

December 23, 2016

Members of the Expert Panel
Review of Environmental Assessment Processes
160 Elgin Street, 8th Floor
Ottawa, Ontario, K1A 0H3

Dear Ms. Gélinas, Mr. Horswill, Mr. Northey, and Ms. Pelletier,

Re: Submission to the Expert Panel Review of Environmental Assessment Processes

We are pleased to contribute this written submission to the *Expert Panel on the Review of Environmental Assessment Processes*. Previously, we submitted an open letter, co-signed by more than 1800 early-career researchers,¹ recommending five actions to strengthen environmental assessment processes. This submission builds on the open letter to address questions raised during Dr. Aerin Jacob's presentation on December 14, 2016, in Nanaimo, BC.

We recognize the importance of the information request and public and Indigenous consultation initiated by the Expert Panel, on behalf of the Government of Canada, and the urgent need to review and strengthen federal environmental assessment processes and related legislation. We echo the sentiments outlined in the Panel's Terms of Reference to "*ensure decisions are based on science, facts and evidence and serve the public's interest*". Science thrives by upholding strong standards of integrity. Carefully conducted and independent science is crucial to evaluating the consequences of proposed projects; limited or biased science will not fully reflect the benefits and risks. We also recognize that science is not the only basis upon which project decisions are made; Indigenous knowledge, Indigenous rights and title, and socioeconomic considerations also play critical roles.

Thank you for the opportunity to contribute to your review of Canada's environmental assessment processes and associated legislation. The number of signatories on our letter demonstrates the groundswell of interest that the next generation of Canadian scientists has in using their skills and knowledge to strengthen the way environment-related decisions are made. Taken together, our recommendations can help rebuild public trust in robust, open, and fair decision-making.

Sincerely,

Aerin Jacob, PhD, Liber Ero and Mitacs Fellow, University of Victoria
Michael Price, MSc, PhD Candidate, Simon Fraser University
Caroline Fox, PhD, Killam Fellow, Dalhousie University and Raincoast Conservation Foundation

Co-signed,

Colin Bailey, BNRS, MSc Student, Simon Fraser University
Travis Gerwing, PhD, Mitacs Fellow, University of Northern British Columbia
Pascale Gibeau, MSc, PhD Candidate, Simon Fraser University
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¹ www.youngresearchersopenletter.org

Recommendation 1: Seek and act on the best available evidence

Making defensible and credible inferences supported by the best available evidence includes incorporating knowledge from experiments, theory, observations, and/or modeling from multiple disciplines,^{1,2,3} collected and interpreted without influence from those who stand to gain or lose from the conclusions. We recommend that existing and potential environmental impacts of projects be assessed – with methods, results, and interpretations rigorously peer-reviewed – by parties with arms-length relationships from proponents. Where knowledge gaps impede adequately assessing risk or effects, information should be generated rather than extrapolated from limited and/or lower quality information; decisions can be adapted considering new, robust evidence.

Update: Best practices to incorporate relevant, accurate, and up-to-date information in policy decisions was developed by the *Science Integrity Project*, a two-year non-partisan initiative of over 70 diverse and experienced Canadians including scientists, Indigenous knowledge-holders, policy-makers, and practitioners. In 2015, they outlined four principles for generating and using evidence in decision-making:

- *Principle 1:* The best available evidence – produced by methods that are transparent, rigorous, and conducted with integrity – should always inform decision-making in Canada.
- *Principle 2:* Information should be openly exchanged among scientific researchers, Indigenous knowledge holders, decision makers, and the public.
- *Principle 3:* Research results should be preserved, protected, interpreted and shared in a way that is broadly understandable and accessible.
- *Principle 4:* Decision-making processes, and the manner in which evidence informs them, should be transparent and routinely evaluated.

Canadian examples where such principles have been demonstrated include: the *Health in All Policies* approach to public policy across sectors⁴; the Vancouver regional health authority's approach to drug harm reduction⁵; and the Mackenzie Valley Pipeline Inquiry⁶. More information is available at scienceintegrity.ca.

Recommendation 2: Make all information from environmental assessments permanently and publicly available.

Making raw data, reproducible analyses, and/or results readily available have rapidly become scientific best practices (subject to privacy and intellectual property laws), including by Canada's three federal research granting agencies,⁷ the European Commission,⁸ and top peer-reviewed scientific journals.^{9,10,11,12} Barring certain private and community-held knowledge, or national security implications, we recommend that publicly and permanently sharing such information in a free, searchable federal registry¹³ become a condition of environmental assessment and review processes. This will help ensure that conclusions can be verified and that data can serve as benchmarks for future studies.

Update: As outlined during our presentation to the panel, having access to raw data is critical for independently verifying conclusions, as well as providing benchmarks for future studies in the same location and contributing to large-scale studies (large spatial and temporal scales). We emphasize that the technology, skills, and spirit of sharing such information are rapidly becoming the norm in the scientific community. Currently, many – perhaps most – Canadian undergraduate students in science, technology, engineering, and math are being taught 'to code' using open-source (i.e., not proprietary) statistical software. Sharing raw data and reproducible code is becoming more common precisely because it increases efficiency of data collection and validates conclusions drawn. Options to safeguard sensitive

information can be explored (e.g., for spatial data, it can be scaled to a coarser resolution and/or GPS coordinates can be randomly shifted a specified mean distance).

