

# Integrated environmental impact assessment: a Canadian example

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**Abstract** The Canadian federal process for environmental impact assessment (EIA) integrates health, social, and environmental aspects into either a screening, comprehensive study, or a review by a public panel, depending on the expected severity of potential adverse environmental effects. In this example, a Public Review Panel considered a proposed diamond mining project in Canada's northern territories, where 50% of the population are Aboriginals. The Panel specifically instructed the project proposer to determine how to incorporate traditional knowledge into the gathering of baseline information, preparing impact prediction, and planning mitigation and monitoring. Traditional knowledge is defined as the knowledge, innovations and practices of indigenous and/or local communities developed from experience gained over the centuries and adapted to local culture and environment. The mining company was asked to consider in its EIA: health, demographics, social and cultural patterns; services and infrastructure; local, regional and territorial economy; land and resource use; employment, education and training; government; and other matters. Cooperative efforts between government, industry and the community led to a project that coordinated the concerns of all interested stakeholders and the needs of present and future generations, thereby meeting the goals of sustainable development. The mitigation measures that were implemented take into account: income and social status, social support networks, education, employment and working conditions, physical environments, personal health practices and coping skills, and health services.

**Keywords** Environmental health; Environmental monitoring/methods; Risk assessment; Health status indicators; Mining; Diamond; Socioeconomic factors; Culture; Aborigines; Knowledge, attitudes, practice; Intersectoral cooperation; Program evaluation; Canada (source: MeSH, NLM).

**Mots clés** Hygiène environnement; Surveillance environnement/méthodes; Evaluation risque; Indicateur état sanitaire; Industrie minière; Diamant; Facteur socio-économique; Culture (Sociologie); Indigène; Connaissance, attitude, pratique; Coopération intersectorielle; Evaluation programme; Canada (source: MeSH, INSERM).

**Palabras clave** Salud ambiental; Monitoreo del ambiente/métodos; Medición de riesgo; Indicadores de salud; Minería; Diamante; Factores socioeconómicos; Cultura; Aborígenes; Conocimientos, actitudes y práctica; Cooperación intersectorial; Evaluación de programas; Canadá (fuente: DeCS, BIREME).

الكلمات المفتاحية: صحة البيئة، الرصد البيئي، طرق الرصد البيئي، تقييم الاختطار، مؤشرات الوضع الصحي، التعدين، الماس، العوامل الاجتماعية الاقتصادية، الثقافة، السكان الأصليون، المعارف، المواقف، الممارسة، التعاون بين القطاعات، تقييم البرنامج، كندا (المصدر: رؤوس الموضوعات الطبية، المكتب الإقليمي لشرق المتوسط).

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Voir page 437 le résumé en français. En la página 438 figura un resumen en español.

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## Introduction

There is a need for economic development in both industrialized and developing countries in order for people to improve their standard of living and reach their full human potential. The challenge facing governments is to find ways to support economic development that enhances health and well-being without adversely impacting the environment.

Canada's north, made up of three territories (Yukon, Northwest Territories and Nunavut) covers an area of 3 922 000 km<sup>2</sup> characterized by a low population density (1 person per 40 km<sup>2</sup>). Compared with Canada's ten southern provinces, the northern territories have a large proportion of Aboriginals (50% vs 3%), high unemployment (13% vs 7%) and a significant number of health and well-being problems. People living in Canada's northern provinces, in particular

Aboriginals, have a holistic view of the environment and link their observations and appreciation of the physical world with the cultural and social attitudes created and supported by close interaction between the environment, health and lifestyle. The federal and territorial governments are anxious to foster development in the north that brings jobs but does not significantly change the unique culture of northern communities or impact adversely on their health, well-being or environment.

Historically, concerns raised by Aboriginals about development projects in Canada's territories include not only those of the physical environment (air, water, food, soil, and plant and animal species) but also a wide range of social, economic, cultural and health matters. Specific health and well-being topics include: socioeconomic and sociocultural stress; racism; assistance with finances and budgets (as the aboriginal

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economy is based on hunting and gathering); social diseases; personal development; self-esteem and confidence; positive mental health; and assistance to families left with one or no parents as a result of employment opportunities outside the community.

