to have inconsequential effects on the fish through water removal.

In our view, cumulative effects are the only real effects worth assessing in most EIAs. This may not be the case where a new development is planned in an area that has had no previous development or other human activities, and where none is expected in the future. But where on earth might this be in the 21st century?

### Interpretations of Cumulative Effects

We sense that despite all the guidance and other literature trying to help people understand cumulative effects and how they should be assessed and mitigated, CEA still represents a mystery to most EIA practitioners. If it were not a mystery, then much stronger performance in CEA practice should be evident. For us, the missing factor is incisive impact-oriented systems analysis of the kind long advocated under the aegis of adaptive environmental assessment and management (Holling 1978). In other words, if each EIA practitioner were competent to undertake explicit, quantitative systems analysis of the interactions between specific proposed developments and specific VECs, then cumulative effects would not be vexing at all, and strong CEA practice would prevail.

Systems analysis aside, many authors have referred to various classifications of cumulative effects in an attempt to shed light on how to go about assessing them. For example, Sonntag and others (1987) described the following types of cumulative effects: linear additive effects, amplifying or exponential effects, discontinuous effects, and structural surprises. We too have been guilty of working up our own such classifications. For example, in Greig and others (2003), we offered the following types of cumulative effects: additive, compensatory, synergistic, and masking.

In our current thinking about CEA, we have found such classifications to be less than helpful. They do offer some assistance in conceptualizing various forms of cumulative effects, and, after all, conceptual modeling is a vital early stage of quantitative systems analysis for impact prediction (Duinker and Baskerville 1986). However, they imply that cumulative effects somehow represent a special class of effect, when the critically important point is quite simply the need to assess the aggregate stresses acting on VECs.

### Future Developments

Predicted impacts (i.e., impacts expected in the future, not those that may already have occurred) are correctly calculated as differences between alternative future outcomes (Duinker and Baskerville 1986). Thus, a project's impacts are, at minimum, the differences in VEC responses (or outcomes or behaviors) between a future without the project and a future with the project. Both these futures, to be realistic, must be firmly anchored in the present, which, if correctly characterized, will depict VEC conditions as they have evolved with the past and present projects in place.

In project EIA, we see three distinct possibilities for mitigation of cumulative effects when VEC sustain-

ability might be compromised by future developments: (1) mitigate the effects of past and present developments where possible (e.g., lower effluents from existing pollutant emitters); (2) mitigate the effects of the project under immediate assessment; and (3) mitigate the effects of potential future projects, or even consider not allowing them to occur when proposals come forward.

Our main point is that the focus of CEA is explicitly on the future. Whatever impacts past projects have had on the VECs are done, and cannot be undone in the sense of turning the clock back and erasing impacts. One may be able to take new mitigative actions to restore VECs to favorable conditions, but this does not mean that the past and present projects have not had impacts. Of key interest with respect to VEC sustainability is how we can secure it in the future. Therefore, dwelling on the past has relevance only in the sense of possible learning about interactions, knowledge that can be used to sharpen predictive analysis for the future.

In a nutshell, CEA done well demands the explicit creation of alternative development scenarios and analysis of potential cumulative effects associated with each one (Greig and others 2004). In practice, most CEAs have trivialized these tasks. Practitioners are minimizing effort associated with future developments. Key problems include not looking far enough into the future (e.g., only a few years), looking much too narrowly at the array of future human activities that might compromise VEC sustainability, and trying to predict a most likely development scenario.

A CEA that takes a short-term, narrowly focused, “most-likely” approach to the development future is doomed (Greig and others 2004). Because VEC sustainability is a long-term concept, short-term futures may miss vital pressures from developments just beyond the study’s horizon. Narrowly focused scenarios may miss whole sets of future activities that bring strong pressures on VECs (see also Mulvihill 2003). Trying to fix a level of likelihood on a scenario is all but impossible to do with confidence. In summary, current practice in CEA is so confined with respect to future developments that little utility may be derived from the analysis.

## Solution Options and Conclusions

The notion that there are problems with the practice of CEA in Canada is not new. Others have written about this and have provided suggestions for improving various aspects of CEA practice. Baxter and others (2001) reviewed 12 Canadian CEAs and found that

despite the distinct character of cumulative effects, approaches to CEA analysis were insufficiently distinct from EIA analysis, scoping was inadequate, and both the analysis and follow-up evaluation were weak. They recommended four corrective actions: including CEA considerations in terms of reference, using context scoping (screening VECs for their potential exposure to cumulative stresses), conducting more follow-up studies, and linking project and regional CEAs. Kennett (1999), writing about the management of cumulative effects, advocated that a proactive planning-based approach should replace the currently reactive practice, that governments should assume the primary responsibility for managing cumulative effects, that overall objectives and thresholds should be established, and that there should be a regional instead of a project-specific focus. We agree with these ideas.