Providing 'metadata', defined as a set of data that describes and gives information about other data is necessary to understand and use the raw data (e.g., resources to identify, discover, and retrieve information, how databases are constructed and stored, the conditions under which resources may be used or handled). Using a common standard facilitates data being easily found and used by both people and machines. There are numerous examples of standards and protocols for creating and using metadata, including the *Government of Canada Standard on Metadata*,¹⁴ *Canadian Heritage Information Network Museum Standards*,¹⁵ *Content Standard for Digital Geospatial Metadata of the United States Federal Geographic Data Committee*,¹⁶ and a database for publishers and funders,¹⁷ amongst others.

Previously noted exceptions aside, we emphasize that sharing data, metadata, model parameters, reproducible code to analyze data ought to be the default for environmental assessments. The onus ought to be on the proponent to thoroughly explain why an exception should be made, specifically with respect to how withholding such information is in the public interest.

Recommendation 3: Assess cumulative environmental effects from past, present, and future projects and activities across multiple scales.

Few things in society or nature occur in isolation. Although regulatory reviews consider a project's potential effects, in many cases they do not adequately consider cumulative effects (e.g., greenhouse gas emissions from product transportation and use, not just project construction and operation; interactive effects of past and future projects on human and environmental health and well-being)¹⁸. We recommend that cumulative effects be comprehensively evaluated across multiple temporal and spatial scales to inform project-level assessment, including areas under all jurisdictions and global-level effects where appropriate, and to align decision-making with provincial, national and international commitments to control carbon emissions and protect biodiversity.^{19,20}

Update: We emphasize that cumulative effects can be evaluated for individual projects (e.g., the greenhouse gas emissions from project exploration, construction, operation, and decommissioning as well as product transportation and use) as well as for a region. Strategic planning and regulatory zoning may also play a role. This might include prioritizing areas of high environmental for intensive monitoring for impacts at the highest standards available, while areas with lower ecological and higher economic priority might require a streamlined version of the EIA process. One well-known decision-support tool to guide regulatory zoning is the software *Marxan*.²¹

Recommendation 4: Work to prevent and eliminate real, apparent, or potential conflicts-of-interest by requiring public disclosure

A key component of scientific integrity includes protecting decision-making from undue influence and actual or perceived individual or institutional bias. Accordingly, we recommend that, in addition to independently conducted and reviewed assessments, all meetings among interested individuals, organizations, stakeholders, and members of the decision-making process be made public, and that all parties publicly disclose any real, apparent, or potential conflicts-of-interest.²² Greater transparency will elevate public trust that decisions are based on evidence, knowledge, and values.

Update: We emphasize that while transparency in data sharing and decision-making can greatly improve the verification and validation of conclusions, it does not remove the need to prevent and eliminate real,

apparent, or potential conflicts-of-interest.

Recommendation 5: Develop explicit decision-making criteria and provide full, transparent rationale of factors considered

Explicit decision-making criteria²³ are necessary to “ensure that decisions are based on science, facts, and evidence, and serve the public’s interest”.²⁴ Furthermore, providing a full, transparent, and cogent accounting of all the evidence presented, risks weighed, and alternatives considered would enable experts, stakeholders, and the public to evaluate the legitimacy of such decisions²⁵. When other factors are prioritized over scientific evidence (e.g., economic gains justifying environmental impacts),²⁶ the metrics and rationale for these trade-offs ought to be thoroughly and openly explained, including the spatial and temporal scales considered.

Update: Scientific methods exist to evaluate tradeoffs in multiple spheres (e.g., how a proposed activity might affect ecological, economic, social, and cultural values). The concepts of ‘ecosystem services’ (i.e., the benefits that people receive from nature, such as clean air and water, fertile soil and pollinating insects for growing crops, and flood control) and scenario planning can be useful in this regard. The benefits from nature are crucial for environmental and human health and well-being, but they are often taken for granted. For instance, an environmental assessment for an individual project might show how the production of ecosystem goods and services might change before, during, and after construction and operation; a regional or strategic environmental assessment might evaluate different scenarios of development using an ecosystem services based approach. The Millennium Ecosystem Assessment²⁷ is an example of using an ecosystem services approach at the global level. The planetary boundaries framework²⁸ can also be illustrative as it identifies environmental boundaries that, if crossed, may generate abrupt or irreversible environmental changes.

We emphasize that 1) native biodiversity must also be considered in tradeoffs-based approaches, 2) biodiversity not be relegated to lower priority than the benefits nature provides people, and 3) a key component and indeed a strength of this approach is the continued engagement of stakeholder groups providing feedback on iterative scenarios.