Environmental impact assessment (EIA) is a planning process used by over 100 countries to predict, assess and mitigate any significant adverse effects associated with a proposed project, programme or policy. An integrated EIA, which combines health, social, economic, cultural and psychological well-being as well as the physical, biological and geochemical environments, provides a holistic understanding of the complex interrelationships between the human and natural environments that are key to human health. Under the Canadian federal EIA process, the project proposer is responsible for preparing the impact assessment report, while the federal government is responsible for providing guidance prior to the EIA report, reviewing the report, and deciding on the fate of the project.

Approximately 6000 projects a year undergo an EIA under the Canadian Environmental Assessment Act. The general rule of thumb is that the level of effort ascribed to an assessment should be comparable to the level of potential adverse environmental effects of a project. There are thus three types of EIAs that a project can undergo: screening, comprehensive study and Public Panel Review. Screenings account for over 95% of EIAs conducted and, generally, the assessment is less intensive than for the other types. Comprehensive studies are applied to large-scale projects that have the potential to result in significant environmental effects, and the assessment is usually more rigorous. A project may be referred by the minister of the initiating department to a Public Panel Review if initial self-assessment (screening or comprehensive study) reveals that a project is likely to cause significant adverse environmental effects and cannot be justified in the circumstances; if a degree of uncertainty remains regarding a project's potential adverse effects; or if public anxiety warrants consideration of the project by a wider public review.

## Assessment process for a diamond mining project

In 1994, BHP Diamonds Inc. (part of BHP Billiton, one of the world's largest diversified resources companies) proposed to develop Canada's first diamond mine in the Northwest Territories (NWT). As the mining industry in general — and, specifically, the diamond industry — is one of the few bright spots in an otherwise bleak NWT economy, the NWT Diamonds Project proposal was of critical importance to the territorial government as well as to the federal government. In view of the uncertainty of the potential adverse environmental effects and the level of public concern arising from the project, the Minister of the Department of Indian Affairs and Northern Development (DIAND) decided to refer the project to the Minister of the Environment for Public Panel Review.

The Minister of the Environment appointed four people to serve as Panel members to conduct the review of the project. Panel members are selected according to their knowledge and expertise relevant to the particular project under review, and care is taken to ensure that there are no conflicts of interest with members' current employment to taint the independence of the Panel. The Panel was chaired by a lawyer from Calgary

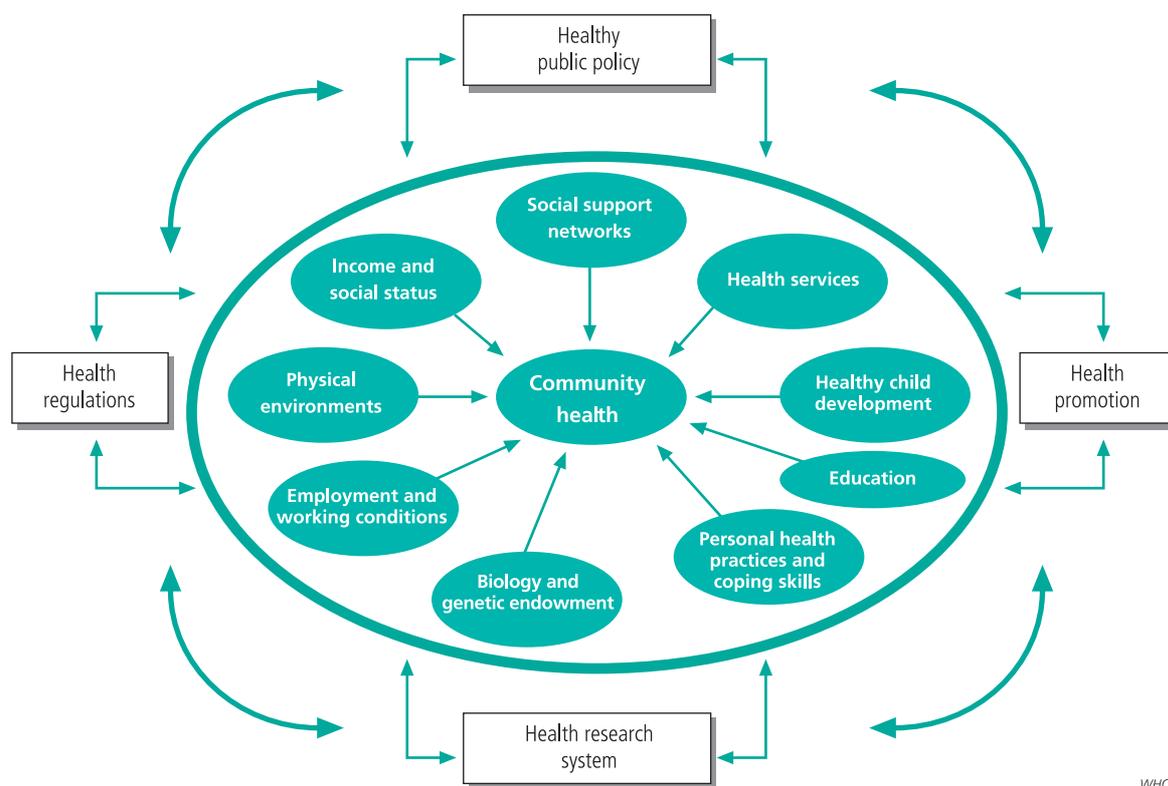
with considerable experience in dealing with northern, aboriginal and environmental issues. The other three members were: an adviser on aboriginal issues from Yellowknife, a retired professor of geological services from the University of Saskatchewan, and an economic policy consultant from Yellowknife. The Panel is not a decision-making body, but serves as an adviser with the mandate to review the environmental consequences of a project, report on its findings, and make recommendations to the Minister of the Environment.

