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# WHY SCIENCE MATTERS IN ENVIRONMENTAL ASSESSMENT

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It is abundantly clear that strong science helps lead to good decision-making in environmental assessment (EA) processes. Indeed, science is an important – if not integral – component of sound EA decision-making, and science-based EA exercises can assist in preventing (or at least minimizing or mitigating) environmental harm from undertakings subject to EA requirements.

This is not to say that current EA practice is perfect or above reproach at both the provincial and federal levels in Canada. This is not to say that EA works every time to stop environmentally risky or socially undesirable projects from proceeding. This is not to say that there is no room for improvement in provincial and federal EA laws, particularly in relation to public participation, assessment of cumulative effects, and other problematic aspects of current EA practice.

However, despite its well-known pitfalls and shortcomings, EA serves as an important legal tool for integrating ecological and socio-economic considerations within the decision-making process, particularly for the large-scale projects which often trigger EA requirements. When implemented in an effective, efficient and equitable manner, EA methodology can deliver positive environmental outcomes for Ontarians.

Sometimes this positive outcome takes the form of a governmental refusal to approve an environmentally risky undertaking at an unsuitable location or near sensitive receptors. In 2006, for example, Ontario's Environment Minister refused to grant EA approval for a large landfill expansion near Napanee. In reaching this decision, the Minister relied upon technical and scientific evidence from public and agency reviewers who raised groundwater/surface water concerns about disposing waste at a site containing shallow overburden, fractured bedrock, and complex flow systems.

Sometimes the positive outcome takes the form of a conditional EA approval of an undertaking that should be permitted to proceed, subject to evidence-based terms which protect the environment and safeguard the public interest. In the Timber Management Class EA hearing, for example, the EA Board recognized the importance of the province's logging industry to the provincial economy (and to local communities), but also identified the need to address the potential adverse effects arising from logging activities.

Accordingly, the EA Board approved the Class EA, subject to over 100 legally binding conditions that not only required further scientific studies in key areas (i.e. impacts on wildlife, effectiveness of certain silvicultural prescriptions, etc.), but also incrementally moved the

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Ministry of Natural Resources (and the industry) towards more sustainable forestry practices on the Crown lands of Ontario. While this conditional EA approval has since been changed into a conditional exemption (i.e. declaration order) under the EA Act, and while there remains some controversy about how well the conditions have been implemented by MNR over the years, there can be little doubt that the public and science-based scrutiny of timber management activities at the EA hearings resulted in some tangible progress on the road to sustainability.

Having been involved in the Timber Management Class EA hearing, the above-noted landfill case, and countless other provincial and federal EA processes since the mid-1980s on numerous proposals (i.e. roads, sewers, incinerators, hazardous waste facilities, nuclear power plants, radioactive waste sites, etc.), I have concluded that science matters a great deal in EA for three main reasons.

**REASON #1: The Advisory Role of Science in EA Decision-making**

In essence, EA is environmental planning, not environmental science *per se*. Nevertheless, EA is still heavily dependent upon the receipt of solid, defensible and reliable scientific input from qualified persons in a variety of disciplines.

In general terms, the decision to approve or reject an undertaking in an EA process is a policy-based decision, not a purely scientific determination. This EA decision is one that weighs the competing public and private interests at stake, and it should be informed by technical and scientific considerations, among other factors (i.e. traditional aboriginal knowledge, views of the "host" community, principle of intra-generational equity, etc.).

For example, the stated purpose of the province's EA Act is "the betterment of the people" of Ontario by providing for the protection, conservation and wise management of the environment. Suffice it to say that the concept of "social betterment" is a polycentric determination of what is in the public interest; it is not a scientific conclusion.

Similarly, under the federal EA process, if a project is likely to cause "significant" adverse effects, then it must be decided whether such effects can be "justified in the circumstances." Again, the evaluation of whether adverse effects are "justifiable" is a policy decision, not a scientific result.

Therefore, the job of the scientist in the EA process is not to make the ultimate "go/no go" decision about a particular project. Instead, the scientist's role is to ensure that sufficient facts, technical information and opinion evidence are conveyed to the EA decision-maker. This is regardless of whether the scientist works for proponents, stakeholders, or government agencies (whose scientific capacity unfortunately appears to be diminishing under recent program cuts, laboratory closures and staff reductions at both the federal and provincial levels).