We view the solutions needed to address the current problems with CEA in Canada as falling both inside and outside the legislated purview of CEA, in other words, at both the project-assessment and regional levels. Conceptually, it would be best to scrap project-specific CEA and replace it with an aggressive program involving CEAs of regional development. Unfortunately, this notion is impractical for two reasons: (1) CEA is a legal requirement of project-oriented EIA processes and abandonment of such requirements is probably politically infeasible for some time, and (2) there are as yet too few formal processes in Canada for regional development planning (or land use planning or integrated resource management) to generate usable suites of future undertakings to assess in CEA. Thus, improvements must be made at two levels of CEA application: mainly technical improvements in project-specific CEA and institutional improvements in relation to regional CEA. In other words, we need sharper CEA analysis in project EIAs, and we need to operationalize the concept of regional CEAs. We raise no technical issues unique to regional CEA. Any that arise will simply be larger and more serious versions of the various technical hurdles (e.g., data insufficiencies, shortages of funds) already identified in project-scale CEA.

In project-scale EIA, analyses should proceed on the assumption that all effects are cumulative. Indeed they are! We believe that for project-level CEA to be meaningful, it must be fully integrated throughout the entire EIA and not treated as an add-on to the end of the analysis. A concerted effort also is needed to raise the consciousness and skill sets of proponents, consultants, and regulators so that they are motivated to take a VEC-centered approach to CEA. A two-pronged approach is needed to strengthen analysis associated with uncertainty about potential future developments.

First, proponents should be required to share plans for relevant future developments. Second, practitioners must be encouraged to create and use their own development scenarios (Greig and others 2004). Analysts need to apply a systematic, incisive, participatory approach to the creation and use of development scenarios (Cornish 2004). Scenarios should be designed to help assess the consequences of uncertainty about potential future developments.

The primary application of CEA really should be in the realm of regional environmental assessments (REAs) or regional environmental effects frameworks (REEFs). The latter term appears in the most recent revisions to the Canadian Environmental Assessment Act, which suggests that project EIA may be informed by REEFs where they exist. Unfortunately, the Act does little to further redirect the practice of CEA toward this more rational form of analysis. In the long run, what we really need is a shift in the focus of CEA from project assessment to a regional assessment context. By region, we mean an area that is ecologically meaningful (e.g. watersheds, ecoregions), not one defined in terms of administrative boundaries.

A key question at this point is what constitutes the undertaking or undertakings that would be assessed in a regional CEA. In project-specific EIA, the process is mandated by the regulatory requirement for formal EIA before a project can be approved by public authorities. This means that the proposed project, whether in the conceptual stage or the final design, is the undertaking assessed. In a regional context, it may be unclear what undertaking to assess. If the regulatory setting in the chosen region is such that comprehensive land use plans or integrated resource management plans are mandated, then a CEA would apply to alternative formulations of such a plan. In the absence of such plans, those wishing to undertake CEA at a regional level may need to create their own images of the future state of development and other human activities in the region (Greig and others 2004).

In either case, to us it seems sensible to relieve many project EIAs of the major burden of CEA. Certainly, such relief should be applied to the multitude of smaller projects that must be assessed under the current legislation. If the approach to project EIAs were to shift, as we recommended earlier, to a primary focus on cumulative effects, then their integration with regional CEAs would be naturally facilitated. If it were to remain as it typically is currently, focused narrowly on project-specific impacts, then special efforts will be needed to foster such integration.

We do not believe it is realistic to try to achieve a regional level of analysis simply by making it a

requirement of project EIAs. Instead, the conduct of regionally focused CEAs should become the responsibility of governments (Kennett 2002). We do not have specific ideas on how that responsibility should and could be implemented, but comprehensive land use planning, or alternatively integrated resource management planning, would provide the ideal context for implementation of regional CEA. We raise as potential examples the Northeast Slopes Resource and Environmental Management Strategy (NESREMS) recently proposed by the Regional Steering Group (2003), and the Eastern Scotian Shelf Integrated Management initiative of Canada's Department of Fisheries and Oceans (Fisheries and Oceans Canada 2004). A project-specific requirement should remain for large projects so that their projected effects can be compared with and related to the results of the existing CEA. The public cost of doing regional CEAs could be recouped by a requirement for proponents to share in the cost as they use the results of a regional CEA and get approval to proceed with their specific developments.

Regional CEA is also more supportive of successful searches and applications of information about ecological thresholds. We believe that no such analysis should be accepted without explicit documentation of the assumptions made regarding threshold levels of stress. We consider regional assessment the appropriate mechanism for this, but in the interim, until regional assessments are in place to provide the essential context for project assessment, a similar requirement should apply to project EIAs as well.

Damman (2002) reported that despite work to develop a cumulative effects framework (including a nested approach to regional, subregional, and project-specific analysis) for the ecologically sensitive Oak Ridges Moraine in Southern Ontario, the framework was not implemented for cumulative effects management. Nor has any other comprehensive framework been implemented. Ultimately, the very best analysis of cumulative effects will be useless if it is not followed up with a vigorous monitoring program and subsequent mitigative action as warranted.

In summary, we believe that making marginal improvements in a seriously flawed system for CEA is unwarranted. We need revolution in how we undertake CEA, not evolution. It is difficult to be optimistic about VEC sustainability if CEA is not revolutionized and rendered meaningful as a tool for pursuing sustainable development. The opportunities for productive CEA work are boundless. The seizing of such opportunities is urgently needed to allow CEA to fulfill its original promise.

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