The Public Review Panel specifically instructed BHP Diamonds Inc. to determine how to incorporate traditional knowledge into the gathering of baseline information, preparing impact prediction, and planning mitigation and monitoring, and to include reference to the socioeconomic environment in their environmental impact report. Traditional knowledge is defined as the knowledge, innovations and practices of indigenous and/or local communities developed from experience gained over the centuries and adapted to local culture and environment. Traditional knowledge is usually intensely local in its factual information and draws on a very long-term information base (1). The determinants of health (2) have become the cornerstone of Canada's approach to health and socioeconomic impact assessment (3, 4). They provide the integrated impact assessment framework detailed in the *Canadian handbook on health impact assessment* (5), which gives national guidance on the integration of health and socioeconomic impact assessment within an EIA. All nine determinants of the assessment framework (Fig. 1) do not warrant detailed review in all projects, programmes and policies, but all of them should be considered.

One of the first tasks of any Public Review Panel is to consult technical experts and the general public to determine the nature and scope of matters to be considered. All federal departments with expertise pertinent to the project are also invited. In March and April 1995, scoping meetings were held in ten NWT communities likely to be affected by the project. With the information obtained from 125 presenters, the Panel developed guidelines for the preparation of the EIA report, in which the proposer must deal with all the points outlined in the guidelines to the satisfaction of the Panel. Failure to do so will only serve to hinder the process, since the Panel can ask for additional information to be provided in order to conform to the guidelines. For this mining project, the guidelines made specific reference to the health and socioeconomic environments. Under this umbrella, the company was asked to consider: health, demographics, social and cultural patterns; services and infrastructure; local, regional and territorial economy; land and resource use; employment, education and training; government; and other matters and concerns relevant to the assessment of project effects.

Over a three-month period, BHP's eight-volume EIA report of more than 5000 pages (6) was then reviewed by the Public Review Panel to determine its adequacy (i.e., whether it provided the information required by the guidelines) and completeness prior to the commencement of the public hearings. Public hearings are not legal proceedings but serve to allow the Panel to receive feedback from the public. In January and February 1996, 18 days of public hearings were held in the project area, so as to be accessible to the local communities that stood to be most affected by the project.

Fig. 1. Model of determinants of health within an integrated impact assessment



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Once the public hearings were completed, the Panel prepared a final report to the Minister of the Environment containing its findings, conclusions and recommendations. The report was made public shortly thereafter and the Panel was disbanded, as unique review panels are created for every project reaching this phase.

The Panel concluded that the environmental effects of the NWT diamond mining project were largely predictable and could be mitigated, and that those effects not predicted could be monitored under the proponent's environmental management plan. It was the view of the Panel that the project would be significantly beneficial to the northerners and economically lucrative for the north, subject to certain provisions. In total, the Panel made 29 recommendations focusing on subjects such as land claims, aboriginal rights, traditional knowledge, monitoring of the environmental and socioeconomic programmes, environmental management plans, mine site security, air quality, water quality, affected wildlife, employment and compensation. The Minister of the Environment and the Minister of the Department of Indian Affairs and Northern Development then responded publicly to the Panel's recommendations. Final decision on the project proposal was taken by Cabinet: all 29 recommendations were accepted by the federal government, and Cabinet approved the project. Upon approval of the project, BHP continued to work with the community and government and has signed Impact and Benefit Protocols with the Kitikmeot Inuit Association and the Métis Nation-Northwest Territories covering revenue sharing, environmental monitoring and socioeconomic aspects, and has publicly stated its commitment to sustainable development.