¹ Science Integrity Project (2015) Statement of Principles for Sound Decision-Making in Canada.

http://www.zoology.ubc.ca/~otto/SIP2015/documents/SIP_Statement_of_Principles.pdf

² InterAcademy Council (2012) Responsible Conduct in the Global Research Enterprise: A Policy Report.

<http://www.interacademies.net/file.aspx?id=19789>

³ Sutcliffe and Court (2005) Evidence-Based Policymaking: What is it? How does it work? What relevance for developing countries?

<https://www.odi.org/publications/2804-evidence-based-policymaking-work-relevance-developing-countries>

⁴ Health in All Policies <http://www.zoology.ubc.ca/~otto/SIP2015/health.html>

⁵ Insite and Vancouver’s Drug Harm Reduction Policy <http://www.zoology.ubc.ca/~otto/SIP2015/insite.html>

⁶ Mackenzie Valley Pipeline Inquiry <http://www.zoology.ubc.ca/~otto/SIP2015/mackenzie.html>

⁷ Tri-Agency Open Access Policy on Publications. <http://www.science.gc.ca/default.asp?lang=En&n=F6765465-1>

⁸ European Commission (17 Jul 2012) Commission recommendation on access to and preservation of scientific information

<https://ec.europa.eu/programmes/horizon2020/en/h2020-section/open-science-open-access>

⁹ Center for Open Science (Accessed 10 Oct 2016) The Transparency and Openness Promotion Guidelines.

<https://cos.io/top/#summary>

¹⁰ McNutt (2014) Reproducibility. *Science*, 334: 229. DOI: 10.1126/science.1250475

¹¹ Miguel et al. (2014) Promoting transparency in social science research. *Science*, 343: 30. DOI: 10.1126/science.1245317

¹² Nature (2016) Availability of data, material and methods. <http://www.nature.com/authors/policies/availability.html>

¹³ Here we specifically refer to raw data, reproducible analyses (e.g., code), results, and reports, beyond what currently exists in the Canadian Environmental Assessment Registry. <http://www.ceaa-acee.gc.ca/050/index-eng.cfm>

¹⁴ Government of Canada Standard on Metadata <https://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=18909>

¹⁵ Canadian Heritage Information Network Guide to Museum Standards, Government of Canada

<http://canada.pch.gc.ca/eng/1443536694304>

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- ¹⁶ The Content Standard for Digital Geospatial Metadata of the United States Federal Geographic Data Committee. <https://www.fgdc.gov/metadata/geospatial-metadata-standards>
- ¹⁷ BioSharing is a curated, informative and educational resource on inter-related data standards, databases, and policies in the life, environmental and biomedical sciences. <https://biosharing.org/>
- ¹⁸ Section 19.1 Canadian Environmental Assessment Act. (2012) <http://laws-lois.justice.gc.ca/eng/acts/c-15.21/page-3.html#h-13>
- ¹⁹ Convention on Biological Diversity (1992) <https://www.cbd.int/convention/text/default.shtml>
- ²⁰ Canada's Intended Nationally Determined Contribution Submission to the United Nations Framework Convention on Climate Change (2015) <http://www4.unfccc.int/submissions/INDC/Published%20Documents/Canada/1/INDC%20-%20Canada%20-%20English.pdf>
- ²¹ Marxan is the most widely used decision support software for conservation planning globally <http://marxan.net/>
- ²² US Occupational Safety and Health Administration (12 Sep 2013) Occupational Exposure to Respirable Crystalline Silica, Document 78 FR 56273. <https://www.gpo.gov/fdsys/pkg/FR-2013-09-12/pdf/2013-20997.pdf>
- ²³ Gibson et al. (2015) Fulfilling the Promise: Basic Components of Next Generation Environmental Assessment. Journal of Environmental Law & Practice. <https://ssrn.com/abstract=2670009>
- ²⁴ Trudeau (13 Nov 2015) Mandate letters to the Minister of Natural Resources, the Minister of Environment and Climate Change, and the Minister of Fisheries, Oceans, and the Canadian Coast Guard. <http://pm.gc.ca/eng/mandate-letters>
- ²⁵ Doelle (2014) The Lower Churchill Panel Review: Sustainability Assessment Under Legislative Constraints. <https://ssrn.com/abstract=2480368>
- ²⁶ CBC News (7 Oct 2016) Economic benefits of LNG project outweighed 'significant adverse' effects, cabinet decided <http://www.cbc.ca/news/politics/cabinet-decision-pacific-northwest-lng-1.3796552>
- ²⁷ The Millennium Ecosystem Assessment (MA) assessed the consequences of ecosystem change for human well-being. Their findings provide a state-of-the-art scientific appraisal of the condition and trends in the world's ecosystems and the services they provide, as well as the scientific basis for action to conserve and use them sustainably. <http://www.millenniumassessment.org/en/index.html>
- ²⁸ Planetary boundaries framework identifies conditions within which humanity can continue to develop and thrive for generations to come. Crossing these boundaries could generate abrupt or irreversible environmental changes; respecting the boundaries reduces the risks to human society of crossing these thresholds. <http://www.stockholmresilience.org/research/planetary-boundaries.html>