In some cases, however, it may be debatable whether – or to what extent – this scientific input was duly considered, or given proper weight, by the EA decision-maker. In my experience, this is where the EA process may come into some public disrepute; that is, in situations where the EA

decision-making is perceived to be overpoliticized, or where the scientific input has been (or seems to be) ignored, discounted or glossed over by the decision-maker.

**REASON #2: EA is Predictive in Nature**

In most cases, EA typically involves making informed predictions about the likelihood and significance of the environmental effects of projects that have not yet been designed, constructed, operated or decommissioned. In short, EA attempts to evaluate the environmental pros and cons of projects that only exist on paper.

In order to make reasonable predictions about a project's potential impacts over the short- and long-term, the EA process generally requires field work, collection of baseline data, sampling/analysis, running of appropriate computer models, quality assurance/quality control mechanisms, and uncertainty analyses. It goes without saying that science has a key role to play in all of these matters in order to ensure that the EA decision-maker has the best available information.

In some cases, however, the evidentiary record may be incomplete despite best efforts, or certain outcomes or impacts may not necessarily be known with 95% scientific certainty. This is particularly true when scientists are trying to predict or assess the full range of environmental effects that may occur hundreds or thousands of years in the future. It is fair to observe that the degree of uncertainty increases with the length of the timeframes involved in the predictions. In such cases, it is incumbent upon scientists to acknowledge such uncertainties, and it is prudent for EA decision-makers to consider and apply the precautionary principle.

Moreover, if a particular project is permitted to proceed, it becomes critically important to design and implement a robust program for assessing the actual environmental effects of the project and the effectiveness of mitigation measures developed during the EA process. In short, scientifically sound monitoring regimes are necessary to verify that the original EA predictions were, in fact, correct. If new or unanticipated effects are detected, or if the effects are more significant than predicted, then this real-world information needs to be acquired and acted upon as soon as possible so that appropriate corrective actions, environmental remediation, or contingency measures can be implemented forthwith.

**REASON #3: Having EA is Better than No EA**

In recent years, some proponents and politicians have questioned the need for, or value of, EA when there are various technical or regulatory statutes which may also be applicable to a particular project. But in true EA fashion, let us consider the option (or "null alternative") of having no EA process at all.

Under this scenario, costly and risk-laden projects, such as landfills or incinerators, would likely still be proposed by proponents, but would only be examined under narrowly focused statutes, such as Ontario's *Environmental Protection Act* (EPA). While this kind of technical review may help identify and mitigate some environmental impacts, it is a far less comprehensive review than what generally occurs in EA processes. This is particularly true since the EPA definition of

"environment" is essentially limited to the natural environment (i.e. air, land and water), while the EA Act definition is considerably broader and includes the biophysical, social, cultural, economic and built environments.

More importantly, EA is (or should be) more than an impact mitigation exercise. Instead, EA is intended to take a hard long look not only at the potential impacts of the proponent's preferred alternative, but also at the impacts, advantages and disadvantages of "alternatives to" the undertaking, and "alternative methods" of carrying out the undertaking. Thus, EA can address the overarching or threshold environmental planning questions that usually do not get asked or answered under regulatory statutes:

- what is the purpose or need for the project?
- are there environmentally preferable (or less harmful) ways to address the identified problem or opportunity?
- what are the pros/cons of the "do-nothing" (or null) alternative?
- are there other better or safer sites for the project?
- does the project make an overall positive contribution to societal sustainability?
- what are the cumulative effects of this project and other existing/planned activities in the area?

In a good, open and accessible EA process, these fundamental questions should be addressed, preferably with scientific input and meaningful public participation. Under the EPA, these questions do not arise at all.

In conclusion, it should be recalled that EA is not a panacea for all environmental problems or concerns in Ontario. Indeed, it can be argued that EA has perhaps been oversold by its supporters (and unjustly criticized by its detractors), which may explain why EA sometimes has difficulty living up to heightened public expectations arising from the broad purpose statements found within Ontario's EA Act and federal EA legislation.

However, the bottom line is that EA is an important planning mechanism if Ontarians are serious about taking meaningful steps towards environmental sustainability. In my experience, good EA can and does make a difference on the ground across the province. Nevertheless, the credibility of EA decision-making depends on many factors, including the quality of scientific input gathered during the EA process.