## Mitigation measures and their implementation

An overview of the application of seven of the determinants of health in the diamond mine project framework is given below, describing briefly how they were taken into account by the mining company. In addition, prior to and independent of the Public Panel Review process, the company made extensive efforts to consult with community stakeholders to ensure that environmental, health and socioeconomic issues were identified and that industry–community mitigation measures were developed.

### Income and social status

The NWT Diamonds Project created over 1000 construction jobs and resulted in over 700 permanent jobs, making BHP the largest private sector employer in the territory. Over 60% of the jobs created were specifically staffed by northern residents, half of them going to Aboriginals. The project has reduced unemployment in the NWT by almost 3%.

### Social support networks

Community meetings, open houses and cross-cultural training workshops were held, in order to share cultural concerns and to minimize any potential conflict between northern residents and newly introduced workers from other parts of Canada. Shift rotation of two weeks in and two weeks out (with aboriginal employees flown from their home communities) allowed aboriginal workers to stay within their communities. Permanent roads were kept to a minimum to prevent a major influx of new settlements and to preserve traditional

relationships with the land. Aboriginal elders were invited to participate in archaeological field programmes to locate, protect and avoid aboriginal burial sites. The elders also participated in environmental workshops.

### Education

A university undergraduate scholarship programme of Canadian \$ 5000 (approximately US\$ 3500) per year per student was established for aboriginal students to ensure a pool of professional staff within the local area. Preferential hiring of Aboriginals (including the relaxation of strict minimum educational employment standards) and on-site job training enhanced the skill sets and employability outside the mining sector of local residents.

### Employment and working conditions

The company put into place a progressive occupational health and safety policy. Compliance with all applicable laws, regulations, codes and standards relating to occupational health and safety is an integral part of this policy. The policy includes follow-up monitoring to establish trends and improve the state of knowledge regarding health and worker safety.

### Physical environments

An environmental management plan and adaptive management strategy were developed, to ensure compliance with all legislative and regulatory requirements. The plan focuses on: the safe and permanent storage of process plant tailings and mined-out pits; the management and proper disposal of domestic and other wastes; construction and operation of the project in such a manner as to minimize environmental disturbance; and the development of a plan for appropriate site reclamation, decommissioning and closure. Aerial and land sightings of wildlife are logged and reported. Employees and contractors are informed of the presence of wildlife in the project area and informed of the animals' seasonal habits, in order to minimize human-animal interactions for the safety of both.

### Personal health practices and coping skills

Community-based committees were established by the mining company to deal with drug and alcohol abuse, family violence, sexually transmitted diseases and other social problems. A policy mandating a drug-free and alcohol-free workplace was created, and an HIV/AIDS policy for education and effective handling of AIDS and HIV-related personnel issues was put in place. An employee assistance programme was established to provide advice and assistance for employees on an additional range of issues including work-related stress management and financial management as, traditionally, aboriginal communities have not been a money-based society.

### Health services

BHP has drawn on project revenues to invest in the social and human resource capital of the NWT, and all employees were incorporated into a health care plan. In addition, the company has worked with aboriginal communities to ensure that their traditional health care practices are respected and utilized as part of the health care plan.

### Conclusions

EIA must involve more than identifying, assessing and mitigating the negative environmental impacts. It must also identify and mitigate perceived concerns and enhance, where possible, the positive aspects of a project. Environmental, health and social consequences of development activities contribute valuable information to each other and draw extensively on comparable and closely interrelated data. The health of the environment is clearly an important aspect of a community's health, but it is not the only determinant. How individuals, families and communities are affected by development, and the social consequences of that development, provide critical information for health professionals. Similarly, knowledge of the impacts on the quality of life and health of individuals, families and communities is vital to social scientists.

Integration of health, social and environmental considerations into a holistic impact assessment of projects, programmes and policies would facilitate decision-making in an integrated manner fully consistent with the recommendations made in Agenda 21. Such assessment can be a cost-effective strategy: when adverse effects on health and well-being can be minimized or prevented from occurring, an additional burden on health care services associated with the project is avoided.

By assessing the human dimensions, costly expenses for mitigation, remedial action and compensation may be avoided. This is accomplished by employing a more holistic approach: by effectively soliciting and elucidating public concerns and examining and evaluating potential changes to the human environment, the consequences may be thoroughly determined. The costs of conducting an integrated impact assessment are likely to be considerably less than those of remedying health, social and environmental impacts were they to occur unexpectedly.

A properly designed impact assessment that integrates health, well-being, social and environmental considerations generates a holistic assessment; it reduces duplication of data and information resources, avoids potential inconsistencies, and enhances financial efficiency, strengths, complementarities and the value of health, social and environmental sciences in proposed project, programme or policy decision-making (7). ■

**Conflicts of interest:** none declared.

## Résumé

### Evaluation intégrée de l'impact sur l'environnement : un exemple canadien

Les méthodes d'évaluation de l'impact sur l'environnement (EIE) utilisées par le Gouvernement fédéral canadien intègrent des aspects sanitaires, sociaux et environnementaux et consistent en un examen préalable, une étude approfondie ou une « enquête d'utilité publique », tenant compte de la gravité escomptée des effets susceptibles de nuire à l'environnement. L'enquête d'utilité

publique a étudié un projet d'extraction de diamants qu'il est proposé d'implanter dans les territoires du Nord du Canada, où la moitié de la population est aborigène. Les experts ont enjoint l'initiateur du projet de voir comment les connaissances traditionnelles pourraient servir à rassembler les données de base, à établir des prévisions d'impact et à prévoir des mesures palliatives

et de surveillance. On entend par connaissances traditionnelles les connaissances, méthodes novatrices et pratiques des communautés indigènes et/ou locales accumulées pendant des siècles et adaptées à la culture et à l'environnement local. La société d'exploitation minière a été priée d'étudier dans le cadre de l'EIE les éléments suivants: schémas relatifs à la situation sanitaire, démographique et socioculturelle; services et infrastructure; économie locale, régionale et territoriale; utilisation des sols et des ressources; emploi, éducation et formation; gouvernement; et

autres éléments. Des efforts collectifs entre le Gouvernement, l'industrie et les collectivités ont abouti à un projet rassemblant les préoccupations de toutes les parties intéressées et les besoins des générations présentes et futures, respectant ainsi les objectifs du développement durable. Les mesures palliatives mises en œuvre tiennent compte du revenu et du niveau social, des réseaux d'appui sociaux, de l'éducation, de l'emploi et des conditions de travail, de l'environnement physique, de l'hygiène de vie, de la faculté d'adaptation et des services de santé.

## Resumen

### Evaluación integrada del impacto ambiental: un ejemplo del Canadá

Los procedimientos federales canadienses de evaluación del impacto ambiental (EIA) integran aspectos sanitarios, sociales y ambientales y consisten en un análisis, estudio detallado o revisión llevado a cabo por un cuadro de expertos público, teniendo en cuenta la severidad prevista de los posibles efectos ambientales adversos. El Cuadro de Expertos Público examinó un proyecto de extracción de diamantes propuesto en los territorios del norte del Canadá, donde el 50% de la población es aborígen. El cuadro de expertos instruyó específicamente al proponente del proyecto para que determinase la manera de incorporar los conocimientos tradicionales en la recopilación de la información de partida, la preparación de la predicción del impacto y la planificación de las medidas de mitigación y monitoreo. Se define como conocimientos tradicionales el conjunto de conocimientos, innovaciones y prácticas de las comunidades indígenas y/o locales acumulado a lo largo de siglos y adaptado a la cultura y el medio

ambiente. Se pidió a la empresa minera que considerara en su EIA lo siguiente: los perfiles de la situación sanitaria, demográfica, social y cultural; los servicios y la infraestructura; la economía local, regional y territorial; el uso de la tierra y los recursos; el empleo, la educación y la capacitación; el gobierno, y otros aspectos. Los esfuerzos de cooperación entre el gobierno, la industria y la comunidad desembocaron en un proyecto que coordina las preocupaciones de todos los interesados directos y las necesidades de las generaciones presentes y futuras, respetando así las metas de desarrollo sostenible. Las medidas de mitigación que se han implementado tienen en cuenta los ingresos y la posición social, las redes de apoyo social, la educación, el empleo y las condiciones de trabajo, los entornos físicos, las prácticas de salud personales y las aptitudes individuales para hacer frente a situaciones difíciles, y los servicios de salud.

## ملخص

### تقييم التأثير البيئي المتكامل، مثال من كندا

تأخذ في اعتبارها عند وضعها للتقييم للتأثير البيئي كلاً من النماذج البيئية والثقافية والاجتماعية والسكانية والصحية، والخدمات والبنية الأساسية، والاقتصاد على الصعيد المحلي والإقليمي وعلى صعيد المقاطعة، واستخدام الأرض والانتفاع من الموارد وفرص العمل، والتعليم والتدريب، والحكم وغير ذلك من القضايا. وقد أدت الجهود المتضافرة التي ساهم فيها كلٌّ من الحكومة وأصحاب الصناعة والمجتمع إلى التنسيق بين اهتمامات جميع أصحاب المصالح من المؤثرين في المجتمع وبين الاحتياجات للأجيال الحاضرة والمستقبلية، مما يؤدي إلى تحقيق المرامي للتنمية المضمونة الاستمرار. إن إجراءات التخفيف التي تم تنفيذها أخذت في اعتبارها: الدخل والوضع الاجتماعي، وشبكات الدعم الاجتماعي، والتعليم، وفرص العمل، وحالات وظروف العمل والبيئة الفيزيائية والممارسات الصحية الشخصية ومهارات التأقلم مع ظروف العمل، والخدمات والمرافق الصحية.

إن العملية الفيدرالية (الاتحادية) الكندية لتقييم التأثير البيئي يندرج فيها كلٌّ من الجوانب الصحية والاجتماعية والبيئية لتكوين دراسة مسح أو دراسة شاملة أو دراسة مراجعة يقوم بها فريق من القطاع العمومي؛ وذلك اعتماداً على الشدة المتوقعة للتأثيرات البيئية الضائرة. وفي هذا المثال استعرض فريق المراجعة من القطاع العمومي مقترح لمشروع في منجم للماس في المقاطعات الكندية الشمالية، حيث يشكل السكان الأصليون نصف مجمل السكان. وقد أعطى فريق العمل تعليمات خاصة لمن اقترح المشروع لتحديد كيفية إدماج المعارف التقليدية الشعبية في مجموعة المعلومات الأساسية، والتنوُّ بالتأثير المتوقع والتخطيط لتخفيف وطأته والمراقبة. وقد عُرِّفَت المعارف الشعبية بأنها المعارف والابتكارات والممارسات التي تطوّرت في المجتمع المحلي لدى السكان الأصليين مع أو بدون السكان الآخرين، مدى القرون المتلاحقة، وتلاءمت مع الثقافة والبيئة المحلية. وقد طلب من الشركة التي تدير المنجم أن

## References

1. Emery A.R. *Integrating indigenous knowledge in project planning and implementation*. Joint publication of the International Labour Organization, The World Bank and the Canadian International Development Agency. Ottawa: KIVU Nature Inc.; 2000.
2. Federal, Provincial, Territorial Advisory Committee on Population Health. *Strategies for population health: investing in the health of Canadians*. Meeting of the Ministers of Health, Halifax, Nova Scotia, 14–15 September 1994. Ottawa: Ministry of Supply and Services Canada; 1994.
3. Kwiatkowski RE, Gosselin P. Promoting human impact assessment within the environmental assessment process: Canada's work in progress. *International Journal of Health Promotion and Education* 2001;8:17-20.
4. Kwiatkowski RE. Health impact assessment: miles to go before we sleep. In: *Environmental assessment yearbook: the EA agenda for Johannesburg and beyond*. Manchester: Institute of Environmental Management and Assessment, University of Manchester; 2002. p. 34-7.
5. *Canadian handbook on health impact assessment*. Ottawa: Environmental Health Assessment Services, Health Canada; 1999. Three-volume set available from: [www.hc-sc.gc.ca/oeha](http://www.hc-sc.gc.ca/oeha) (English) and [www.hc-sc.gc.ca/behm/](http://www.hc-sc.gc.ca/behm/) (French).
6. Canadian Environmental Assessment Agency. Available from: [www.ceaa.gc.ca/0009/0001/0001/0015/0001/nr960621\\_e.htm](http://www.ceaa.gc.ca/0009/0001/0001/0015/0001/nr960621_e.htm)
7. Rattle R, Kwiatkowski RE. Defining boundaries: health impact assessment and social impact assessment. In: Becker HA, Vanclay F, editors. *The international handbook of social impact assessment*. Northampton (MA): Edward Elgar Publishing Ltd.; 2003. ISBN 1-84064-935-6.